

Implementing Strategies to Reduce Hospital-Acquired Catheter-Associated Urinary Tract Infection

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Funding: none to disclose.

The Problem

- Urinary catheters are often placed **unnecessarily**, in place **without physician awareness** and **not removed promptly** when no longer needed.¹
- Prolonged catheterization is the **#1** risk factor for catheter-associated urinary tract infection.²



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- Catheter-associated urinary tract infection (CAUTI) is the #1 nosocomial infection: >1 million cases in hospitals and nursing homes nationwide.²



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- Prolonged catheterization is the #1 risk for catheter-associated urinary tract infection.²
- Catheter-associated urinary tract infection (CAUTI) is the #1 nosocomial infection: >1 million cases in hospitals and nursing homes nationwide.²
- New motivation to prevent CAUTI:³
Hospital-Acquired Conditions Initiative (October 2008):
no additional payment for diagnosis of hospital-acquired CAUTI.

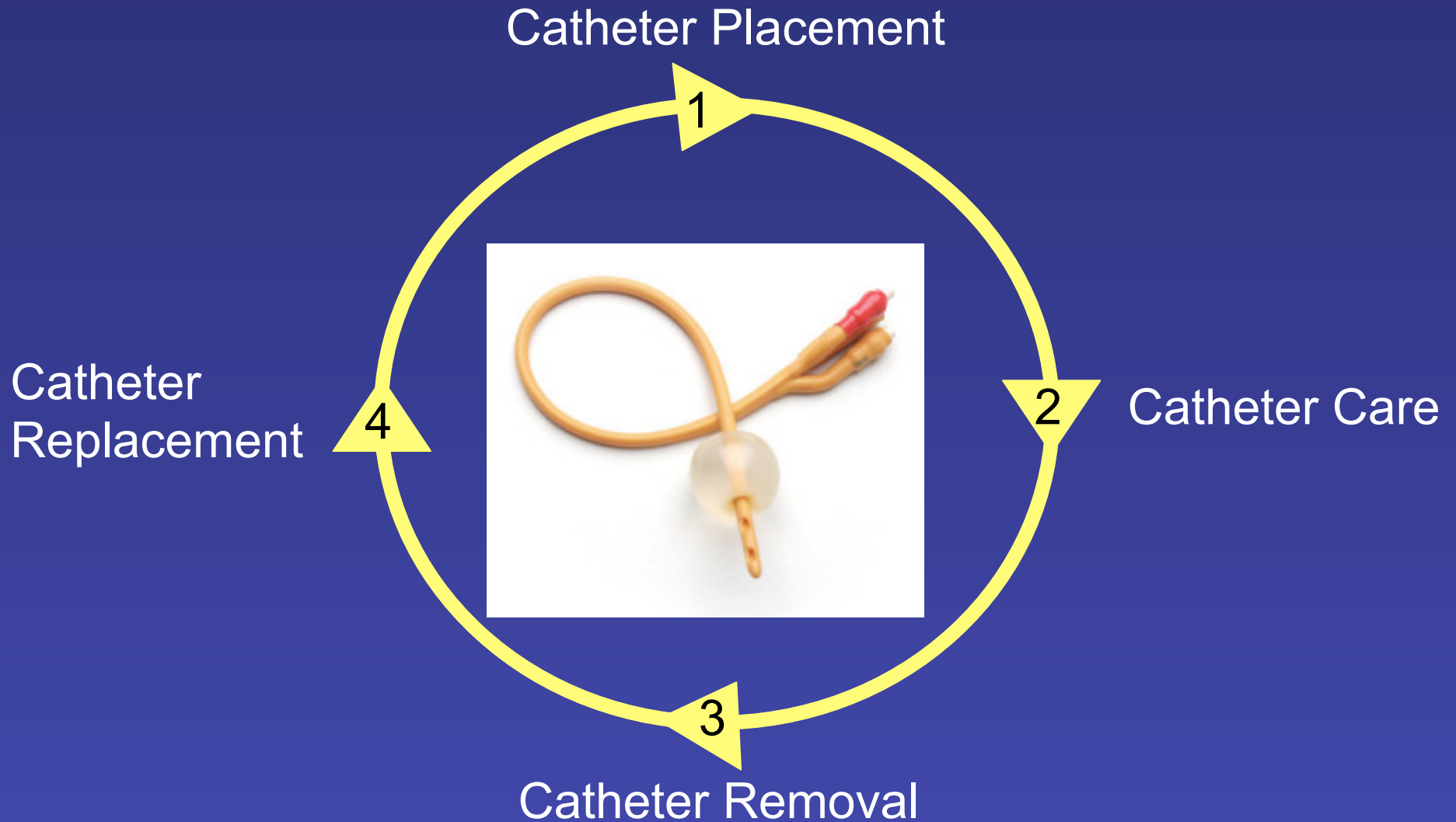


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“Lifecycle” of the Urinary Catheter



