# W22: Evidence-base and Clinical Application of Urologic Catheters

Workshop Chair: Diane Newman, United States
15 September 2016 11:00 - 12:30

| Start | End | Topic | Speakers |
|---|---|---|---|
| 11:00 | 11:25 | Introduction and overview of workshop. Current use of urologic with differentiation of techniques, indications, complications and nursing management. | Diane Newman |
| 11:25 | 11:45 | Current guidelines on the use of urinary catheters | Jaclyn (Seok) Lee |
| 11:45 | 12:05 | Use of catheters post urologic surgical procedures | Tomas Griebling |
| 12:05 | 12:25 | Summary of research on catheter self-management | Mary Wilde |
| 12:25 | 12:30 | Questions | All |

**Aims of course/workshop**

This workshop will provide a comprehensive review of urologic catheters; their indications, use, and complications. There will be a discussion of current catheter technology and provide current and updated evidence-based guidelines with translation to clinical practice. The use of catheters in surgical cases, particularly in the elderly will be presented. Information on urologic device, commonly used in management of incontinence is an important education lecture worth providing at an ICS meeting. Review of world-wide problem with catheter associated UTIs will be presented. The workshop will also include a "hands-on" section reviewing different catheters, sizes, material, etc.

**Learning Objectives**

After this workshop participants should be able to:

1. To detail the current use of urologic catheters used for incontinence and retention.
2. To differentiate the various catheterization techniques, indications, complications and nursing management.
3. To understand the perioperative use of catheters for incontinence surgery with a discussion of protocols for discontinuing catheters.
4. To describe self-management techniques and the quality of life burden of patients with urinary catheters.
5. To present evidence-based guidelines on the use of urinary catheters, especially in relation to catheter associated UTIs

**Learning Outcomes**

Manage urinary catheters with increased knowledge and understanding

**Target Audience**

Physicians, nurses, residents, basic scientists

**Advanced/Basic**

Advanced

**Conditions for learning**

Lecture and Discussion

**Suggested Reading**


- Griebling TL (Editor-in-Chief): Geriatric Urology. New York, Springer, 2014.
- Griebling TL (Guest Editor): Issues in Geriatric Urology. Curr Opin Urol 2016; volume 26, issue 2 (March 2016).
- Lamin, E. & Newman, D.K. (2016) Clean intermittent catheterization revisited. International Urology and Nephrology, Mar 6 PMID:26956983
- Newman, D.K. (2016). Devices, Products, Catheters and Catheter-Associated Urinary Tract Infections. In D.K. Newman, J.F. Wyman, V. W. Welch (Eds). Core Curriculum for Urologic Nursing. Society of Urologic Nursing & Associates (1st Ed, in press).
- Newman, D.K. (2010). Prevention and management of catheter-associated UTIs. Infectious Disease Special Edition. Sept: 13-20. Retrieved from http://www.idse.net/download/UTI_IDSE10_WM.pdf
- Newman, D.K. & Wein, A.J. (2009). Managing and Treating Urinary Incontinence, 2nd Edition, Health Professions Press, Baltimore, Maryland: 365-483.
- Wilde, M. H., Fairbanks, E., Parshall, R., Zhang, F., Miner, S., Thayer, D., Harrington, B., Brasch, J., Schneiderman, D., & McMahon, J. M. (2015). A Web-based self-management intervention for intermittent catheter users. Urologic Nursing, 35, 3, 127-133.
- Wilde, M. H., Fairbanks, E., Parshall, R., Zhang, F., Miner, S., Thayer, D., Harrington, B., Brasch, J., & McMahon, J. M. (2015). Development of an internet self-management intervention for intermittent urinary catheter users with spinal cord injury, CIN Computers, Informatics, and Nursing, 33(11) 478–486.

**Diane Newman, DNP USA**

Current use of urologic with differentiation of techniques, indications, complications and nursing management.

Urologic catheters are used in the management of lower urinary tract dysfunction. They are used to drain urine in patients with neurogenic lower urinary tract dysfunction or to collect urine in patients with urinary incontinence. A catheter is placed internally or externally, and may remain for a short or long period of time, depending on the type of catheter and the reason for its use. Indwelling urinary catheters should only be used short term and only if medically indicated. Intermittent self-catheterization entails patient responsibility for bladder management and includes a certain discipline and cognitive function. An external catheter is used to contain urine leakage in men. These catheters come in various sizes and material with latex-based products becoming of concern because of the increase of latex-related allergies in this population. Complications such as catheter associated UTIs occur with long term catheter use and increase patient mortality. This area has seen new technology development and evidence-based guidelines released. Professionals need to remain current and informed on how they may impact practice. Providers need to maintain knowledge of types of catheters, current indications, and complications associated with urinary catheters.

Take home message: Catheters are used in urologic practice for ongoing bladder management. Understanding indications and evidence-based care will prevent complications and misuse.

**Jacklyn Lee, RN**

Current guidelines on the use of urinary catheters

There are many examples of clinical guidance for the best use of indwelling urinary catheters, which predominantly endeavor to guide healthcare professionals in considering alternative methods of management of bladder dysfunction and reduce infection. A key challenge for modern healthcare is the embedding of these recommendations of best practice into everyday clinical work. This presentation will aim to:

- Recognise the drivers towards clinical guidelines
- Understand what makes up a 'good' clinical guideline
- Appreciate similarities and differences between selected, available guidelines for indwelling urinary catheters

Take home message: Evidence-based guidelines on the use of urinary catheters are available, especially in relation to catheter associated UTIs. Key to their success are optimum implementation strategies.

**Tomas Griebling, MD MPH USA**

Use of catheters post urologic surgical procedures

Urinary catheters are frequently used in the operative and perioperative care settings. These include a wide variety of types of catheters to drain the bladder including urethral catheters, suprapubic tubes, and other vesicostomy tubes; and tubes to drain the kidneys and upper urinary tracts including percutaneous nephrostomy tubes, internal ureteral stents, combination internal/external stents; and tubes to drain the pelvic and peritoneal cavities such as Jackson-Pratt or other drains. Each type of catheter has specific indications for use, and associated benefits and risks. Duration of use will vary depending on the specific clinical indication and needs of the patient. Some catheters are only intended for short-term use, and are typically removed at the end of a surgical procedure or in the immediate postoperative period. Other catheters are designed for long-term use, but will still need to be removed or changed. Many hospitals and healthcare system have implemented standardized protocols for catheter discontinuation in an attempt to reduce rates of catheter associated urinary tract infections (CAUTIs). There is evidence-based data regarding these types of protocols. This presentation will review the potential benefits and risks of these protocols, particularly in the perioperative setting. The role of electronic medical records and other system-based methods to help optimize catheter and stent management will be reviewed.

Take home message: Urinary catheters and stents are widely used in surgical and perioperative management. These can be very useful, but are also associated with potential risks. System-based practices can be useful to optimize surgical and perioperative catheter use.

**Mary Wilde, PhD RN USA**

Summary of research on catheter self-management

In a U.S. 12 month randomized clinical trial (RCT) teaching self-management in 202 adults with long-term indwelling urinary catheters, the intervention focus was on promoting optimal and consistent levels of fluid intake to decrease blockage and in preventing traction leading to accidental dislodgment of the catheter. Group differences in main outcomes favoring the intervention (P=0.016) were found for blockage in the first six months of the study, but not in catheter-associated urinary tract infection (CAUTI). There was a significant group difference in CAUTI in the second six months favoring the control group (P=0.01). There were no group differences in accidental dislodgment Because the intervention was delivered in the first four months of the study, significant decreases in catheter blockage in the experimental group in the first 6 months of the RCT suggest that the intervention effect could extend with more nurse coaching and support, particularly related to consuming fluids. Rates per 1000 catheter days indicate that both groups improved over the 12 months' study with significantly decreased

rates from baseline of CAUTI and catheter blockage. We hypothesize that this result was related to an unintentional self-monitoring intervention through use of a catheter calendar to aid accuracy in reporting catheter problems and treatments during the bimonthly interviews for data collection. We therefore suggest tracking catheter problems in a calendar, which is a simple intervention that could alert the person to their usual catheter patterns and promote changes in self-management.

Further analysis using logistic regression indicated that catheter blockage marginally predicted CAUTI (P= 0.057). Leakage, sediment, and bladder spasms predicted both CAUTI and blockage. The amount and frequency of sediment and of irrigation predicted blockage, and a large amount of sediment also predicted CAUTI. Additional healthcare utilization is common in relation to CAUTI and blockage, including hospitalization and emergency department visits. Finally, the structural equation modeling (SEM) analysis suggests that increased confidence (self-efficacy) about fluids can increase self-management about fluids and decrease the frequency of catheter blockage, but not whether it occurred or not. Neither self-efficacy nor self-management of fluids decreased CAUTI episodes.

Take home message: The amount of sediment in the urine is predictive of catheter-associated urinary tract infection and blockage, and therefore it should be monitored routinely in people with long-term indwelling urinary catheters so that further action can be taken to prevent these problems.

