W22: Evidence-base and Clinical Application of Urologic Catheters
Workshop Chair: Diane Newman, United States
15 September 2016 11:00 - 12:30

<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
<th>Topic</th>
<th>Speakers</th>
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<tbody>
<tr>
<td>11:25</td>
<td>11:45</td>
<td>Current guidelines on the use of urinary catheters</td>
<td>Jaclyn (Seok) Lee</td>
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<td>Mary Wilde</td>
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<tr>
<td>12:25</td>
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<td>Questions</td>
<td>All</td>
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**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**
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

<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
<th>Topic</th>
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<tbody>
<tr>
<td>11:00</td>
<td>11:25</td>
<td>Introduction: Current use of urologic with differentiation of techniques, indications, complications and nursing management</td>
<td>Diane Newman, DNP Chair</td>
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<tr>
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<td>12:30</td>
<td>Questions, Answers, Discussion</td>
<td>All</td>
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</table>

Objectives

- To detail the current use of urologic catheters used for incontinence and retention.
- 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.
- To describe self-management techniques and the quality of life burden of patients with urinary catheters.
- 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

Intermittent & External Urinary Catheterization

- Indwelling Urinary Catheterization (IUC)
- Intermittent Catheterization (IC)
- External Urinary Catheterization (EC)
• International Consultation on Incontinence 2013–2017


• 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”

Indwelling Urinary Catheterization

• Routes of an IUC
  – 2 methods of insertion
    – Through the urethra or suprapubic (S/P) opening (usually 2 cm above pubic bone)

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.


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

<table>
<thead>
<tr>
<th>% Unaware Their Patient Had A Urinary Catheter</th>
<th>Attending Physician</th>
<th>Residents</th>
<th>Interns</th>
<th>Medical Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>38%</td>
<td>27%</td>
<td>22%</td>
<td>21%</td>
</tr>
</tbody>
</table>


Inappropriate Reasons for IUC Use

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Urinary incontinence</td>
<td>38%</td>
</tr>
<tr>
<td>Use of diuretics</td>
<td>37%</td>
</tr>
<tr>
<td>Bed rest or decreased mobility</td>
<td>34%</td>
</tr>
<tr>
<td>Unaware of recommendations</td>
<td>25%</td>
</tr>
<tr>
<td>Physician uncertainty about the patient’s medical course</td>
<td>21%</td>
</tr>
</tbody>
</table>

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

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)

Complex biofilm communities - Interactions on a variety of scales

Cost Industry $ billions
Contaminate water pipes and food surfaces
KII millions -- NIH: 80% of all infections

Urinary catheter encrustation and blockage

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

A. Hydrogel-coated latex catheter, indwelling suprapublically for 6 months before surgical removal. Crystalline material covered the eyelets 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.
Studies Suggest Efforts to Maintain Compliance with Practice Guidelines Is Difficult

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

<table>
<thead>
<tr>
<th>Hand Washing Compliance</th>
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<tbody>
<tr>
<td>Nurse</td>
<td>52%</td>
</tr>
<tr>
<td>Physician</td>
<td>30%</td>
</tr>
<tr>
<td>Nursing Asst</td>
<td>47%</td>
</tr>
<tr>
<td>Other</td>
<td>38%</td>
</tr>
</tbody>
</table>


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)

Evidence-Based Recommendations for IUC Nursing Practice to Prevent CaUTIs

- Drainage Bag Off Floor?
- < 400 mLs in Drainage Bag?
- Drainage Bag Labeled with Insertion Date?
- Canisters Labeled?
- Drainage Bag Positioned Below Bladder?
- IUC Anchored/Secured?
- IUC Seal Intact?
- Catheter Anchor/Securement Device?
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 detergent”

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


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)

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

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

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)