Disrupting the Lifecycle of the Urinary Catheter

1. Prevent Unnecessary and Improper Placement

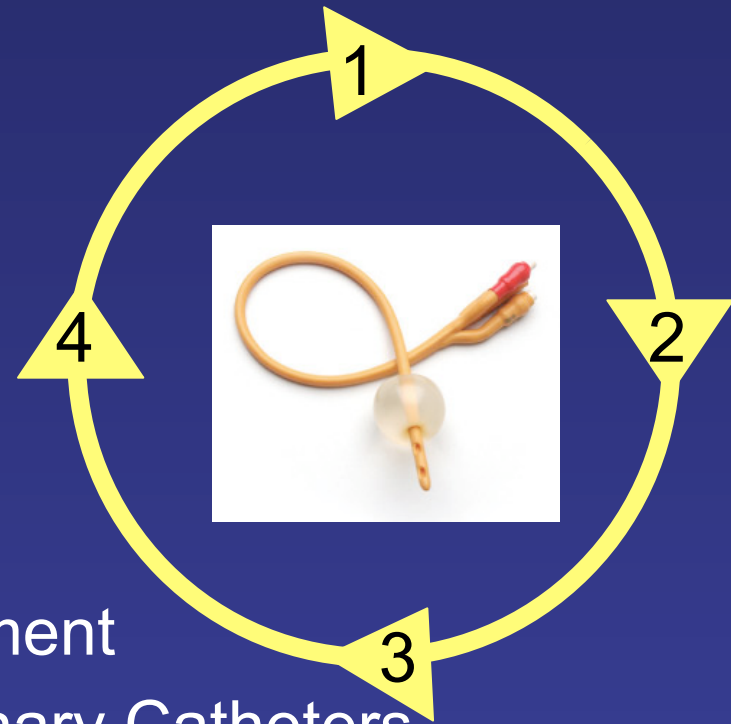
4. Prevent Catheter Replacement



2. Maintain Awareness and Proper Care of Catheters in Place

3. Prompting Catheter Removal

Outline



A. Strategies to Disrupt the Lifecycle of the Urinary Catheter

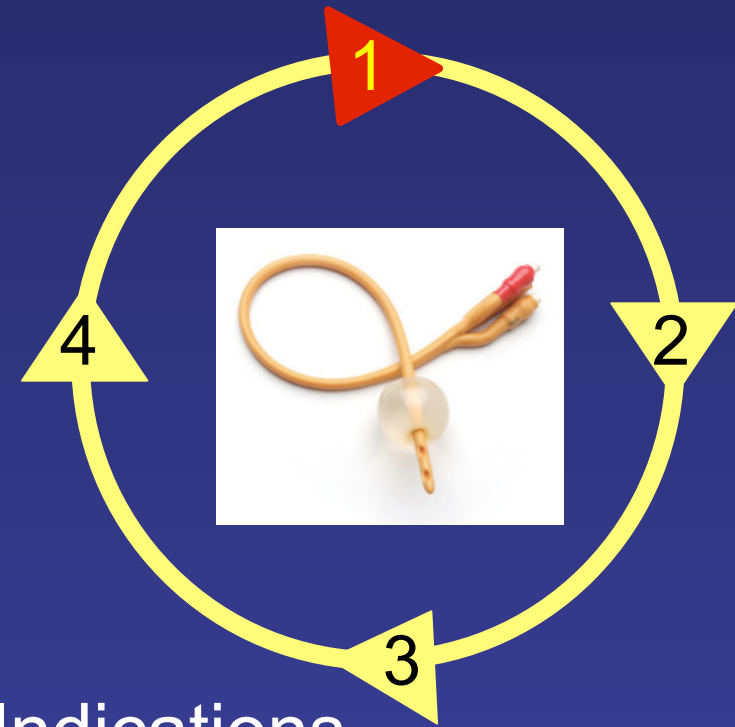
1. Avoiding Unnecessary, Improper Placement
2. Maintaining Awareness and Care of Urinary Catheters
3. Getting Catheters Removed *by Default*
4. Preventing Catheter Replacement

B. Translating Recommendations into Practice:

Champions, “Bladder Bundles,” Pearls and Pitfalls

C. Take-Home Points

1. Avoid Unnecessary and Improper Placement



Recommendations

- Insert Catheters only for Appropriate Indications.
- Ensure only properly trained persons insert catheters, and insert using aseptic technique and sterile equipment.

