Catheters issues – New thinking

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Catheter issues

- Bacterial colonization
- Recurrent and chronic infections
- Bladder stones
- Septicaemia
- Damage to the kidneys, the bladder and the urethra
- Contribute to the development of antibiotic resistance
- Autonomic dysreflexia in spinal patients

Sounds obvious?

- The need for a catheter should be regularly reviewed
- Indwelling catheters should removed as soon as possible
- Healthcare professionals need to be able to explain/discuss the need for continued catheterisation with the individual
- Indwelling catheters should be changed only when clinically necessary or in accordance with manufacturers guidelines
- Consider intermittent catheterisation
- Suprapubic catheterisation is a better option for long-term

Infection definitions

- Urinary tract infection is broadly defined as an infection of the urinary system by microorganisms, with signs and symptoms that can be attributed to an infection and which may involve both the upper and lower urinary tracts (Ninan et al 2014, Sobel and Kaye, 2010).

- Bacteriuria, is defined as the presence of bacteria in the urine.
- Asymptomatic bacteriuria, the presence of bacteria in the urine without the typical signs and symptoms of a UTI (Ninan et al 2014).
- Bacteraemia - the presence of bacteria in the blood

Infection

- About 50% of patients catheterised for longer than 7-10 days contract bacteriuria
- Although frequently asymptomatic - 20 to 30% of patients with catheter-associated bacteriuria will develop symptoms of CAUTI.
- Once a CAUTI has developed there is a 1 to 4% risk of developing bacteraemia with an associated mortality rate of 13 to 30%.
- The NHS in England spent £434 million in 2013/14 on treating 184,000 hospital admissions for a urinary tract infection.

Symptoms of CAUTI

- Confusion/or delirium-like state
- Agitation
- Hallucinations
- Other behavioural changes –e.g. lethargy, loss of consciousness and disorganised speech
- Loss of motor skills or dizziness
- Falling
- Changes in the colour and odour of the urine
- Anorexia
- Low abdominal pain
- Constipation

(Rowe and Juthani-Mehta 2013, Cove-Smith and Almond 2007, Robichaud and Blondeau 2008).

Infection (cont)

- Symptomatic catheter-associated UTI (CA-UTI) cannot be differentiated from asymptomatic bacteriuria on the basis of urine analysis with dipstick tests.

- Dipstick testing should not be used to diagnose UTI in catheterised patients.

- Urine samples should only be sent for laboratory culture if the patient has clinical signs & symptoms, not because the appearance or smell of the urine suggests that bacteriuria is present.

Infection

- If an indwelling catheter has been in place for >2 weeks at the onset of CA-UTI and is still indicated, the catheter should be replaced prior to commencing antibiotics to hasten resolution of symptoms and to reduce the risk of subsequent CA-UTI.

- The urine for culture should be obtained from the freshly placed catheter **prior to** the initiation of antimicrobial therapy.

- Urine samples must be obtained aseptically from the sampling port, culture specimens should not be obtained from the drainage bag

Infection prevention

- Maintaining a sterile, closed urinary drainage system is central to the prevention of CAUTIs.

- Do not offer prophylaxis antibiotics routinely when changing long term indwelling urinary catheters. Where there is a history of UTI after catheter change or trauma during catheterisation appropriate prophylaxis antibiotics should be considered under specialist advice.

- Cranberry juice and cranberry capsules have been considered to prevent or treat UTI, although the usefulness in older adults is disputed (Beveridge et al, 2011, Jepson et al 2012).

Prevention (cont)

- Intermittent catheterisation should be used in preference to an indwelling catheter if it is clinically appropriate and a practical option for the patient
- No patient should be discharged or transferred with a short-term indwelling urethral catheter without a plan documenting the:
  - Reason for a catheter
  - Clinical reasons for continuing catheterisation
  - Date of removal or review by a appropriate professional overseeing their care

HOUDINI indicators

H – Haematuria

O – Obstruction – urinary

U – Urology surgery

D – Decubitus ulcers – open sacral sore or perineal sore in an incontinent patient

I – input / output monitoring

N – Not for resus / comfort care

I – Immobility due to physical constraints

Fluid intake

- The amount of fluid required by an individual varies depending on:
  - the individual weight - calculated as 25-35ml/kg/day (Benelam and Wyness (British Nutrition Foundation), 2010)
  - the amount of fluid loss (such as in sweat or diarrhea),
  - the amount taken in through the diet and the individual renal and circulatory status (Geng et al, 2012).

Catheters should be regularly monitored to ensure a drainage output of 50-100mls /hr is maintained (Geng et al, 2012).

Hygiene

- Typically described as perineal care.
- Involves cleansing around the individual genitalia and the anus.
- An individual should always be cleansed from the “front-to-back”, i.e. from the symphis pubis towards the anus.
- Warm water and a clean washcloth are recommended with a clean side (or clean cloth) being used for each wipe.
- The external portion of the catheter should also be cleansed using a wipe away from the patient and down the catheter tubing.
- Evidence suggests that general hygiene with water is sufficient, as the use of disinfectants and soap can lead to urethral irritation and discomfort (Simmerville., Maxted and Pahira, 2005 and Cunha et al, 2013).

Treatment of Infection

- Trimethoprim or nitrofurantoin first line (or alternatively pivmecillinam)
- The choice between these medications and length of treatment should be based on the patient (allergy status, tolerability and compliance) and local guidelines.
- For those patients for whom trimethoprim or nitrofurantoin are unsuitable amoxicillin, ampicillin or an oral cephalosporin should be prescribed
- For complicated UTI Treatment for 7-14 days is generally recommended, but can be prolonged for up to 21 days, according to the clinical presentation (Joint Formulary Committee 2016, Grabe et al 2015).