# Evidence-base and Clinical Application of Urologic Catheters

ICS Workshop # 22

Diane K. Newman, DNP ANP-BC FAAN
Chair

Tomas L. Griebling, MD, MPH
Mary Wilde, RN, PhD
Jacklyn Lee, RN

International Continence Society, Tokyo, September 14, 2016

# Workshop 22 Outline

| Start | End | Topic | Speakers |
|---|---|---|---|
| 11:00 | 11:25 | Introduction: Current use of urologic with differentiation of techniques, indications, complications and nursing management | Diane Newman, DNP Chair |
| | | | |
| 11:25- | 11:45 | Current guidelines on the use of urinary catheters | Jacklyn Lee, RN |
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# Objectives

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- To differentiate the various catheterization techniques, indications, complications and nursing management.
- To understand the perioperative use of catheters for incontinence surgery with a discussion of protocols for discontinuing catheters.
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- To present evidence-based guidelines on the use of urinary catheters, especially in relation to catheter associated UTIs

# Current use of urologic with differentiation of techniques, indications, complications and nursing management

**Diane K. Newman, DNP, ANP-BC, FAAN**

Adjunct Professor of Urology in Surgery
Research Investigator Senior, Perelman School of Medicine
Philadelphia, Pennsylvania

Co-Director, Penn Center for Continence and Pelvic Health
Division of Urology, University of Pennsylvania Health System

Penn Urology

## Diane Newman

Affiliations to disclose:

University of Pennsylvania (employer) funded for ICS meeting travel

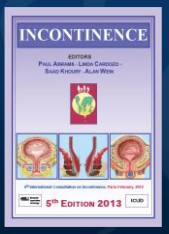
Funding for speaker to attend:
Enter **X** in appropriate box

| | |
|---|---|
| | Self-funded |
| X | Institution (non-industry) funded |
| | Sponsored by company: |

# Intermittent & External Urinary Catheterization

- Indwelling Urinary Catheterization (IUC)
- Intermittent Catheterization (IC)
- External Urinary Catheterization (EC)

- International Consultation on Incontinence ~~2013~~ 2017




Cottenden, Bliss, Buckley, Fader, Gartley, Hayder, Ostaszkiewicz, Wilde, Management using Continence products. In Abrams P, Cardozo L, Khoury S, Wein A (Eds.): *Incontinence: Proceedings from the 5th International Consultation on Inc*
Plymouth UK: Health Publication



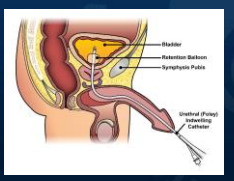
## Indwelling Urinary Catheterization

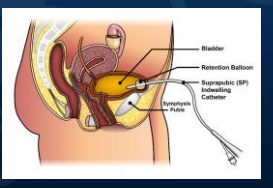
- Definition
  - Closed, sterile system
  - Allows for continual bladder drainage
  - Insertion of a flexible tube in the bladder
  - Either via urethra or suprapubic (S/P) opening
  - Short term use – defined as 2 to 4 weeks
  - Long term - > 30 days

**Referred to as a "Foley"**

## Routes of an IUC

- 2 methods of insertion
  - Through the urethra or suprapubic (S/P) opening (usually 2 cm above pubic bone)




Hunter, Bharmal, Moore. Long-term bladder drainage: Suprapubic catheter versus other methods: A scoping review. Neurourol Urodyn. 2012 Nov 28.

Guideline for Prevention of Catheter-Associated Urinary Tract Infections 2009

Gould, Umscheid, Agarwal, Kuntz, Pegues, and the Healthcare Infection Control Practices Advisory Committee (HICPAC), Guideline for the Prevention of Catheter – Associated Urinary Tract Infections 2009
http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/CAUTI_Guideline2009final.pdf

## Patient Perspective

- Indwelling urinary catheters (IUC)
  - Patients report:
    - An IUC is uncomfortable.
    - They are painful.
    - Restrict activities of daily living.
      - Decreased activity increases risk of pressure ulcer and venous thromboembolism.

Saint, Lipsky, & Goold. Indwelling urinary catheters: a one-point restraint? Ann Intern Med. 2002 Jul 16;137(2):125-7

## Studies Suggest Efforts to Maintain Compliance with Practice Guidelines Is Difficult

**Foley catheter use in 31% of patients in acute care hospital was deemed inappropriate**

| % Unaware Their Patient Had A Urinary Catheter | |
|---|---|
| Attending Physician | 38% |
| Residents | 27% |
| Interns | 22% |
| Medical Students | 21% |

Saint, Sanjay, Jeff Wiese, John Amory, et al. Are physicians aware of which of their patients have indwelling urinary catheters? *The American Journal of Medicine* 109.6 (2000): 476-80.

## Inappropriate Reasons for IUC Use

- Urinary incontinence
- Use of diuretics
- Bed rest or decreased mobility
- Unaware of recommendations
- Physician uncertainty about the patient's medical course
- Convenience of hospital staff
- Reluctance to perform IC
- For routine monitoring of intake and output
- Monitoring of renal function in the absence of being critically ill

Jain, Parada, David, & Smith. (1995) Overuse of the indwelling urinary tract catheter in hospitalized medical patients. Arch Intern Med. 155:1425-9.

## Catheter-associated Urinary Tract Infections - CaUTI

- 70%-75% of all hospital-acquired infections UTIs have been attributed to an indwelling urinary catheter (IUC) (Pennsylvania, 2009)
- 50% of SCI men or women performing intermittent catheterization develop bacteriuria (Nicolle, 2012)
- Low prevalence of UTIs in men with an external catheter (Saint, 1999)

Nicolle (2012) Urinary catheter-associated infections. Infect Dis Clin North Am. Mar;26(1):13-27.
Pennsylvania Patient Safety Authority 2009 Annual Report. Harrisburg, PA: Pennsylvania Patient Safety Authority, 2010. http://patientsafetyauthority.org/Documents/Annual_Report_2009.pdf. Accessed September 15, 2012.
Saint, et al. (1999) Urinary catheters: what type do men and their nurses prefer? J Am Geriatr Soc. 47: 1453–7

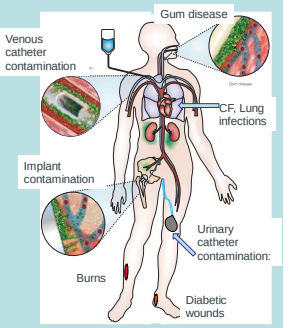
## Complex biofilm communities - Interactions on a variety of scales

Cost Industry $ billions

Contaminate water pipes and food surfaces

Kill millions –
NIH: 80% of all infections

**Biofilm-associated infections**




## Urinary catheter encrustation and blockage


A. Hydrogel-coated latex catheter, indwelling suprapubically for 6 months before surgical removal. Crystalline material covered the eyehole and balloon.
B. Cross-section of a silicone catheter that had been indwelling for 8 weeks. The image shows that the central lumen is occluded by crystalline biofilm.
C. Longitudinal section of silver-hydrogel-coated latex catheter, blocked after 11 days.

## What We Know

- Biofilms rapidly colonize urinary catheters
- Current materials and design give little advantage
- Biofilm defense against host attack and antimicrobial agents
- Biofilm-like in bladder by uropathogenic *E. coli*
- Link to inflammatory response, cystitis etc
- New strategies required

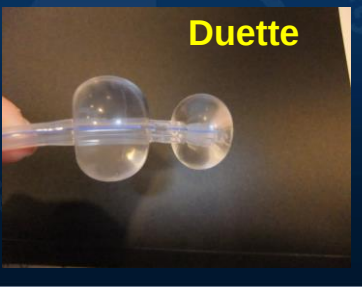
## Studies Suggest Efforts to Maintain Compliance with Practice Guidelines Is Difficult

Average compliance to hand washing protocols at a large teaching hospital was 48%

| Hand Washing Compliance | |
|---|---|
| Nurse | 52% |
| Physician | 30% |
| Nursing Asst | 47% |
| Other | 38% |

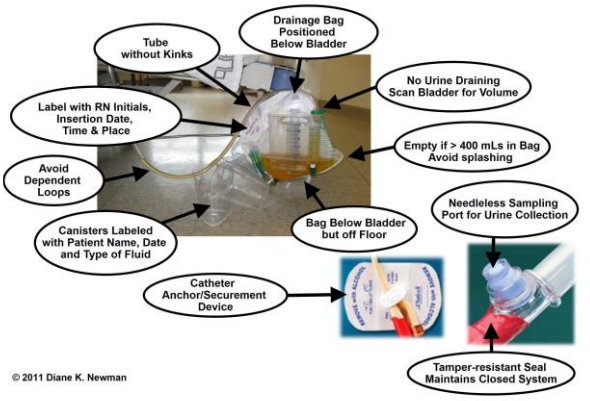
Pittet, Diddier, and Phillipe Mourouga.Compliance with handwashing in a teaching hospital. *Annals of Internal Medicine* 130.2 (1999): 126-30

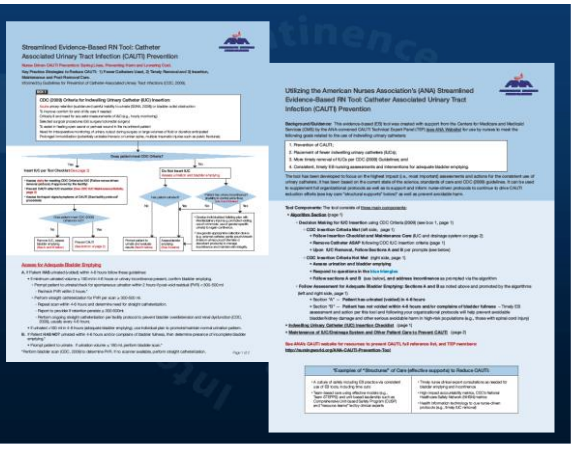
## IUC – No new design in decades



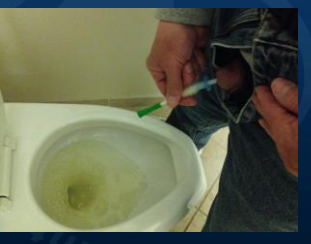

## Tissue response- urethra

- Tissue response differs between patients
- Immune system tries to attack the catheter itself and the bacteria in the biofilm
- Latex very high risk of scarring




## Intermittent Catheterization (IC)

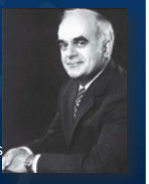


Penn Urology

# Terminology

- Intermittent catheterization (IC)
- Clean intermittent catheterization (CIC)
- Intermittent Self-catheterization (ISC)
- Clean intermittent Self-catheterization (CISC)

# Jack Lapides, MD



- Coined: Intermittent, Clean, Self-catheterization or CIC
- Technique (woman):
  - Patient washes hands with soap and water
  - Assumes lithotomy position
  - Hand mirror between legs for visualization of meatus
  - Lubricate tip of catheter
  - Cleaning "Use small Tupperware or margarine plastic container for sterilizing the catheter with a detergicide"

**Infections occurred:**
- **Not cleaning with "detergicide", just soap and water**
- **Dropped catheter and reused without cleaning**

Lapides, Diokno, Silber, Lowe (1972) Clean, intermittent self-catheterization in the treatment of urinary disease. J Urol, 107: 458–461.