Distribution of any UTI in relation to Catheter Re-Use

<table>
<thead>
<tr>
<th>Duration</th>
<th>Single use n=11</th>
<th>Re-use n=12</th>
</tr>
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<tbody>
<tr>
<td>Symptomatic UTI Week 8</td>
<td>2 / 10 (20%)</td>
<td>2 / 12 (17%)</td>
</tr>
<tr>
<td>Symptomatic UTI Week 16</td>
<td>2 / 9 (22%)</td>
<td>1 / 11 (9%)</td>
</tr>
<tr>
<td>Proven Bacterial Cystitis Week 8</td>
<td>1 / 10 (10%)</td>
<td>0 / 12 (0%)</td>
</tr>
<tr>
<td>Proven Bacterial Cystitis Week 16</td>
<td>2 / 9 (22%)</td>
<td>2 / 11 (18%)</td>
</tr>
<tr>
<td>Asymptomatic Bacteriuria Week 8</td>
<td>4 / 10 (40%)</td>
<td>4 / 12 (33%)</td>
</tr>
<tr>
<td>Asymptomatic Bacteriuria Week 16</td>
<td>7 / 9 (71%)</td>
<td>2 / 11 (18%)</td>
</tr>
<tr>
<td>Any Bacteriuria Week 8</td>
<td>7 / 10 (70%)</td>
<td>6 / 12 (50%)</td>
</tr>
<tr>
<td>Any Bacteriuria Week 16</td>
<td>5 / 9 (55%)</td>
<td>5 / 11 (46%)</td>
</tr>
</tbody>
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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


Problems with Single-use Catheter

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

Pre-lubricated hydrophilic

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

Pre-lubricated hydrophilic catheter for women
**Hydrophilic catheters: Meta-analysis**

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

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

**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.


**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 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

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

MECs: Considerations for Use

- Sizing (one size does not fit all)
  - Penile Shaft
    - Length (1.5 in) sufficient to support adherence
    - 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

Types

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

Product Performance

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

Patient Preference

- Corvan Optima Sheaths: 69%
- Usual Absorbent Products: 29.3%
- Do Not Know (Wear both day, AP at night): 1.7%
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
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

International Consultation on Incontinence 2013

http://www.ics.org

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

……and care can go wrong!

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

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)
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)

What guidelines are available?

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

Compliance

Best Practice Recommendations (ICI 2009 & 2013)

<table>
<thead>
<tr>
<th>GR</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indwelling catheters should only be used after alternative management strategies have been considered and rejected as unsatisfactory</td>
<td>x</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Duration of catheterisation should be minimal</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A closed drainage system should be maintained to reduce risk of catheter-associated infection</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asymptomatic bacteriuria should NOT be treated with antibiotics (unless urological instrumentation is planned)</td>
<td>B</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>
In patients with recurrent catheter encrustation and blockage, careful monitoring should be undertaken to identify a characteristic pattern of ‘catheter life’ and instigate preemptive catheter changes prior to likely blockage.

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.

- 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, 39 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)

- 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 audit of urinary catheter care and management
- Saving Lives 2005: To reduce the incidence of UTI-related to temporary, urinary catheter a audit of insertion techniques and continuing care
- Dismissing & Excellence 2010: To demonstrate a dramatic reduction in the rate of UTIs for patients (50% in hospitalised patients)
- Safety Thermometer 2012: To deliver harm-free care as defined by the absence of major pressure sores, CAUTI and VTE by December 2012

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

More focus on nurse-led approaches to reduce catheter use

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

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 surgical 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 01722 515422.
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.’


Thank you
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

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

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


**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
- Most procedures requiring urethral bridging
- Patient satisfaction and cost data lacking


**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


**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


**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

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, nitrofuraz, or control catheters
- Primary outcome was symptomatic UTI
  - 3.3% reduction would be considered useful clinically
- Secondary outcomes were comfort


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)


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

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)


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


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-trimoxazole 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


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%


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


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

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 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
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)

Self-Management of Urine Flow Intervention

Self-Management

• Awareness
• Self-monitoring
• Self-management behaviors

Catheter Self-Management

• UTIs
• Blockage
• Displacement
• Health Care Utilization
• Quality of Life

Catheter-related Health Outcomes

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%), bireacial (2%), and unknown (9%). And 13% Hispanic

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

January 2009 Catheter Calendar

Problems:

Dr. Blockage
Dr. Urinary Tract Infection
Dr. Urologic Pelvic Organ Prolapsed
Dr. High Blood Pressure
Dr. Diabetes
Dr. Depression
Dr. Heart Condition
Dr. Chronic Pain
Dr. Incontinence
Dr. Weak Urine Stream

Treatments:

What Was Done?

Dr. Antibiotic
Dr. Urinary Tract Infection
Dr. Urologic Pelvic Organ Prolapsed
Dr. High Blood Pressure
Dr. Diabetes
Dr. Depression
Dr. Heart Condition
Dr. Chronic Pain
Dr. Incontinence
Dr. Weak Urine Stream
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.