Considerations

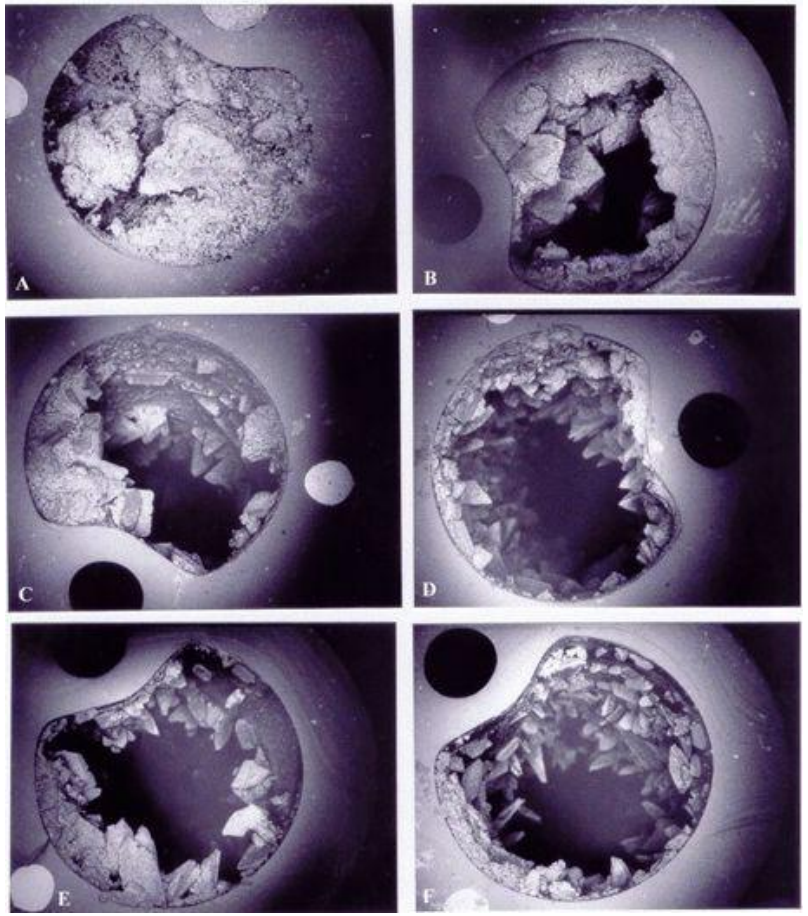
- Although *E. coli* has low resistance rates to nitrofurantoin, other *Enterobacteraciae* species, more common in older adults, may have intrinsic resistance to nitrofurantoin (Rowe and Juthani-Mehta 2013)
- Many antibiotics are excreted via the kidneys – therefore renal function is an important consideration - Older patients have reduced renal function (eGFR)

- The Health Protection Agency guidelines for primary care (2016) recommend first line treatment with nitrofurantoin if the GFR is over 45ml/min and where GFR is 30-45 if there is resistance or no alternative
- Where there is an increased risk of resistance, or the GFR is < 45ml/min or the patient is elderly pivmecillinam or alternatively fosfomycon should be considered

Catheter materials

- Infection risks similar with latex or silicone, and whether or not there is a hydrogel coating
- Individual with long-term catheters have decreased frequency of obstruction with silicone catheters – attributed to larger drainage bore size (not material)
- Silver alloy coating does not decrease frequency of CAUTI long term
- Nitrofurazone coated catheters have been reported to be associated with a small decrease in CAUTI, but are accompanied by more frequent catheter removal and increased catheter discomfort
- Antibacterial/antimicrobial impregnation/coating-Evidence supporting effectiveness negligible

Crystal formation/catheter blockage



- Unplanned hospital admissions for blocked catheters cost the NHS approximately £18 million per year

- ***CCGs spent an average of £84,609 per year on unplanned admissions for blocked catheters alone.***

The Medical Technology Group. Admissions of failure. The truth about unplanned NHS admissions in England. 2015. Available at: http://www.mtg.org.uk/unplannedadmissons.