# Catheterization Technique

## Sterile

•Equipment
  - Sterile gloves
  - Genital disinfection
  - Sterile single-use catheter
  - Sterile drainage tray

•Can be performed with a non-lubricated catheter using external gel or a hydrophilic catheter

•Used when catheterization occurs in institutions (hospitals, nursing homes)

# Catheterization Technique

## Aseptic

•User‧caregiver never touches the catheter

•Catheter is inside a protective sleeve or collection bag or product packaging may be used to hold the catheter during insertion

•Can be performed with a pre-lubricated gel or hydrophilic catheter

# Catheterization Technique

## Clean, Single-Use Insertion Method

•Use of a sterile, non-lubricated disposable catheter lubricated with an external gel or a hydrophilic catheter

•User touches the catheter with clean hands – the product does not feature a protective sleeve or collection bag

•User disposes of catheter after insertion

# Catheterization Technique

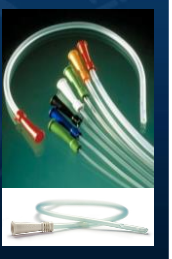
## Clean, Re-used Insertion Method

•Non-lubricated catheter lubricated with an external gel

•Re-used by the same patient for a limited period of time

•Cleaned between catheterization episodes

•Use is dependent on reimbursement



## CATHETERIZATION TECHNIQUES –CURRENT EVIDENCE BASED ON A COCHRANE REVIEW

- No evidence that any of the following strategy is better than any other for all clinical settings:
  - Specific technique (aseptic or clean)
  - Catheter type (coated or uncoated)
  - Method (single-use or multiple-use)
  - Person (self or other)

Prieto J, Murphy CL, Moore KN, Fader M. (2014) Intermittent catheterisation for long-term bladder management Cochrane Database Syst Rev. Sep 10;9:CD006608.

## Catheterization Techniques –Current Evidence Infectious Disease Society of America (IDSA)

- **Evidence is poor to moderate for recommending multiple-use catheters instead of single-use catheters with regard to bacteriuria or UTI**
- **Insufficient data for recommending a cleaning method for multiple-use catheters**

Hooton, T. M., Bradley, S. F., Cardenas, D. D., Colgan, R., Geerlings, S. E., Rice, J. C., et al. (2010) Diagnosis, prevention, and treatment of catheter-associated

## Distribution of any UTI in relation to Catheter Re-Use

| Duration | Single use n=11 | Re-use n=12 |
|---|---|---|
| Symptomatic UTI Week 8 | 2 / 10 (20%) | 2 / 12 (17%) |
| Symptomatic UTI Week 16 | 2 / 9 (22%) | 1 / 11 (9%) |
| Proven Bacterial Cystitis Week 8 | 1 /10 (10%) | 0/12 (0%) |
| Proven Bacterial Cystitis Week 16 | 2 / 9 (22%) | 2 / 11 (18%) |
| Asymptomatic Bacteriuria Week 8 | 4/10 (40%) | 4 / 12 (33%) |
| Asymptomatic Bacteriuria Week 16 | 1 / 9 (11%) | 2 / 11 (18%) |
| Any Bacteriuria Wk 8 | 7 /10 (70%) | 6 / 12 (50%) |
| Any Bacteriuria Wk 16 | 5 / 9 (55%) | 5 / 11 (45%) |

Leek H, Stephenson Z, Reus A, Karantanis E, Moore KH. (2013) Clean intermittent selfcatheterisation:a randomised controlled crossover trial of single-use versus multiple re-use of non-coated catheters; is cystitis rate altered? Neurourol Urodyn; 32:759–760.

## Problems with Catheter Reuse

- Reuse is “Off-Label”
- Inadequate cleaning-no guidelines
- Need for Storage
- No guidelines/reports on number of times catheter can or is being reused (e.g. 24 hours, 7 days)
- Not supported by legal requirements
- UTIs

Håkansson MÅ. (2014) Reuse versus single-use catheters for intermittent catheterization: what is safe and preferred? Review of current status. Spinal Cord. 52(7):511-6.

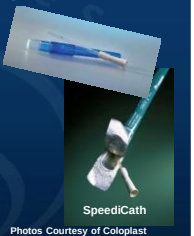
## Problems with Single-use Catheter

- Costly (patient, health care)
- Negative environmental impact

Håkansson MÅ. Reuse versus single-use catheters for intermittent catheterization: what is safe and preferred? Review of current status. Spinal Cord. 2014 Jul;52(7):511-6.

## Pre-lubricated hydrophilic

- **Coated with a substance that absorbs water and binds it to the catheter surface**
- **Extremely slippery smooth layer of water stays during insertion and withdrawal**
- **Advantages:**
  - **Easier insertion**
  - **Minimize patient discomfort, urethral stricture**
  - **Protects urethra from damage and irritation**
- **Disadvantage:**
  - **Can be slippery and difficult to manage**
  - **Water spillage resulting in “messes”**
  - **Surface dries after 5 minutes and catheter becomes “sticky” – SO NO REUSE**
- **One-time use only**




**Photos Courtesy of Coloplast**

**More compact shorter length catheter for women**

## Hydrophilic catheters: Meta-analysis

| Author, Year | Country or Area | Hydrophilic-Coated Catheters/Control | No. of Patients (H/C) | Age (y) (H/C) | Sex (M/F) | | Outcomes | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Hydrophilic Catheters | Control | Subjects with UTIs | Subjects with Hematuria |
| Cardenas et al, 2011 | United States | Hydrophilic-coated (SpeediCath)/uncoated polyvinyl chloride catheters | 100/100 | 35.1 ± 13.2/ 37.2 ± 14.4 | 79/21 | 82/18 | 41/76 | 23/34 |
| Cardenas and Hoffman, 2009 | United States | Hydrophilic (LoFric)/ non-coated catheters | 22/23 | 42.3 ± 10.4/ 40.1 ± 9.3 | 17/5 | 12/11 | 12/14 | No mention |
| Ridder et al, 2005 | Spain | Hydrophilic-coated (SpeediCath)/uncoated polyvinyl chloride catheters | 61/62 | 37.5 ± 14.6/ 36.7 ± 14.6 | 61/0 | 62/0 | 39/51 | 55/59 |
| Vapnek et al, 2003 | New York | Hydrophilic-coated (LoFric)/standard polyvinyl chloride catheters | 30/31 | 39.8 ± 12.9/ 39.6 ± 16.0 | 30/0 | 31/0 | 19/22 | 8/11 |
| Sutherland et al, 1996 | California | Hydrophilic-coated (LoFric)/nonhydrophilic polyvinyl chloride catheters | 17/16 | Boys (vague) | 17/0 | 16/0 | 3/4 | 9/11 |
| TOTAL | | | 230/232 | | 207/84 | 139/32 | 114/167 | 95/115 |

NOTE. Values are n, mean ± SD, or median (range). Abbreviations: H/C, hydrophilic-coated catheters/control; M/F, male/female.

Li L, Ye W, Ruan H, Yang B, Zhang S, Li L. (2013). Impact of hydrophilic catheters on urinary tract infections in people with spinal cord injury: systematic review and meta-analysis of randomized controlled trials. Arch Phys Med Rehabil; 94: 782–787.

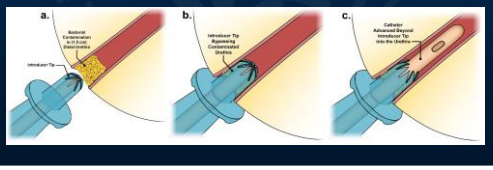
## EAU Guidelines on Neurogenic Lower Urinary Tract Dysfunction (NLUTD)

- Intermittent, self- or third-party, catheterization (IC) is the gold standard for the management of NLUTD.
- Compared to clean IC, aseptic IC, provides significant benefit in reducing the potential for contamination.

Stohrer, Blok, Castro-Diaz, et.al. (2009) EAU guidelines on neurogenic lower urinary tract dysfunction. *Eur Urol.* Jul;56(1):81-8.

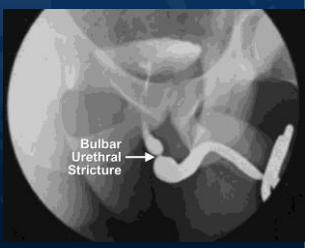
## Gel pre-lubricated, self-contained systems

- Referred to as 'No-Touch'
- Closed system that provides aseptic catheterization.
- System is 100% latex-free
- Uses a pre-lubricated catheter.
- Catheter passes through a special guide mechanism at the top of the pocket.




## IC Complications (*cont*) Urethral Complications

- Urethral stricture
  - **Inflammatory response to repeated catheterization**
  - **Risk increases with the number of years in IC**
  - **Use of hydrophilic catheters may decrease the incidence**




## External Urinary Catheterization

Penn Urology

## External Catheterization

***(Texas catheter, Penile sheaths, Condom catheter)***

**Definition:**

- External devices which are secured to the skin with adhesive or straps and are connected to a tube and collecting bag

**Indications:**

- Urinary incontinence
- Preferable to indwelling urethral catheter

Saint, et al. (1999) Urinary catheters: what type do men and their nurses prefer? *JAGS*, December, 47(12): 1453-1457.