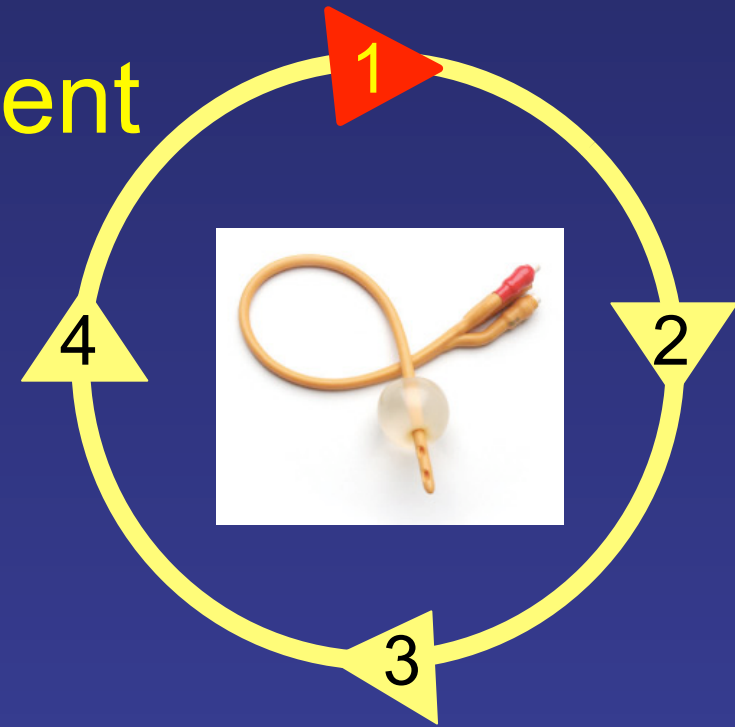
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1. Avoid Unnecessary Placement

To place or not to place?