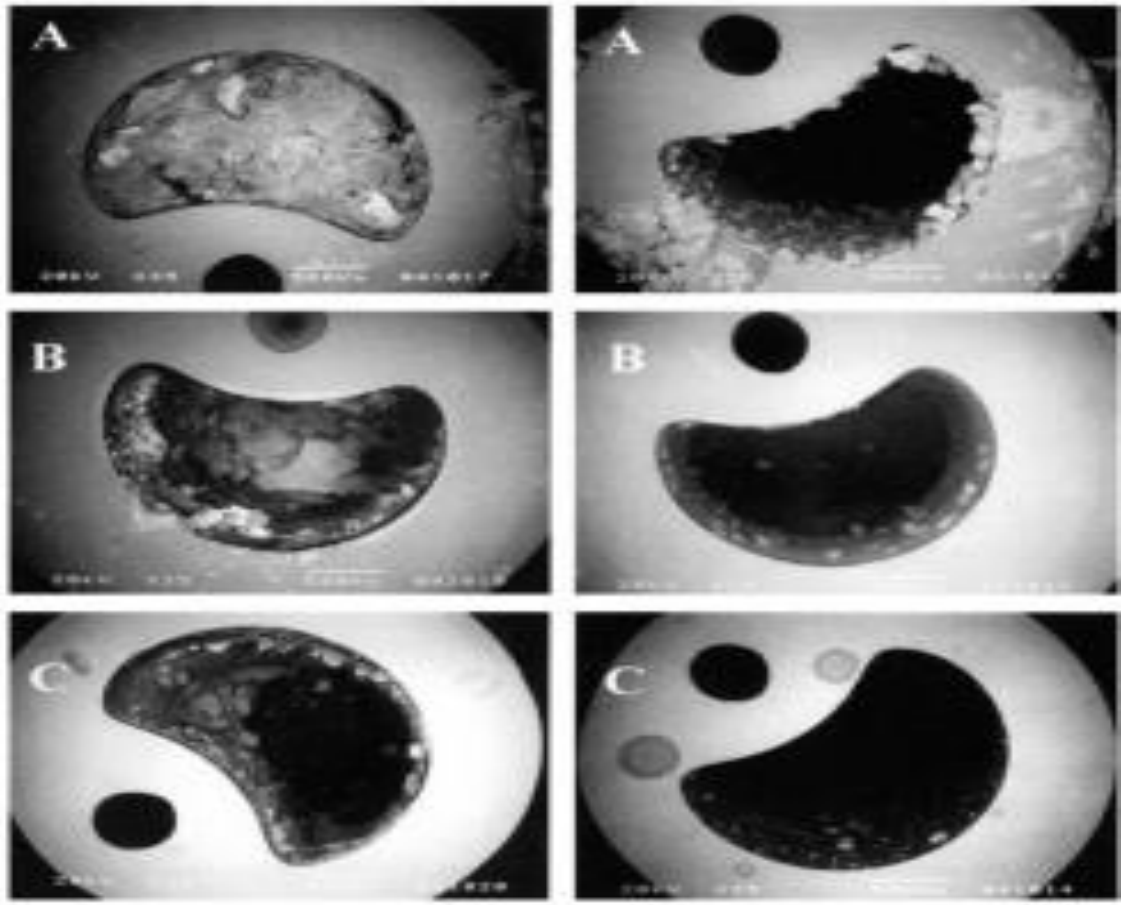
Management of Catheter blockage

- A cochrane review undertaken by Hagen., Sinclair and Cross (2010) concluded that there insufficient evidence to support the use of catheter "washouts" for infection prevention
  - However since the evidence was inconclusive catheter maintenance solutions remain an option to be determined on an individual resident basis in discussion with the clinical team (Geng et al, 2012).
- There are suggestions that potassium citrate supplementation, cranberry juice and lemon juice supplements all reduce the incidence and severity of catheter encrustation.
  - However only lemon juice supplements and increasing fluid intake have been demonstrated to reduce the incidence and severity of catheter encrustation (Geng et al, 2012 and Hagen., Sinclair and Cross, 2010 and Morris and Stickler, 2001).
- Maintaining dilute urine has been shown to reduce encrustation

Triclosan (*Farco-fill® Protect*)

- Use of the broad spectrum antimicrobial Triclosan in catheter balloons, may prolong the drainage time of the catheter (Sperling et al, 2014).
- Most encrustation caused by urease-producing bacteria, particularly *Proteus mirabilis* – particularly sensitive to Triclosan, which destabilises the bacterial membrane
- Triclosan diffuses into the bladder helping reduce bacterial colonisation.
- May also minimise or even eliminate the need for catheter maintenance solutions, avoiding disruption to the closed drainage system.

Catheter Valve versus continuous drainage?



Continuous drainage

Drainage regulated by an automatic valve at 4h intervals

Bladder spasm/Urethral leakage

- Usually related to Detrusor over-activity
- Reduced bladder compliance →
  - pain from spasm
  - Incontinence – particularly in women with suprapubic catheters

- Treat with:
  - anticholinergic/antimuscarinic medication
  - or intravesical botulinum toxin injections

Medication options – OAB

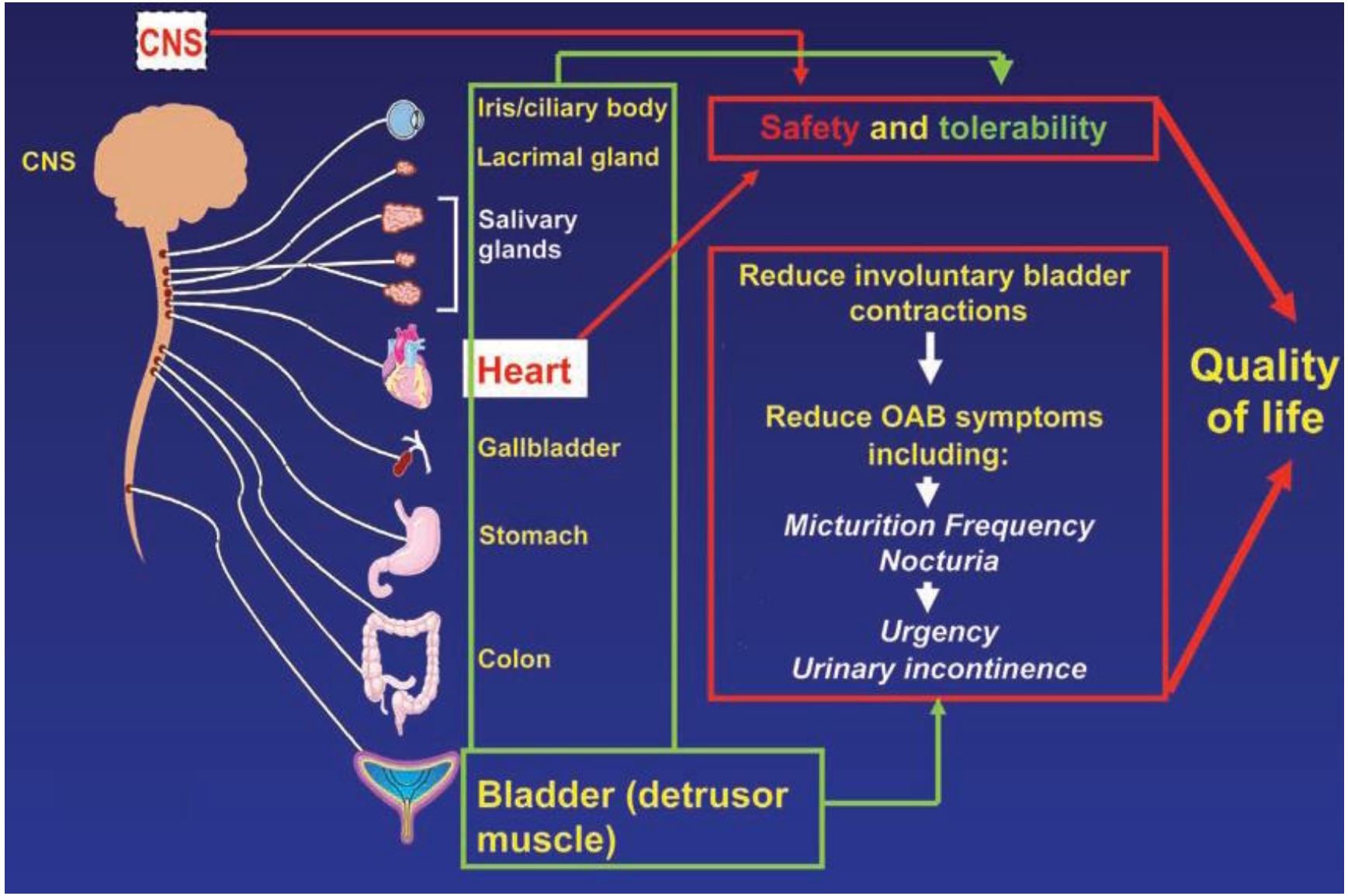
Antimuscarinic/Anticholinergic drugs choices:

- Darifenacin
- Fesoterodine fumarate
- Flavoxate Hydrochloride
- Oxybutinin Hydrochloride
- Propiverine Hydrochloride
- Solifenacin succinate
- Tolterodine tartrate
- Tropsium chloride

Mode of action

- Acetylcholine main neurotransmitter in bladder
- Drugs are competitive antagonists within smooth muscle
- Inhibiting micturition
- Some are M_3 selective – darifenacin
- Others are non-selective – oxybutynin, tolterodine

Side effects

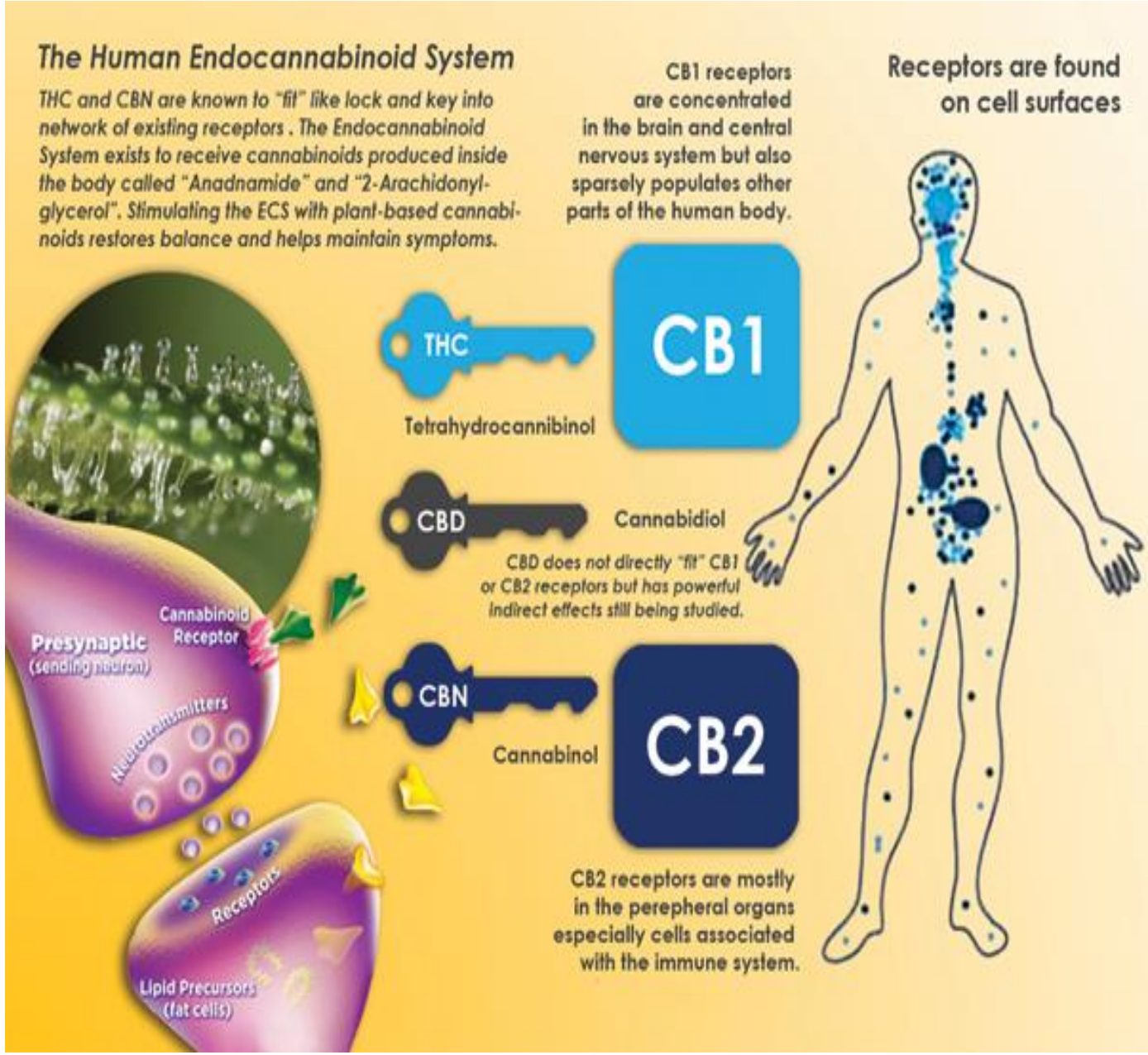


$BETA_3$ Adrenoceptor Agonists

- Mirabegron (Betmiga- MR) - potent and selective beta 3-adrenoceptor agonist → relaxation of bladder smooth muscle
- Side effects: GI disorders, ↑Blood pressure
- Mirabegron should be offered if 'antimuscarinics' do not work, if they are not suitable, or their side effects are unacceptable
- Combination therapy an option for anticholinergic-resistant neurogenic bladder
- No evidence for use with catheterised patients?

Cannabis?

- Sativex®, a sublingual spray made from cannabis
- Target the peripheral CB_1 and CB_2 receptor system in lower urinary tract
- Studies in MS patients promising



How do you choose?