## Complications of External Catheters

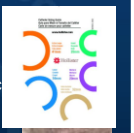
- Infection (CaUTI)
- Maceration and irritation of the skin
  - Secondary to friction from catheter
- Phimosis
  - Constriction of the foreskin that prevents retraction of the foreskin over the glans
  - Result of over-constriction of the penis from a condom catheter
- Strangulation of the Penis
  - Can occur with double-sided adhesive strip

## Types

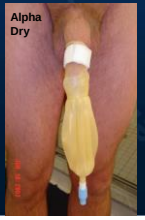

- Rolled over the shaft of the penis and pressed to stick
  - –Adhesive
  - –Non-adhesive
- Two-Piece Systems
- Latex or silicone

## MECs: Considerations for Use

- Sizing (one size does not fit all)
  - Penile Shaft –
    - Length (1.5 in) sufficient to support adherenc
    - Circumference
    - Use a sizing guide
- Condition of the Skin –
  - Assess for redness, open areas, rash
- Dexterity –
  - Difficulty with dexterity and manipulation of small objects
    - Identify a caregiver or family member for application
    - In an institution, staff can be taught to apply these catheters

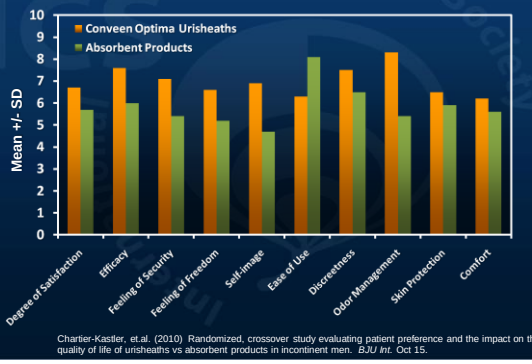


## External Catheters/ Urinary Collection Devices/ Bodyworn

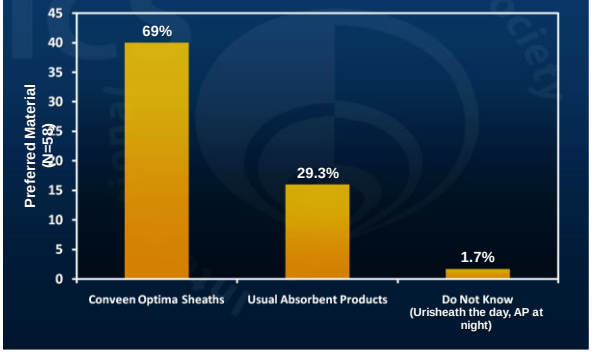


## Product Performance




Chartier-Kastler, et.al. (2010) Randomized, crossover study evaluating patient preference and the impact on the quality of life of urisheaths vs absorbent products in incontinent men. *BJU Int.* Oct 15.

## Patient Preference



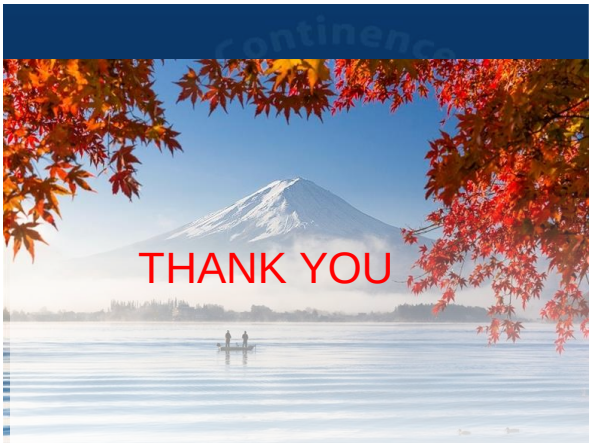

## External Urinary Collection Pouches

- Flexible form-fitting “ostomy” style pouch
- Skin friendly hydrocolloid attachment
- Pouch opening centered above the urinary meatus and used to funnel urine away into a urine collection system.
  - » Women:
    - » Training in device application by caregiver is necessary
    - » Application may be time-intensive
      - » Requires trimming of mons and labia hair
      - » Barrier paste may be used to smooth irregular contours
  - » Men:
    - » Useful with insufficient length for MEC
    - » Pouch opening centered over exposed shaft, adheres to pubis and scrotal tissues
      - » Requires trimming of pubic hair


Female Pouch


Female Pouch in Place


Male Retracted Penis Pouch




THANK YOU

ISC 2018
PHILADELPHIA

Jaclyn Lee

ICS 2016 TOKYO

Affiliations to disclose†:

None

† All financial ties (over the last year) that you may have with any business organisation with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

- ☐ Self-funded
- ☐ Institution (non-industry) funded
- ☒ Sponsored by: *Hollister; Fittleworth; Coloplast; Astella and Pfizer*

# Current guidelines on the use of urinary catheters

*Jaclyn Lee*
*Senior Urology Clinical Nurse Specialist*
*On behalf of*
*Sharon Eustice*
*Nurse Consultant UK*

# Objectives

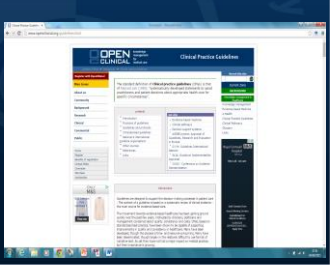
- Recognise the drivers towards clinical guidelines
- Understand what makes up a 'good' clinical guideline
- Appreciate similarities and differences between selected, available guidelines for indwelling urinary catheters

# Scope of guideline production

- What we know…there are lots of them!
- Sources:
  - Professional associations or societies (e.g. Royal College of Nursing, ANZUNS, European Associations of Urology)
  - Government departments (e.g. NICE, Centers for Disease Control and Prevention)
  - Local communities and hospitals

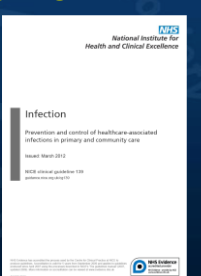

# Differences between guidelines and pathways

- Guidelines
  - The content of a guideline is based on a systematic review of clinical evidence - the main source for evidence-based care.
- Pathways
  - These are structured, multidisciplinary plans of care with the continuity and co-ordination; a step-wise sequence.




# What elements make up a good guideline

- Review of the literature
- Reliability and reproducibility
- Clinical applicability and flexibility - the guideline should addresses the patients it applies to (and exceptions)
- Clarity - logical and easy to follow
- Multidisciplinary and integrated process
- Scheduled review




Giudice E L Critiquing Clinical Practice Guidelines (accessed online PPT on 30 April 2013)

# Implementing guidance: key messages from 1994!


- Can change clinical practice and affect patient outcome
- Effective based on active implementation
- Should be based on reliable clinical and cost-effectiveness

www.york.ac.uk/inst/crd/EHC/ehc18.pdf

## What's the evidence that NICE guidance has been implemented in 2004?

Results from a national evaluation of an audit of patients' notes, and interviews

•Implementation of NICE guidance has been variable

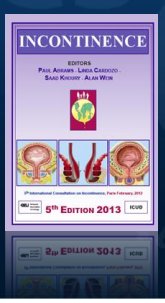
•Adoption influenced by:
- strong professional support
- a stable and convincing evidence base
- established good systems for tracking guidance implementation professionals involved are not isolated

•Guidance needs to be clear and reflect the clinical context

BMJ 2004; http://www.bmj.com/content/329/7473/999.abstract (accessed 7 May 2013)

## International Consultation on Incontinence 2013

http://www.ics.org



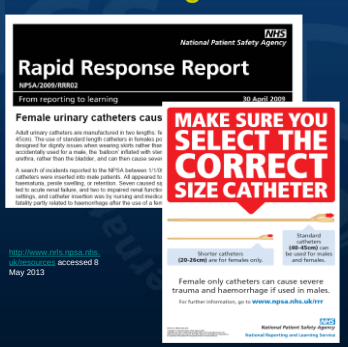

*'Although guidelines and protocols for catheter-care practices are abundant, relatively few practices are supported by research evidence and even fewer by evidence from randomized controlled trials'.*

# Why do we need guidelines for indwelling urinary catheter (IUC)?

•1 in 4 patients admitted to hospital have an IUC
- Some may require antibiotics
- A few may experience life-threatening complications

Saint (2000) Clinical and economic consequences of nosocomial catheter-related bacteriuria Am J Infect Control 28: 68-75

## .....and care can go wrong!




http://www.nrls.npsa.nhs.uk/resources accessed 8 May 2013

**Nursing Documentation: Court Faults Nurse For Failing To Note Time Of Catheter Removal.**

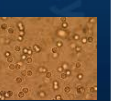
Immediately prior to her hysterectomy, the patient was given an indwelling urinary catheter to facilitate post-operative drainage. On the morning after surgery, the catheter was removed by one of the hospital's nurses.

The nurse noted in the patient's chart that she had removed the catheter, but did not record the time of day. Later that day, the patient was unable to void her urine. According to the court record, because the nurse who removed the catheter did not record the time of day, there was a delay in reinserting another catheter to enable the patient to void. The Court of Appeals of Georgia faulted the nurse who removed the catheter. The court ruled it was negligent nursing practice for the nurse not to have made note of the time of day when the catheter was removed.

Hartman v Shallowford Community Hospital 1995
http://www.nursinglaw.com/catheter3.pdf accessed 8 May 2013

## Infection is a significant problem

- 40% of all nosocomial infections are urinary tract infections (UTI)
  - 80% of these are related to IUC
- For every CAUTI the length of hospital stay and cost increases
- By the 20th day, bacteriuria is nearly universal (5% growth per day)

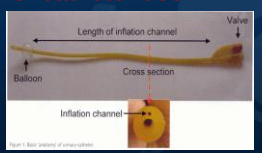


Saint (2000) Clinical and economic consequences of nosocomial catheter-related bacteriuria Am J Infect Control 28: 68-75
Stamm W (1991) Catheter-associated urinary tract infections: Epidemiology, pathogenesis, and prevention Am J Med 16: 9
Loveday H P et al (2014) epic3: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England Journal of Hospital Infection 86S1 S1–S70

# Prevalence can be high …..

Key aim of all guidance: Reducing the duration of catheter use!