~21-50% catheterizations were unjustified¹

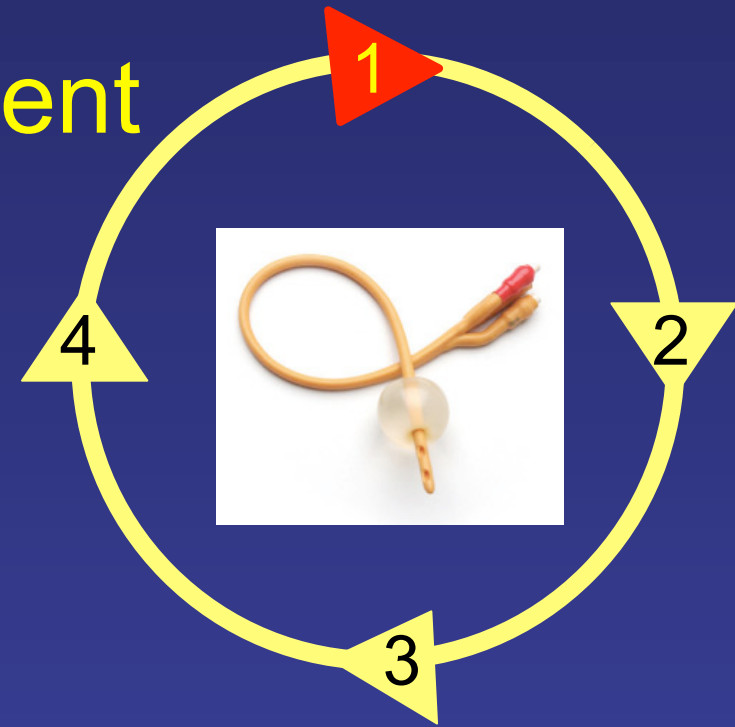


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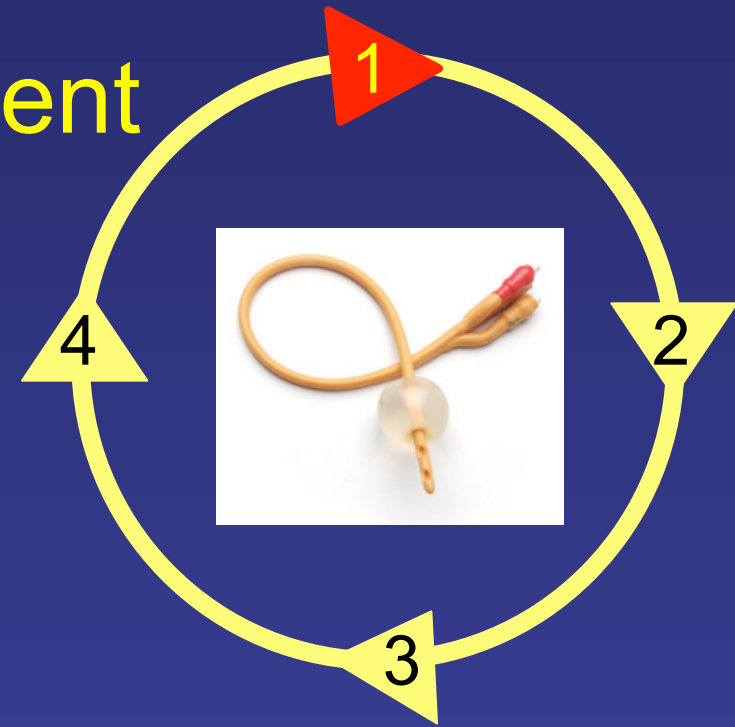
Just Say
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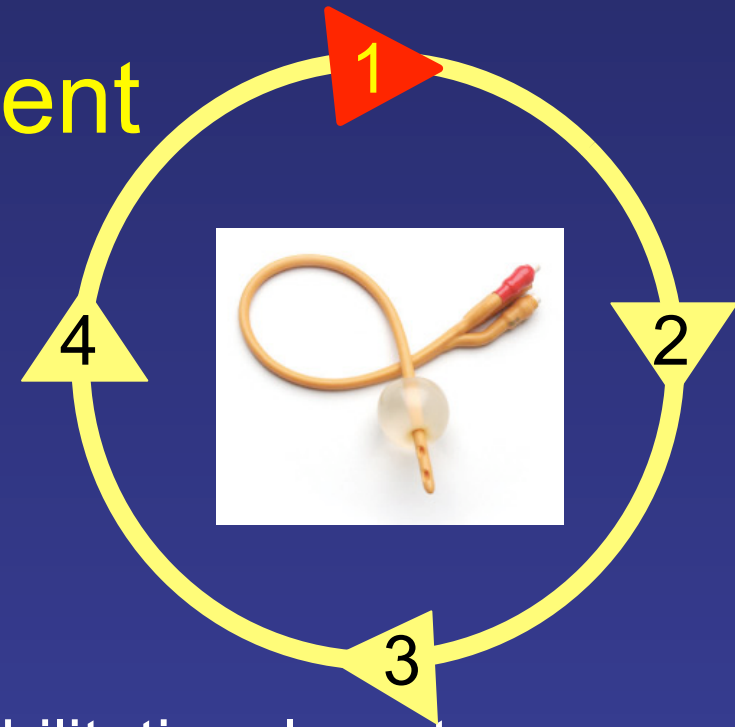
*So why is this
so hard?*

¹Hooton T, et al. IDSA Urinary Catheter Guidelines, CID 2010;50 (1 March):625-663.

1. Avoid Unnecessary Placement

Challenges

- Multiple environments:
 1. Emergency Department,
 2. Pre/Post Operating Room,
 3. Inpatient Unit: acute care, ICU, rehabilitation, long-term care.
- **Different systems of care:** unique procedures for ordering/placing catheters, with varying resources, stakeholders, priorities.