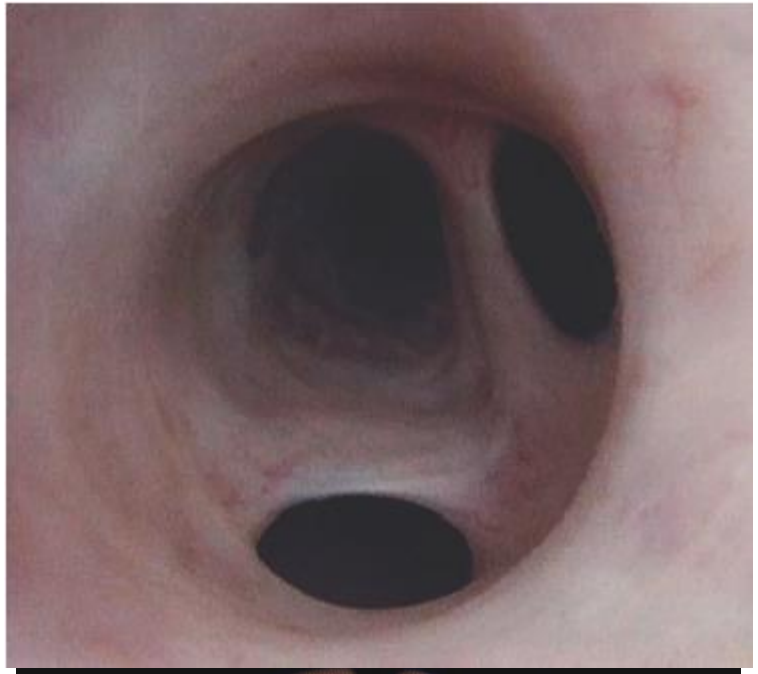
- Take into account pre-existing conditions
- Use of other anticholinergic medications
- Risk of adverse effects and common side effects

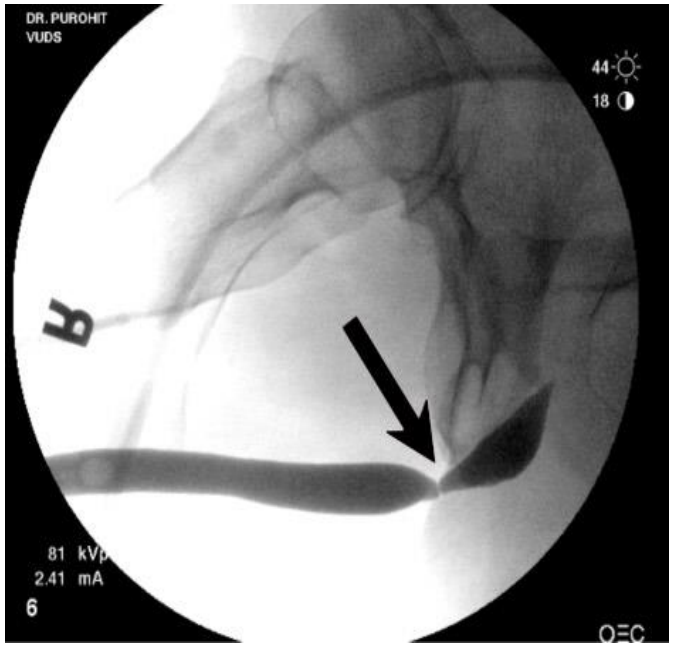
- Also consider
  - The likelihood of success
  - Frequency and route of administration
  - Some adverse effects may indicate treatment is starting to have an effect
  - May not see full benefit for 4 weeks

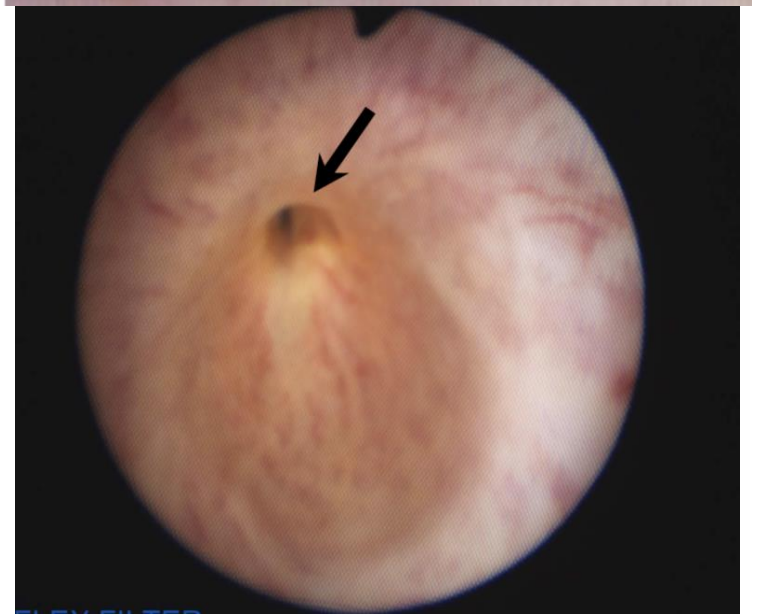
Urethral Stricture and false passage

- Incidence increases with time
- Due to repeated catheterisation/traumatic catheterisation

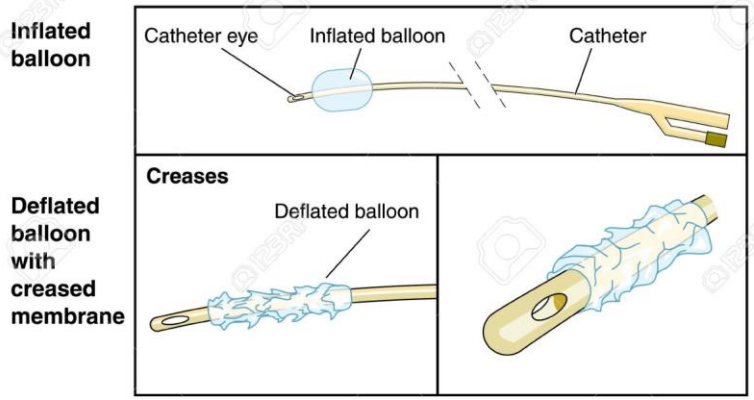
- Symptoms:
  - New-onset Haematuria
  - Pain on catheterisation
  - UTI







Unable to remove catheter?