**HPA survey on HCAI and antimicrobial use across acute hospitals in England (Sept-Nov 2011)**



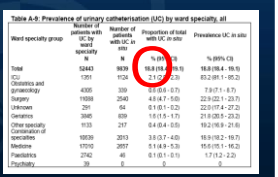



Table A-9: Prevalence of urinary catheterisation (UC) by ward specialty, all

| Ward specialty group | Number of patients with UC by ward specialty N | Number of patients with UC in site N | Proportion of total with UC in site % (95% CI) | Prevalence UC in site % (95% CI) |
|---|---|---|---|---|
| Total | 52443 | 9939 | 18.8 (18.4 - 19.1) | 18.8 (18.4 - 19.1) |
| ICU | 1351 | 1124 | 2.1 (2.0 - 2.3) | 83.2 (81.1 - 85.2) |
| Obstetrics and gynaecology | 4305 | 339 | 0.6 (0.6 - 0.7) | 7.9 (7.1 - 8.7) |
| Surgery | 19268 | 2540 | 4.8 (4.7 - 5.0) | 22.9 (22.1 - 23.7) |
| Unknown | 291 | 64 | 0.1 (0.1 - 0.2) | 22.0 (17.4 - 27.2) |
| Geriatrics | 3945 | 839 | 1.6 (1.5 - 1.7) | 21.8 (20.5 - 23.2) |
| Other specialty Combination of specialties | 1133 | 217 | 0.4 (0.4 - 0.5) | 19.2 (16.9 - 21.6) |
| Medicine | 18939 | 2013 | 3.8 (3.7 - 4.0) | 10.9 (10.2 - 11.7) |
| Medicine | 17010 | 2697 | 5.1 (4.9 - 5.3) | 15.6 (15.1 - 16.2) |
| Paediatrics | 2742 | 46 | 0.1 (0.1 - 0.1) | 1.7 (1.2 - 2.2) |
| Psychiatry | 39 | 0 | 0 | 0 |

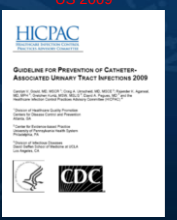
English National Point Prevalence Survey on Healthcare-associated Infections and Antimicrobial Use, 2011 (Preliminary Data) Published May 2012

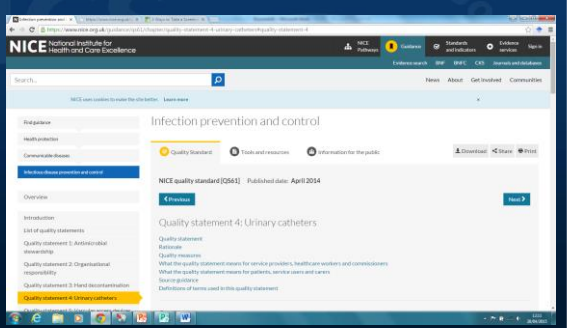
# What guidelines are available?

European & Asia 2008


Ireland 2011


US 2009




# Compliance

| Best Practice Recommendations (ICI 2009 & 2013) | GR |  |  |  |
|---|---|---|---|---|
| Indwelling catheters should only be used after alternative management strategies have been considered and rejected as unsatisfactory | A | x | √ | √ |
| Duration of catheterisation should be minimal | A | √ | √ | √ |
| A closed drainage system should be maintained to reduce risk of catheter associated infection | A | √ | √ | √ |
| Asymptomatic bacteriuria should NOT be treated with antibiotics (unless urological instrumentation is planned) | B | √ | √ | √ |

# Compliance

| Best Practice Recommendations (ICI 2009 & 2013) | GR |  |  |  |
|---|---|---|---|---|
| Routine urine culture in an asymptomatic patient is not recommended | C | √ | √ | √ |
| Silver-alloy catheters should be considered for short-term catheterised patients to reduce the risk of catheter-associated infection | A | √ | √ | No rec; unresolved |
| Catheter materials designed for long-term use (all silicone, silicone or hydrogel-coating) should be used where a catheter is expected to be used long term (i.e. >14days) | B | No consensus | √ | √ |
| Meatal cleansing with plain soap and water (not with antimicrobial agents) is recommended | A | √ | √ | √ |

# Compliance

| Best Practice Recommendations (ICI 2009 & 2013) | GR |  |  |  |
|---|---|---|---|---|
| Addition of disinfectants to drainage bags, bladder irrigation and antibiotic prophylaxis are NOT recommended as routine infection control measure | A | x | √ | √ |
| If an indwelling catheter is being considered, SPC should be considered alongside UC, following appropriate risk assessment | B | √ | √ | No rec; unresolved |
| *(UC and)* SPC insertion should be carried out only by appropriately trained and skilled practitioners | C | x | √ | x |
| UC and SPC catheters and drainage bags should be adequately supported to prevent meatal or cystostomy damage from traction | C | x | √ | √ |

# Compliance

| Best Practice Recommendations (ICI 2009 & 2013) | GR | | | |
|---|---|---|---|---|
| In patients with recurrent catheter encrustation and blockage, careful monitoring should be undertaken to identify of a characteristic pattern of 'catheter life' and instigate pre-emptive catheter changes prior to likely blockage | C | No rec made | √ | √ |

*Specific recommendations*
Patients with urethral catheters in place for 10 years or more should be screened for bladder cancer (C).

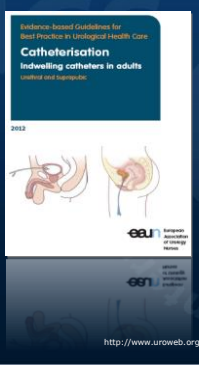
*Specific recommendations*
Governance: education, documentation and surveillance

## Reduction in catheter-associated urinary tract infections by bundling interventions.

Clarke K et al 2012 Division of Hospital Medicine, Department of Medicine, Emory University School of Medicine, Atlanta,

- Bundle of four evidence-based interventions
  - Silver-alloy catheter
  - Securing the device
  - Avoid touching the floor
  - Removal at day 1 or 2 post-surgery
- During the study period, 33 of the 2228 patients were diagnosed with a CAUTI. Pre-intervention period was 5.2/1000.
- 7 months following the implementation of the fourth intervention, the rate was 1.5/1000 catheter days

## European Association of Urology Nurses (2012)




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

http://www.uroweb.org/fileadmin/EAUN/guidelines/EAUN_Paris_Guideline_2012_LR_online_file.pdf

## Types of urethral catheter for reducing symptomatic urinary tract infections in hospitalised adults requiring short-term catheterisation

Pickard R et al (2012) Institute of Cellular Medicine, Newcastle University, Newcastle upon Tyne, UK.

- RCT: multicentre UK comparing three catheters in 24 hospitals
- Adults requiring temporary urethral catheterisation for a period of between 1 and 14 days
- Unconvincing findings for any particular catheter

## UK drivers for improved care

| | | |
|---|---|---|
| Winning Ways | 2003 | Management of urinary catheters<br>Audit of urinary catheter care and management |
| Saving Lives | 2005 | To reduce the incidence of UTI related to indwelling urinary catheters<br>Audit of insertion techniques and continuing care |
| Energising 4 Excellence | 2010 | To demonstrate a dramatic reduction in the rate of UTI's for patients (50% in England) |
| Safety Thermometer | 2012 | To deliver harm free care as defined by the absence of pressure ulcers, falls, CAUTI and VTE by December 2012 |


## More focus on nurse-led approaches to reduce catheter use

- nurse-led interventions and informatics-led interventions:
  - computerized
  - chart reminders

Bernard et al (2012) A review of strategies to decrease the duration of indwelling urethral catheters and potentially reduce the incidence of catheter-associated urinary tract infections; Urologic Nursing

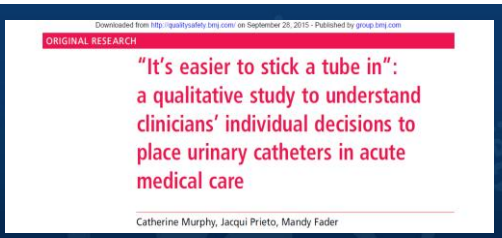
**Stop-Order**

On admission all patients with an indwelling urethral urinary catheter will have catheter removed within 72 hours.

Exceptions
- urinary obstruction leading to urinary retention (where intermittent catheterisation is not viable)
- neurogenic bladder and urinary retention (where intermittent catheterisation is not viable)
- urological surgery
- open sacral wounds (stage 3 or 4) for incontinent patients

All exceptions should be fully documented and reviewed every 7 days

If any concerns, please contact the patient's medical team or the Bladder & Bowel Service on 01726 291042




- Identified the complexity of a clinicians' decision making to place an IUC
- Choices may be beyond the categories of appropriate or inappropriate

Murphy C, Prieto J, Fader M. BMJ Qual Saf 2015;24:444–450.