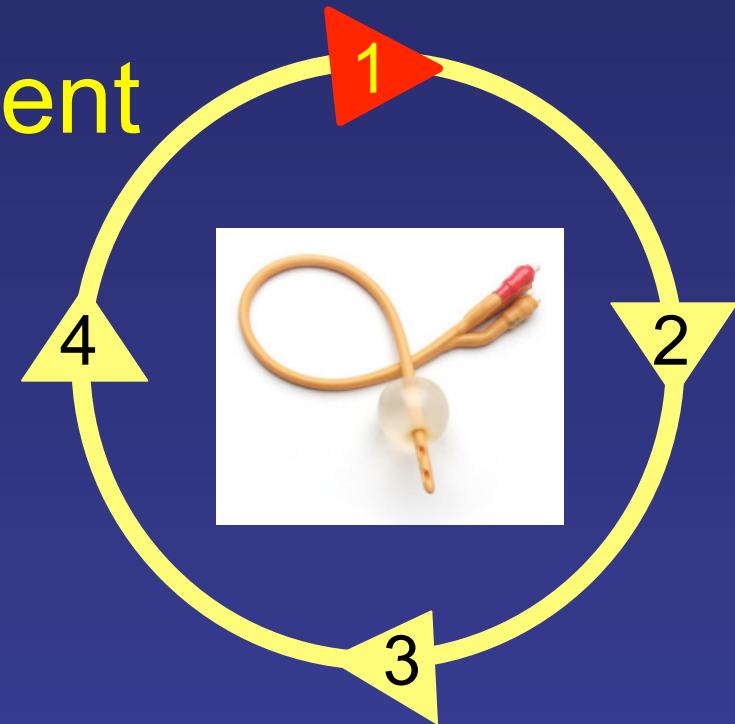


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- Different systems of care: procedures, resources, stakeholders, priorities.

Infection Control Nurse: "...our other barrier is the Emergency Department and this is where most Foleys are placed...Doctors forget to look under the sheets to say 'Oh yeah, there's a Foley there'...and the nurses aren't going to take the initiative...."



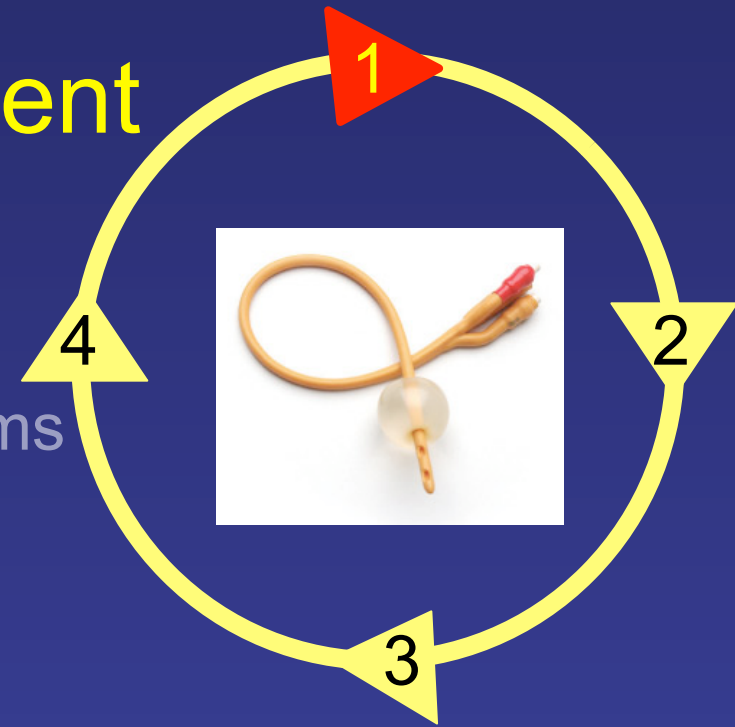
Changing Catheter Use, by Environment

Setting	Specific Strategy	References
Emergency Department	Indication checklists, stickers attached to catheter kits	Gokula, 2005
ICU	Daily checklists used in multi-disciplinary rounds	Dumigan, 1998 Jain, 2006 Reilly, 2008 Huang, 2004
Peri-Procedure	Procedure-specific protocols for catheter placement and post-op stop orders.	Stephan, 2006 Multiple genitourinary catheter protocol studies.
General Admissions	Reminders vs. stop order written, verbal, electronic	Saint, 2005 Fakih, 2008 Topal, 2005 Crouzet, 2007 Apisarnthanarak, 2007

1. Avoid Unnecessary Placement

Challenges

- **Multiple environments**, with different systems of care and different stakeholders/priorities:
 1. Emergency Department,
 2. Pre/Post Operating Room,
 3. Inpatient Unit: acute care, ICU, rehabilitation, long-term care.
- **No Single Source for Distribution (unlike Pharmacy)**: more difficult to regulate, monitor and provide feedback regarding use of urinary catheters.
- **Lack of Consensus on Appropriate Indications for Catheters**



Appropriate Catheter Indications

Patient has acute urinary retention or obstruction

Need for accurate measurements of urinary output in critically ill patients.