- Particular problem with suprapubic catheters
- Caused by “cuffing” or encrustation

Options

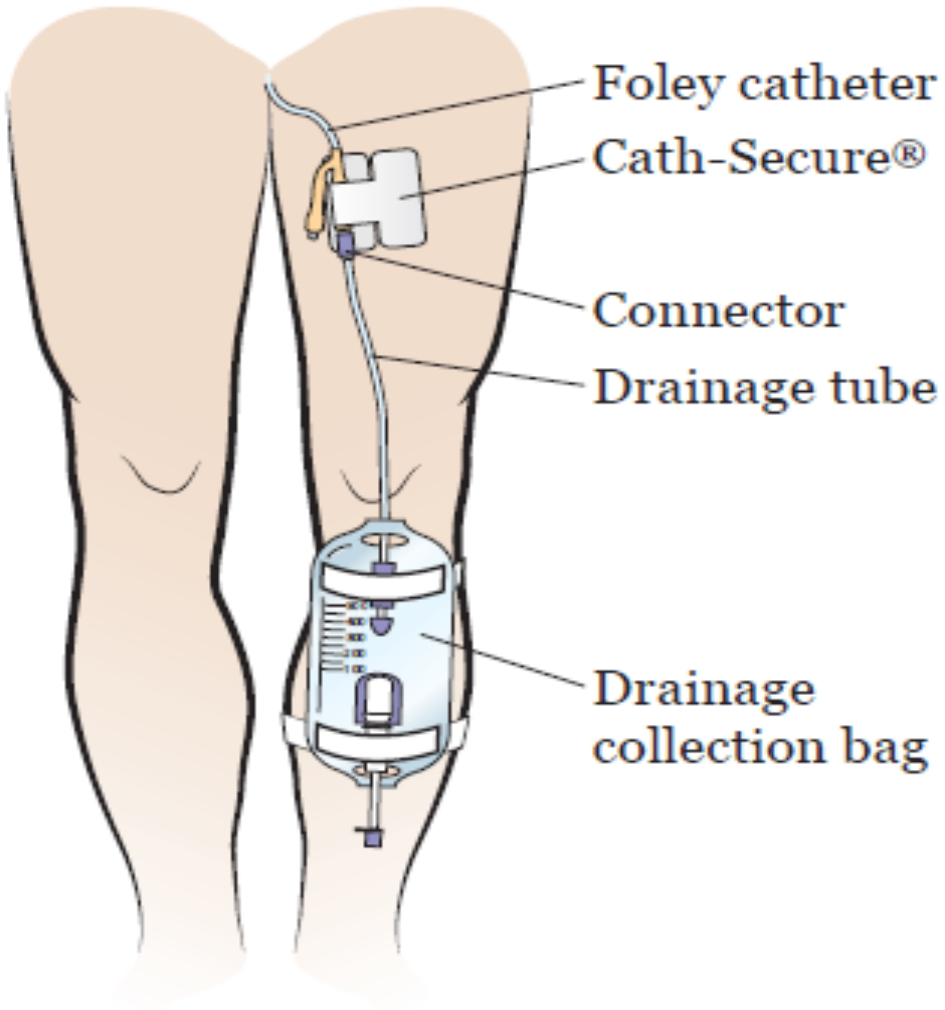
- Do not attempt to burst the catheter balloon by overinflating it.
- Do not cut the catheter or the inflation arm.
- Leave the syringe in place and allow slow seepage. This can take up to 20 minutes.
- Check if the patient is constipated.
- Try another syringe. The syringe may be faulty.
- Insert 1-2mL of sterile water and draw back. This demonstrates the patency of the inflation channel and indicates if water has been lost from the
- Gently ‘milk’ along the catheter tubing. This may move any blockage and allow the water to drain from the inflation channel balloon Insert a few mL of air and then draw back on the syringe. This can create a vacuum, which may aid deflation.
- Use a bladder instillation to dissolve crystal formation prior to removal
- If all of the above fails. Attach an orange needle (25 gauge 16mm (5/8 inch) needle to the syringe and pierce the catheter below the valve, inserting the needle into the inflation chamber; then draw back. This method bypasses the faulty catheter valve.
- If the balloon still does not deflate, and no water can be withdrawn, seek medical advice.