*'…..new appropriateness criteria can inform large-scale collaborative and bedside efforts to reduce inappropriate urinary catheter use'.*

**Guide for Foley Catheter Use in Hospitalized Medical Patients**
Appropriate indications:
Reduce *acute*, severe pain with movement when other urine management strategies are difficult‡
*Example: acute unrepaired fracture*

*Ann Intern Med.* 2015;162:S1-S34. doi:10.7326/M14-1304 www.annals.org

## So what do we know?

- The international drivers towards clinical guidelines
- What makes up a 'good' clinical guideline
- Similarities and differences between selected, available guidelines for indwelling urinary catheters
- Recognition and opportunity to develop international standards for guideline development

*'Work is being duplicated around the world, with institutions failing to work jointly, consolidating networks around health topics or fields'.*

Alonso-Coello et al (2011) The updating of clinical practice guidelines: insights from an international survey. Updating Guidelines Working Group. Implement Sci. 2011; 6: 107

## Thank you

## Tomas L. Griebling, MD, MPH

Affiliations to disclose†:

National Institutes of Health (NIH)
National Institute on Aging (NIA)
Donald W. Reynolds Foundation

† All financial ties (over the last year) that you may have with any business organisation with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

- [X] Self-funded
- [ ] Institution (non-industry) funded
- [ ] Sponsored by:

## Urinary Catheters: Surgical Issues

**Tomas L. Griebling, MD, MPH**

**Senior Associate Dean for Medical Education**

**John P. Wolf 33° Masonic Distinguished Professor of Urology**
**Faculty Associate – The Landon Center on Aging**

**The University of Kansas School of Medicine**
**Kansas City, Kansas USA**

## Educational Objectives

Review recent evidence-based data including recommendations for catheter use

- Intraoperative / perioperative concepts
- Catheter technology
  - Silver coated catheters
  - Antibiotic coated catheters
  - Nanotechnology
- Urethral reconstruction and duration of catheter use
- Antibiotic administration at the time of catheter removal or manipulation
- Discuss the relationship between catheter use and risk of delirium in geriatrics

## Intraoperative / Perioperative

## Intraoperative / Perioperative

Timing of catheter placement

- Prior to preparation of the patient
- After preparation on sterile surgical field

Limited scientific data

Often associated with surgeon preference or specific surgical procedure

- Will the catheter be manipulated during surgery?
- Urologic versus other surgical procedures?
- Anesthesia monitoring of urinary output
  - Temperature monitoring

## Intraoperative / Perioperative

Transurethral catheter (Foley) versus other options (suprapubic or other drains)

- Dependent on specific surgical procedure and surgeon preference
- Will catheter be manipulated postoperatively?
- How long is catheter drainage required?
- Is the catheter necessary as a bridge across a reconstructive repair?

- General lack of evidence-based data

## Intraoperative / Perioperative

Transurethral versus suprapubic tube

- Systematic review and meta-analysis
  - 12 Randomized controlled trials
  - 1,300 women undergoing gynecologic surgery
  - Primary outcome – urinary tract infections
  - Secondary outcomes
    - Need for recatheterization
    - Duration of catheterization
    - Catheter-related complications
    - Duration of hospital stay

*Healy EF et al: Obstet Gynecol 2012, 120: 678-687*

## Intraoperative / Perioperative

- SP tubes reduced infection (20%) vs. Foley (31%)
  - OR 0.31, 95% CI 0.185-0.512, p < 0.01
- SP tubes increased complications (29% vs. 11%)
  - OR 4.14, 95% CI 1.327-12.9, p = 0.01
  - Mostly due to tube malfunction
  - No visceral injuries
  - No increased hospital stay
- Not procedures requiring urethral bridging
- Patient satisfaction and cost data lacking

*Healy EF et al: Obstet Gynecol 2012, 120: 678-687*

## Catheter Technology

## Catheter Technology

Systematic review of 8 studies

- Mostly men with spinal injury on CIC for retention
- Gel reservoir and hydrophilic catheters vs. others
- Somewhat lower rates overall UTI with gel reservoir and hydrophilic catheters, but otherwise NO overall differences.
- Cost was higher with the special catheters
- Cost effectiveness not demonstrated
- But recommended giving patients options

*Bermingham SL, et al: BMJ 2013, 345: e8639*

## Catheter Technology

Cochrane review of 23 trials

- 5,236 hospitalized adults in 22 parallel group trials
- 27,878 adults in a cluster randomized cross-over trial
- Silver or antibiotic treated catheters compared to control
- Silver alloy catheters reduced asymptomatic bacteriuria
  - < 1 week (RR 0.54); > 1 week (RR 0.36)
  - Economic benefit is unclear
- Antibiotic catheters showed short term effects only
  - < 1 week (RR 0.36-0.52); > 1 week (no difference)
- No differences between different standard catheters

*Schumm K, Lam TBL: Neurourol Urodyn 2008, 27: 738-746*

## Catheter Technology

Do silver coated catheters increase strictures?

- Retrospective review – single institution
  - Men undergoing robot assisted laparoscopic radical prostatectomy for prostate cancer
  - Two 12 month intervals with specific catheters
  - 188 men standard & 217 men silver alloy catheters
  - Median followup 18 months
  - 0 strictures standard vs. 6 strictures with silver alloy
  - Rate 0% vs. 2.8% (p = 0.03)
  - Limitations – nonrandomized, retrospective

*Liu XS et al: Urology 2011, 78: 365-367*

## Catheter Technology

Do antimicrobial or silver alloy catheters decrease infection?

- Prospective, randomized, multicenter trial
- 24 hospitals in UK
- Adults requiring catheter ≤ 14 days
- Equally randomized 1:1:1 to silver alloy, nitrofural, or control catheters
- Primary outcome was symptomatic UTI
  - 3.3% reduction would be considered useful clinically
- Secondary outcomes were comfort

*Pickard R et al: Lancet 2012, 380: 1927-1935*

## Catheter Technology

- 7,102 subjects randomized – but 10% (708) excluded
- Of those catheterized, UTI occurred:
  - 228 (10.6%) of 2,153 with antibiotic catheter
  - 263 (12.5%) of 2,097 with silver alloy catheter
  - 271 (12.6%) of 2,144 with standard catheter (control)

- No statistically significant difference between groups
- Reduction of UTI in antibiotic group did not meet threshold
- Patients with antibiotic catheter had more discomfort
- Concluded that neither treated catheter was superior

*Pickard R et al: Lancet 2012, 380: 1927-1935*

## Catheter Technology

Antibiotic nanotechnology

- 1,150 subjects randomized to catheter sprayed with sterile saline vs. antibiotic nanoparticles
- Daily catheter care used same sprays
- 7 days of indwelling catheterization
- Outcome was bacterial colonization
  - Incidence of bacteriuria was reduced by treatment
  - 4.52% treated vs. 13.04% controls ($p < 0.001$)
- Catheters also tested in an *in vitro* assay
  - Reduced biofilm in treated vs. controls ($p < 0.001$)

*He W, et al: J Translational Med 2013, 10(Suppl 1): S14*

## Catheter Duration and Removal

## Urethroplasty

- Survey of 40 international reconstructive urologists
- Questionnaire specific to urethroplasty
- 85% response rate
- Extensive variability in actual practice
  - 71% preoperative urine cultures (? timing)
  - 41.8% treat for $10^5$ CFU – 35% for 7 days
  - 58.8% would NOT delay surgery if not treated
  - Most give 2 antibiotics perioperatively
    - 42% aminoglycoside + penicillin
  - 18-24% give antibiotics > 24 hour after surgery
  - 61% continue antibiotics until catheter out
    - 2-4 weeks + additional at removal

McDonald and Buckley: *Urology* 2016; 94: 237-245

## Urethroplasty

- Catheter duration after urethral reconstruction?
- Wide variability
  - Surgeon preference and technical aspects
  - Vascularized flap? Graft? What materials?
- Prospective study 219 patients – catheter duration
  - ≤ 10 days (n = 86) or > 10 days (n = 133)
  - 3.5% postoperative extravasation in group 1
  - 8.6% postoperative extravasation in group 2
  - Strictures: longer and more complex in group 2
- Catheters can be safely removed at 8-10 days in most

Poelaert et al: Minerva Urol Nefrol 2016; PMID 27097155

## Antibiotics and Catheter Removal

- Use of antibiotics at time of catheter removal has been variable
- Often determined by surgeon / physician preference and training dogma or tradition
- Limited evidence-based data
- Theory is to reduce potential bacterial seeding from catheter biofilm or urine to reduce risk of UTI or urosepsis

## Antibiotics and Catheter Removal

- Prospective, randomized trial 239 adults after elective abdominal surgery
  - 3 days of antibiotics (TMP/SMX) vs. control
  - Urine cultures before and 3 days after removal
  - Treated patients had reduced UTI incidence ($p < 0.001$)
    - 5 of 103 (4.9%) with antibiotics had UTI
    - 22 of 102 (21.6%) without antibiotics had UTI
    - Absolute risk reduction was 16.7%
    - Relative risk reduction was 77.5%
    - Number needed to treat = 6
    - Bacteriuria at 3 days also reduced (16.5% vs. 41.2%, $p < 0.001$)

*Pfefferkorn U et al: Ann Surg 2009, 249: 573-575*

## Antibiotics and Catheter Removal

- Retrospective cohort study
  - Catheter removal 1 week after radical prostatectomy
  - 3 days of ciprofloxacin vs. no treatment
  - Single institution, two different surgeons
    - Antibiotics reduced incidence of UTI ($p = 0.019$)
    - 8 of 261 (3.1%) receiving antibiotics had UTI
    - 33 of 452 (7.3%) not receiving antibiotics had UTI
    - Number needed to treat = 24
    - Readmission for febrile UTI not significantly different
      - 0% vs. 1.1%, $p = 0.16$

*Pinochet R et al: Urol Int 2010, 85: 415-420*

## Antibiotics and Catheter Removal

- Prospective, randomized, placebo controlled trial of 140 adults undergoing abdominal or hip surgery
- Catheter drainage for 3 – 14 days
- Bacteriuria and UTI at 12 – 14 days post removal
  - Single dose antibiotics administered at removal
    - co-trimaxazole 960 mg (n = 46)
    - ciprofloxacin 500 mg (n = 43)
    - placebo (n = 51)
  - Bacteriuria incidence was 19%, 19%, 33% ($p > 0.05$)
  - UTI incidence was 3%, 0%, 3% ($p > 0.05$)
  - Concluded antibiotics were not statistically useful