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 of 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

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

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)

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

Results: Blockage bimonthly % – significant difference

First 6 months in experimental group = 0.0168

Results: Rates UTI/1000 catheter days

<table>
<thead>
<tr>
<th></th>
<th>Intervention group</th>
<th>Control group</th>
<th>Group P values</th>
<th>Change from baseline rates: Intervention</th>
<th>Change from baseline rates: Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTI Rates</td>
<td>Simple Rates (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake prior two months</td>
<td>6.9 (5.00, 9.37)</td>
<td>5.5 (3.79, 7.72)</td>
<td>0.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First 6 months</td>
<td>4.4 (3.40, 5.5)</td>
<td>4.8 (3.82, 6.03)</td>
<td>0.05</td>
<td>0.02</td>
<td>0.53</td>
</tr>
<tr>
<td>Second 6 months</td>
<td>5.5 (4.31, 6.87)</td>
<td>3.3 (2.41, 4.39)</td>
<td>0.01</td>
<td>0.22</td>
<td>0.02</td>
</tr>
<tr>
<td>Full 12 months</td>
<td>4.9 (4.12, 5.75)</td>
<td>4.1 (3.42, 4.91)</td>
<td>0.16</td>
<td>0.06</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Results: Rates Blockage/1000 catheter days

<table>
<thead>
<tr>
<th></th>
<th>Intervention group</th>
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</thead>
<tbody>
<tr>
<td>Blockage Rates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake prior two months</td>
<td>9.4 (6.98, 12.05)</td>
<td>11.5 (8.95, 14.53)</td>
<td>0.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First 6 months</td>
<td>4.3 (3.32, 5.43)</td>
<td>7.4 (6.14, 8.86)</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Second 6 months</td>
<td>5.3 (4.15, 6.76)</td>
<td>4.5 (3.41, 5.71)</td>
<td>0.31</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Full 12 months</td>
<td>4.8 (4.00, 5.62)</td>
<td>6.0 (5.30, 6.99)</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

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.
Conclusion

• Both groups improved over time—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 support over time to sustain intervention.
• Value in optimal/consistent fluid intake.
• 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

<table>
<thead>
<tr>
<th>Primary catheter problems (# events)</th>
<th>Percentage reporting problem *</th>
<th>Mean (SE)</th>
<th>Rate/1000 catheter days</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTI (268)</td>
<td>57%</td>
<td>0.27 (0.017)</td>
<td>4.49</td>
</tr>
<tr>
<td>Blockage (507)</td>
<td>34%</td>
<td>0.51 (0.114)**</td>
<td>8.54</td>
</tr>
<tr>
<td>Dislodgement (139)</td>
<td>28%</td>
<td>0.14 (0.019)</td>
<td>2.33</td>
</tr>
</tbody>
</table>

*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%

(Treatments for CAUTI & Blockage)

<table>
<thead>
<tr>
<th>Type of excess healthcare events</th>
<th>Total n events (n=268)</th>
<th>Number and % people affected (n=110) (57%)</th>
<th>Total n events for reports on up to 12 blockages (n=344)</th>
<th>Number and % affected people (n=66) (44%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra nurse home visit</td>
<td>50</td>
<td>40 [36.70%]</td>
<td>97</td>
<td>26 [39.39%]</td>
</tr>
<tr>
<td>Extra office visit</td>
<td>73</td>
<td>45 [41.28%]</td>
<td>29</td>
<td>18 [27.27%]</td>
</tr>
<tr>
<td>ED visit</td>
<td>79</td>
<td>51 [46.79%]</td>
<td>17</td>
<td>12 [18.18%]</td>
</tr>
<tr>
<td>Hospitalized</td>
<td>49</td>
<td>31 [28.44%]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Catheter changed</td>
<td>155</td>
<td>84 [77.06%]</td>
<td>209</td>
<td>55 [83.33%]</td>
</tr>
<tr>
<td>Urine cultured</td>
<td>216</td>
<td>98 [89.91%]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Antibiotic prescribed</td>
<td>267</td>
<td>109 [100%]</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

(Article Wilde, et al. in review)
Conclusion of additional analyses

1. Catheter 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.

References


References continued