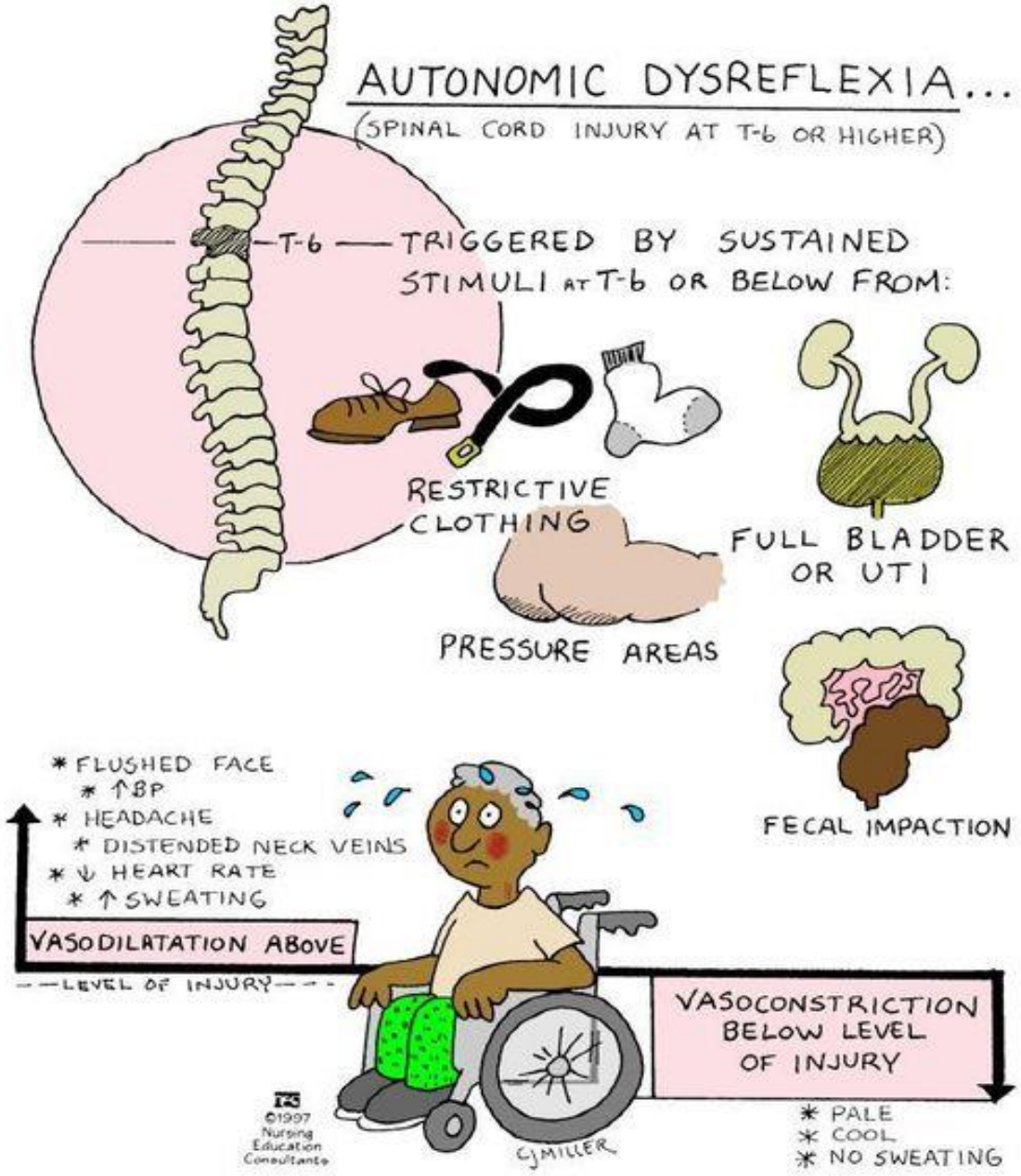
No excuse for Urethral trauma

Figure 1. Urethral destruction looks like penoscrotal hypospadias and urethral catheter was indwelled.

Simple solution

- Bladder scan prior to catheterisation
- Ensure the catheter AND the catheter bag is correctly secured




AUTONOMIC DYSREFLEXIA...
(SPINAL CORD INJURY AT T-6 OR HIGHER)
T-6
TRIGGERED BY SUSTAINED STIMULI AT T-6 OR BELOW FROM:
RESTRICTIVE CLOTHING
FULL BLADDER OR UTI
PRESSURE AREAS
FECAL IMPACTION
* FLUSHED FACE
* ↑BP
* HEADACHE
* DISTENDED NECK VEINS
* ↓ HEART RATE
* ↑SWEATING
VASODILATATION ABOVE
LEVEL OF INJURY
VASOCONSTRICTION BELOW LEVEL OF INJURY
* PALE
* COOL
* NO SWEATING
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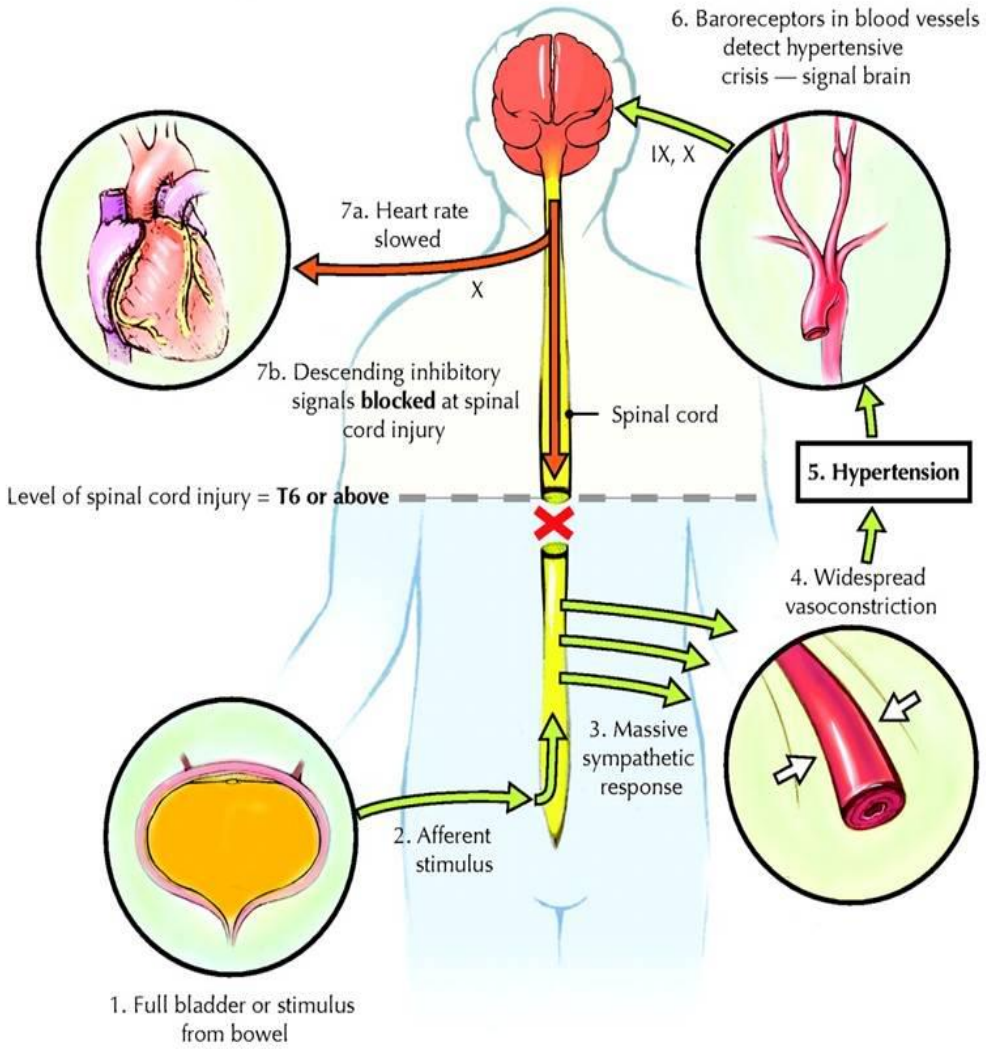
Symptoms