*Van Hees BC et al: Clin Microbiol Infect 2011, 17: 1091-1094*

## Delirium

## Delirium

Multifactorial syndrome

High incidence after surgery
- 10-15% of elective non-cardiac surgery
- > 50% after emergency surgery

Increased risk mortality within one year (2-3x)

Increased risk cognitive decline, nursing home

Beware underlying risks (prior episode, dementia)

*Arch Intern Med 162:457-463, 2002*
*JAMA 291: 1753-1762, 2004*

## Delirium

Confusion Assessment Method (CAM)

- 1) Acute change mental status w/fluctuating course
- 2) Inattention

AND either

- Disorganized thinking or Altered level of consciousness

Sensitivity = 94 - 100%
Specificity = 90 - 95%

*Inouye SK: Arch Intern Med 113:941-948, 1990*
*Inouye SK: NEJM 354:1157-1165, 2006*

## Delirium

Prevention is key

- Environmental orientation, family, sleep cycles
- Assistive devices (hearing aids, glasses, etc.)
- Avoid restraints – physical, chemical, catheters
- Avoid risky drugs
  - Narcotics 2.5 – 2.7 fold increased risk
  - Sedative hypnotics 3.0 – 11.7 fold increased risk
  - Anticholinergics 4.5 – 11.7 fold increased risk

## Delirium

Computerized clinical decision support system

- Consulting geriatrician
- Removing catheter (72 & 76%, p=0.99) / restraints / avoiding anticholinergic medications
- 60 older adults admitted to ICU, cognitive impairment (baseline) mean 74.6 years
- Incidence of delirium 27-29% (p=0.85)
- This system may not be effective for these outcomes

*Kahn BA et al: Am J Crit Care 2013, 22: 257-262*

## Delirium

Clinical intervention trial

- 60 older adults (mean age 74.6) with cognitive impairment admitted to ICU care
- Randomized to electronic prompts to staff physicians to do preventive measures
  - Consult geriatrics, remove restraints, remove Foley
  - Discontinue anticholinergic medications
- No differences observed in these 4 measures
- No difference in incidence of delirium (27% vs. 29%)
- Effectiveness of prompts?

*Khan BA et al: Am J Critical Care 2013, 22: 257-262*

## Delirium

Clinical study examining risk factors in ICU

- 4 hospitals (1 academic, 2 community, 1 private)
- 523 patients assessed using validated measures
- Overall incidence of delirium 30%
- Strongest patient factors
  - Smoking (OR 2.04)
  - Alcohol use ≥ 3 drinks daily (OR 3.23)
  - Living alone at home (OR 1.94)
- Care factors were also highly predictive

*Van Rompaey B et al: Critical Care 2009, 13: R77*

## Delirium

- Clinical care factors
  - Physical restraints (OR 33.84, 11.19 – 102.36)
  - Sedation (OR 13.66, 7.15 – 26.10)
  - Length of ICU stay > 2 days (OR 5.77, 3.71 – 8.97)
  - **Urinary catheter (OR 5.37, 95% CI 2.09 – 13.80)**
  - Benzodiazepine (OR 2.89, 1.44 – 5.69)
  - No visitors (OR 2.83, 1.50 – 5.36)
  - Isolation (OR 3.74, 1.69 – 8.25)
  - No normal food (OR 3.83, 2.36 – 6.22)

*Van Rompaey B et al: Critical Care 2009, 13: R77*

## Indwelling Catheters

## Indwelling Catheters

Indwelling catheters may be useful in highly selected older adults
- Primarily retention – not incontinence

May be useful when CIC is impossible
- Physical limitations
  - Morbid obesity / Lower extremity contractures
  - Urethral strictures not amenable to surgical reconstruction
- Cognitive limitations
  - Behavioral issues / dementia
  - Discomfort with CIC
- Reduce caregiver / staffing burden for CIC
- Surgical urinary diversion / reconstruction not possible

## Summary

- Care is highly tailored to each individual patient, particularly for operative catheter use
- Catheter technology has not substantially changed UTI risk
- Wide variability in perioperative catheter use
- Antibiotics appear useful at time of catheter removal

## Summary

- Indwelling catheters increase risk of delirium
- Use in highly select patients
- Recommendations regarding catheter use are evolving
- Research and evidence base are expanding

KU Medical Center

Theo and Alfree M. Landon Center on Aging

## Mary H. Wilde

Affiliations to disclose†:

† All financial ties (over the last year) that you may have with any business organisation with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

- ☐ Self-funded
- ☒ Institution (non-industry) funded
- ☐ Sponsored by:

## ICS conference 2016

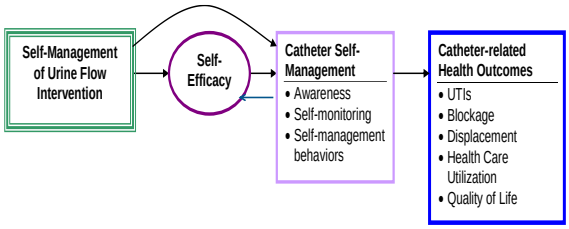
# Workshop on: Evidence-base and Clinical Application of Urologic Catheters

# Summary of research on indwelling catheter self-management

Mary H. Wilde, PhD, RN, Professor
University of Rochester (USA)

Funding NIH/NINR R01 NR01553

## Theoretical model for Self-management of Urine Flow Intervention (RCT)






## Study design- RCT (N= 202)

**Four contacts with Intervention nurse: 3 home visits, 1 telephone call**

**Teaching self-monitoring for 3 days**
- **Urinary diary ( I & O and catheter journal)**
- **Educational booklet**

**To increase awareness, self-monitoring and self-management behaviors**

**Data collection bimonthly for a year**



## Sample

**Similar number males (51%) and females (49%)**

**Age: 19-96, mean 61(SD 17.4) years**

**Urethral 56%, Suprapubic 44%**

**Use of catheter: 1-470 months, mean 6 (SD 7) years**

**Diverse by race and ethnicity**
- **white (57%), Black (30%), Asian (2%), American Indian or Alaskan Native (2%), biracial (2%), and unknown (9%). And 11% Hispanic**

**Highly disabled: 60% need help in bathing, dressing, toileting, and getting out of bed; 19% need help in feeding**



## January 2009 Catheter Calendar

| SUNDAY | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY |
|---|---|---|---|---|---|---|
| Problems: B= Blockage U= Urinary Tract Infection D = Falls Out/Dislodged Treatments: What Was Done? A= Antibiotic O= Extra Office Visit HV= Extra Nurse Visit ER= Emergency Room H= Hospitalizations R= Rehabilitation | | | | 1 | | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

## Educational Booklet--Basic Catheter Self-Management--Fluids

- **Stay Aware**. stay aware of your body and how you feel.
- **Drink more water** than any other beverage! Limit caffeine.
- **Drink Consistently**. Optimal and consistent level all day to help prevent catheter blockage.
- **Your Body Needs Fluids**. Most people need 2000 to 3000 cc of fluid a day. For instance a 150 pound person would need 2045 cc which is equivalent to about 8½ glasses per day. More fluids are needed for hot weather or when exercising. My fluid goal is _____.
- **Pay attention** to the color of your urine. It should be light yellow all day long.



## Basic Catheter Self-management- Prevent dislodgement

- **Notice Changes** in what you feel.
- **Notice Catheter Position** when you move and teach others.
- **Check for kinks and twists** by feeling with your hand.
- **Ask for Help**.



## Tips from Catheter Users

"**Drink the water and go**!"

"I didn't know amounts of intake and output."

"I am paying attention to the color and quantity of the urine."

"Now I drink more when I am out of the house."

"I measure intake and caffeine and notice the color of urine, and sediment in the tubing. I am really being aware."

"I check the position of the catheter when getting in and out of bed."

"I think about how to best secure the catheter during activities to take the pressure off it."

**"If something does not feel right, act on it quickly!"**



## Quick Guide to Problems and Action Strategies

| Problem | Action Strategies | See Page Number |
|---|---|---|
| Decreased/inconsistent fluid intake | Increase fluid intake | 7 |
| UTI | Increase fluid intake<br>Recognize early symptoms of UTI and acting on it | 7<br>8 |
| Catheter blocks | Increase fluid intake<br>Promote catheter changes at best intervals | 7<br>11 |
| Adjustment to living with a catheter | Approaches for living with a catheter | 9 |
| Not sure of the best schedule for catheter changes | Promote catheter changes at best intervals | 11 |
| Kinks, twists, or tugs on catheter | Prevent kinks, twists, or tugs on catheter | 13 |
| Too much caffeine | Decrease caffeine | 14 |
| Catheter leaks | Decrease catheter leakage<br>Empty urine bag | 15<br>16 |
| Urine bag odor | Clean urine drainage bag | 17 |
| Changes with sex | Make adjustments for sexual activity | 18 |
| Autonomic Dysreflexia (for people with spinal cord injury) | Recognize early symptoms of Autonomic Dysreflexia | 19 |



## Increase fluid intake

- "I am more conscious of what I drink. I am adamant about drinking 6 glasses of water
- Low fluid intake might be associated with blockage and urinary tract infection (UTI).

| Paying Attention | Things You Can Do |
|---|---|
| Notice whether you are getting enough fluids throughout the day. | Drink 2000-3000 cc. fluids per day. More fluid than this is not advised as it can interfere with body defenses and/or electrolytes.<br>If you like the water cold, keep several bottles in the fridge and refill them everyday.<br>To add flavor to water, try 2 oz of cranberry or apple juice to 8-10oz of water. You may also try adding a little "Tang."<br>Keep glasses of water scattered throughout the house.<br>Secure a jug of water to your wheelchair.<br>You may want to drink around meal times and before bed.<br>Have a caregiver remind you to drink water. |
| Notice changes in color or odor of urine. | If color gets dark or urine has foul smell, increase water. |
| If you are on fluid restriction, make sure that you stay within the restricted range. | Record occasionally to check that you are staying within range. |
| Be aware of changes in | Use a journal to increase awareness of how activity affects fluid |

## Background about fluids and blockage

- Sodium, magnesium, and calcium drop out of the urine, often about 6.8 pH, causing sediment and encrustation.
- Urine pH could increase to as high as 9 or 10 and the catheter might not block if fluid intake is increased to DILUTE the concentration of minerals. (Khan et al. 2010)
- Urine pH differs from Nucleation pH (mineral drop out point).
  - Diluted urine from **higher and consistent levels of fluids** over the day extends time between catheter changes.
  - Citrate drinks also can increase nucleation pH. We did not try that.