Vasodilation Above Level of Injury:

- A pounding headache.
- A flushed face and/or red blotches on the skin above the level of spinal injury.
- Sweating above the level of spinal injury.
- Nasal stuffiness.
- Nausea.
- A slow heart rate (bradycardia).

Vasoconstriction Below Level of Injury:

- Goose bumps below the level of spinal injury.
- Cold, clammy skin below the level of spinal injury.
- Pale colouring
-



Treatment

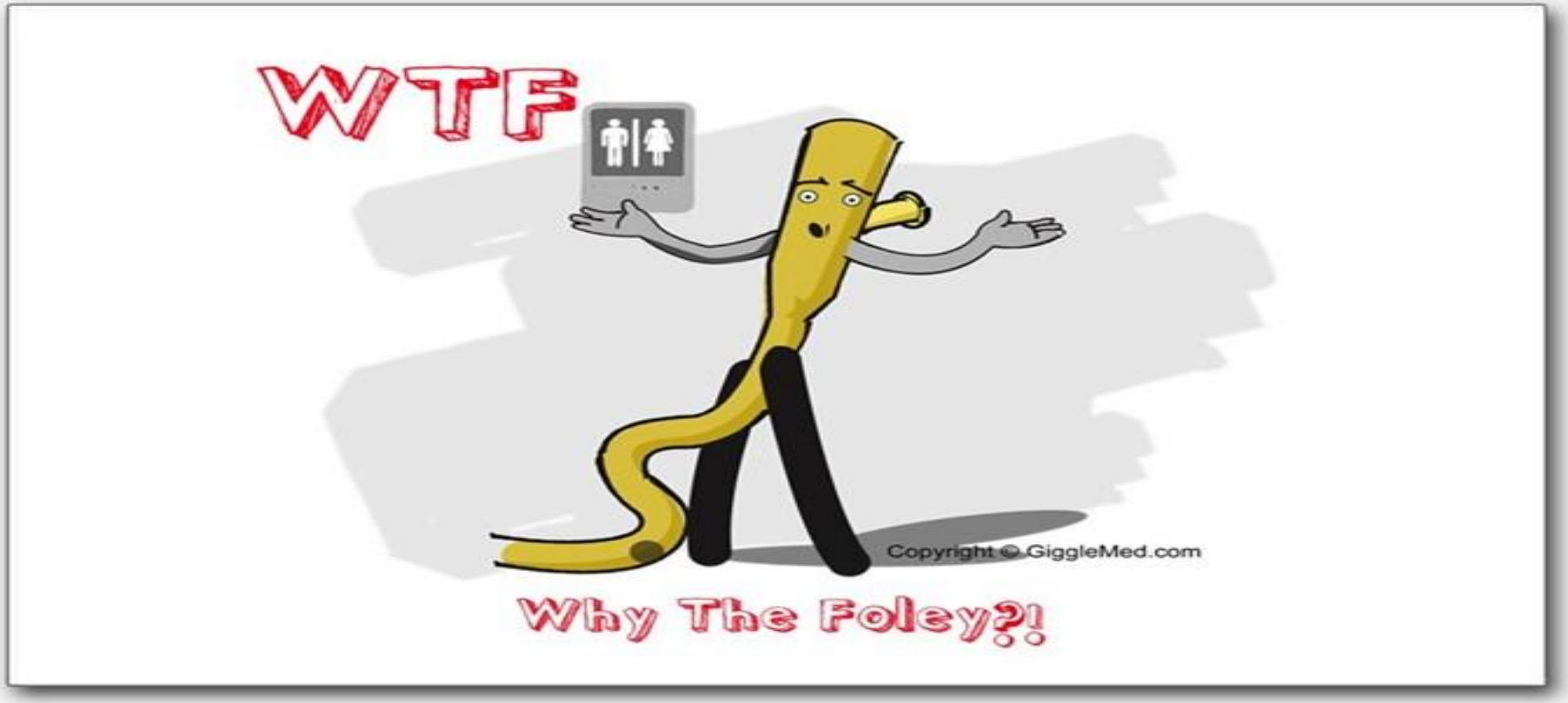
- Sit the person up straight, or raise their head so they are looking straight ahead. If they can lower their legs, do so. They need to be sitting upright until their blood pressure is back to normal.
- Loosen or take off any tight clothing or accessories. This includes braces, catheter tape, socks or stockings, shoes, and bandages.
- Empty the bladder.
- Use digital stimulation, if necessary, to empty the bowel.
- Check the skin for red spots that mean they might have a pressure sore.

- If possible, check your blood pressure every 5 minutes to see if it improves.
- **Contact emergency services even if symptoms correct themselves.**

Do we treat Purple urine?

- Tryptophan in the diet is metabolized by bacteria in the gastrointestinal tract to produce indole.
- Indole is absorbed into the blood by the intestine and passes to the liver.
- There, indole is converted to indoxyl sulfate.
- Indoxyl sulfate is excreted in the urine.
- Bacteria that colonize the urinary catheter convert the indoxyl sulfate to indirubin and indigo

Final message?



Thank you for listening