## Symptom recognition

Urine Changes:

- Color – Discolored, cloudy, dark, blood stained
- Odor – Foul smelling, change in smell from usual
- Sediment (grit) – Increased amount

Temperature – Fever chills,

Pain and/or pressure in bladder area or back (Burning possible, not common)

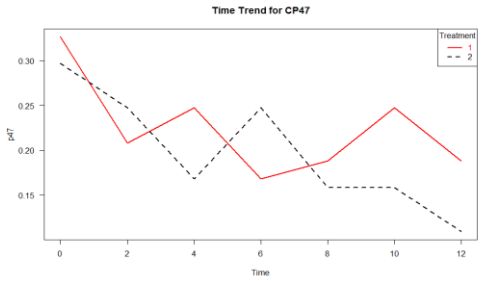
Early, mild symptoms of autonomic dysreflexia (e.g., goosebumps, headaches, sweats) mainly in people with spinal cord injury

General Symptoms Blahs!, feeling sick

- Functioning or mental changes – weakness, spasticity, change in the level of alertness (Wilde, McDonald et al., 2013)

NIH/NINR R01 NR01553

## Results: UTI bimonthly % (Y/N)--no significant difference



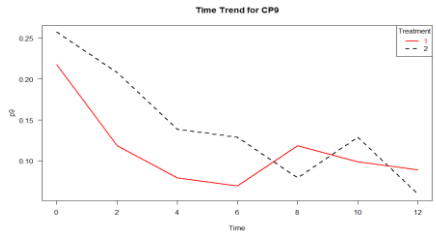

Funding NIH/NINR RO1 25031

## Results: Rates UTI/1000 catheter days

| | Intervention group | Control group | Group P values | Change from baseline rates: Intervention | Change from baseline rates: Control |
|---|---|---|---|---|---|
| **UTI Rates** | Simple Rates (95% CI) | | | Change in rates P values | |
| **Intake- prior two months** | 6.9 (5.00, 9.37) | 5.5 (3.79, 7.72) | 0.32 | | |
| **First 6 months** | 4.4 (3.40, 5.53) | 4.8 (3.82, 6.03) | 0.55 | 0.02 | 0.53 |
| **Second 6 months** | 5.5 (4.31, 6.87) | 3.3 (2.41, 4.39) | 0.01 | 0.22 | 0.02 |
| **Full 12 months** | 4.9 (4.12, 5.75) | 4.1 (3.42, 4.91) | 0.16 | 0.05 | 0.14 |

Funding NIH/NINR RO1 25031

## Results: Blockage bimonthly %--significant difference first 6 months in experimental group = 0.0168)




Funding NIH/NINR RO1 25031

## Results: Rates Blockage/1000 catheter days

| | Intervention group | Control group | Group P values | Change from baseline rates: Intervention | Change from baseline rates: Control |
|---|---|---|---|---|---|
| **Blockage Rates** | | | | | |
| **Intake-prior two months** | 9.4 (6.98, 12.05) | 11.5 (8.95, 14.55) | 0.23 | | |
| **First 6 months** | 4.3 (3.32, 5.43) | 7.4( 6.14, 8.86) | <0.01 | <.0001 | 0.0036 |
| **Second 6 months** | 5.3 (4.15, 6.67) | 4.5 (3.41, 5.71) | 0.31 | <.0001 | <.0001 |
| **Full 12 months** | 4.8 (4.00, 5.62) | 6.0 (5.20, 6.99) | 0.03 | <.0001 | <.0001 |

Funding NIH/NINR RO1 25031

## Results

- CAUTI and dislodgement outcomes did not differ by group.
- **Blockage was significantly lower (P=. 02)** in the intervention group, but the result did not last the full 12 months.
- Rates showed **both groups** improved.
- The intervention group had **more ED visits & hospitalizations** for CAUTI and also **higher self-reported CAUTI severity scores**. Not powered for hospitalization.

NIH/NINR RO1 NR01553

## Conclusion

- **Both groups improved over t**ime--Self-monitoring r/t calendar (unintentional intervention).
- **Unclear** whether decreases in UTI, blockage, and dislodgement rates were related to the intervention.
- **Symptom identification, severity of UTIs, & getting care early** could be r/t higher hospitalization for CAUTI in the intervention group.



## Implications

- Recommend **additional nurse supp**ort over time to sustain intervention.
- Value in **optimal/consistent fluid int**ake.
- **Catheter calendar**, a minimal intervention, **could be easily implemented.**



# Additional Recent Analyses

Descriptive analysis, predictions of CAUTI & blockage, healthcare utilization and structural equation modeling



## Key Catheter Problems

| Primary catheter problems (# events) | Percentage reporting problem * | Mean (SE) | Rate/1000 catheter days |
|---|---|---|---|
| CAUTI (268) | 57% | 0.27 (0.017) | 4.49 |
| Blockage (507) | 34% | 0.51 (0.114)** | 8.54 |
| Dislodgement (139) | 28% | 0.14 (0.019) | 2.33 |

*Indicates the percentage of study participants who had this happen ***at any time*** during the previous 12 months, rounded to nearest percent. This does not include baseline data.

**87% of responses were zero. Among non-zero responses bi-monthly, the range was 1 to 60, mode and median=1, mean=3.96 (SE: 0.81. (Article Wilde, et al. in review)



## Other catheter problems

- Leakage (bypassing) 67%
- Bladder spasms 59%
- Kinks/twists 42%
- Sediment 87%
- Catheter related pain 49%

(Article Wilde, et al. in review)



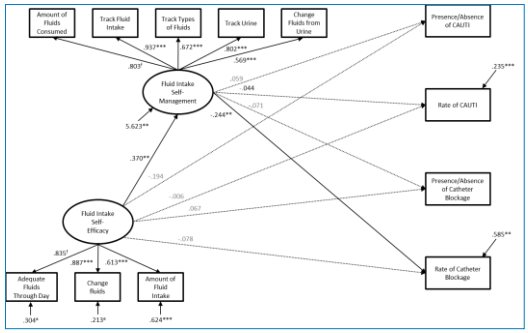
| Treatments for | CAUTI | | Blockage | |
|---|---|---|---|---|
| Type of excess healthcare events | Total n events (n=268) | Number and % people affected (n=110) (57%) | Total n events for reports on up to 12 blockages (n= 344) | Number and % affected people affected (n=66) (34%) |
| Extra nurse home visit | 50 | 40 (36.70%) | 97 | 26 (39.39%) |
| Extra office visit | 73 | 45 (41.28%) | 29 | 18 (27.27%) |
| ED visit | 79 | 51 (46.79%) | 17 | 12 (18.18%) |
| Hospitalized | 49 | 31 (28.44%) | N/A | N/A |
| Catheter changed | 155 | 84 (77.06%) | 209 | 55 (83.33%) |
| Urine cultured | 216 | 98 (89.91%) | N/A | N/A |
| Antibiotic prescribed | 267 | 109 (100%) | N/A | N/A |

## Predictions of catheter problems

| | CAUTI | | Blockage | |
|---|---|---|---|---|
| Variable | OR (95% CI) | P-value | OR (95% CI) | |
| Blockage | 1.52 (0.99, 2.33) | 0.057 | | |
| **Catheter problems (secondary)** | | | | |
| Leakage (yes/no) | 1.34 (1.00, 1.79) | 0.052 | 1.91 (1.19, 3.04) | 0.007 |
| Kinks/twists (yes/no) | 1.15 (0.82, 1.61) | 0.418 | 1.40 (0.83, 2.35) | 0.203 |
| Bladder spasms (yes/no) | 2.86 (2.00, 4.08) | >0.001 | 1.62 (1.06, 2.47) | 0.026 |
| Catheter related pain (yes/no) | 1.00 (0.97, 1.05) | 0.720 | 1.13 (0.70, 1.83) | 0.609 |
| Sediment (yes/no) | 1.81 (1.28, 2.55) | 0.001 | 4.23 (2.45, 7.28) | <0.001 |

NIH/NINR R01 NR01553 (Article Wilde, et al. in review)

## Structural Equation Modeling




NIH/NINR R01 NR01553; article Wilde et al. 2016

## Conclusion of additional analyses

1. **Cather blockage marginally (.057) predicted CAUTI**.
2. **Leakage, sediment, and bladder spasms** predicted both CAUTI and blockage.
   - The **amount and frequency of sediment** as well as **irrigation** also predicted blockage.
   - A **large amount of sediment** predicted CAUTI.
3. Additional **healthcare utilization is common** related to CAUTI and blockage. (Wilde et al. in review)
4. SEM suggests increased confidence (**self-efficacy) about fluids can increase self-management about fluids and decrease the frequency of catheter blockage**. (Wilde et al., 2016)
5. More research in this area is warranted **targeting people with frequent blockage.**

## Acknowledgement of teams

Research team **main findings**: Wilde, M. H. (PI), McMahon, J.M. (Co-I), McDonald, M., Tang, W., Wang, W., Brasch, J., Fairbanks, E., Shah, S., Zhang, F., Chen, D.

Team for **SEM and CAUTI/block analysis**: Wilde, M. H., Crean H., McMahon, J. M. and Brasch, J.

NIH/NINR R01 NR01553

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