Perioperative use for selected procedures:

- urologic surgery or other surgery on contiguous structures of genitourinary tract,
- anticipated prolonged surgery duration (removed in post-anesthesia unit),
- anticipated to receive large-volume infusions or diuretics in surgery,
- operative patients with urinary incontinence,
- need to intraoperative monitoring of urinary output.

To assist in healing of open sacral or perineal wounds in incontinent patients.

Requires prolonged immobilization (e.g., potentially unstable thoracic or lumbar spine)

To improve comfort for end of life care if needed.

Appropriate Catheter Indication Lists

- Limited Evidence of Use of Catheter as Intervention.
- Literature Review
- Expert Consensus...

but which experts?

*physicians (medical, surgical),
nurses, infection control
professionals, medical
directors, microbiology...*

Different Processes & Lists:

Loeb, 2008

Apisarnthanarak, 2007

Topal, 2005

Stephan, 2006

Saint, 2005

Huang, 2004

Fakih, 2008

Dumigan, 1998

Weitzel, 2008

Lo, 2008

Not Appropriate Indications for Catheters

- Substitute for incontinence care tasks.
- Means to obtain urine for diagnostic tests when patient can voluntarily void.
- Prolonged postoperative duration without appropriate indications.
- Routinely for patients receiving epidural anesthesia/analgesia.

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- Means to obtain urine for diagnostic tests when patient can voluntarily void.
- Prolonged postoperative duration without appropriate indications.
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But what about the other well-intended reasons using catheters?

The Other Reasons

- Reduce skin wetness (pressure ulcer risk)?
- Decrease fall risk if unsteady gait?
- Difficulty turning/lifting patients to provide incontinence care:
 - weight (obesity, severe edema), combativeness, extreme frailty.
- Patient Request: fatigue, to avoid pain with walking.

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The Other Risks

- UTI → bacteremia, sepsis, joint infection.
- “One-point restraint” = decreased mobility:
 - blood clots (DVT/PE), pressure ulcers, delirium, pneumonia, deconditioning, fall risk by tripping over catheter.
- Patient discomfort, need to retrain bladder.

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- Longer length-of-stay (more exposure to nosocomial hazards)
- Higher risk of death, disability.

The Other Reasons

Short-term

- Reduce skin wetness (pressure ulcer risk)?
- Decrease fall risk if unsteady gait?
- Difficulty turning/lifting patients to provide incontinence care:
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The Other Risks

Long-term

- UTI → bacteremia, sepsis, joint infection.
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Strategies to decrease catheter use need to provide resources to address these temptations to use catheters:

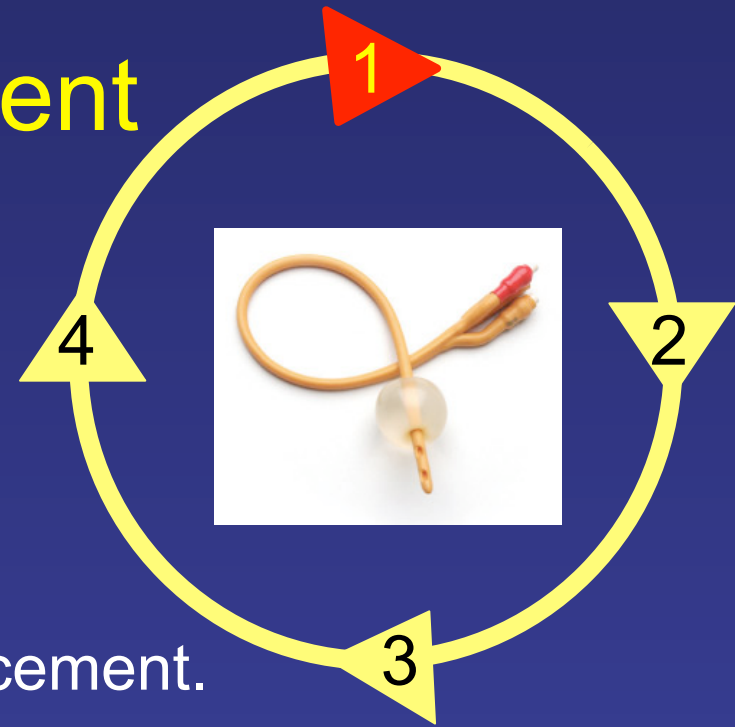
- “People power”: lift teams, care assistants to help with frequent bedside tasks, adjust RN/patient ratios for these tasks.
- Readily-available supplies for catheter alternatives.

1. Avoid Unnecessary Placement

Tools

Require physician order for placement.

Require appropriate indications for catheter placement.



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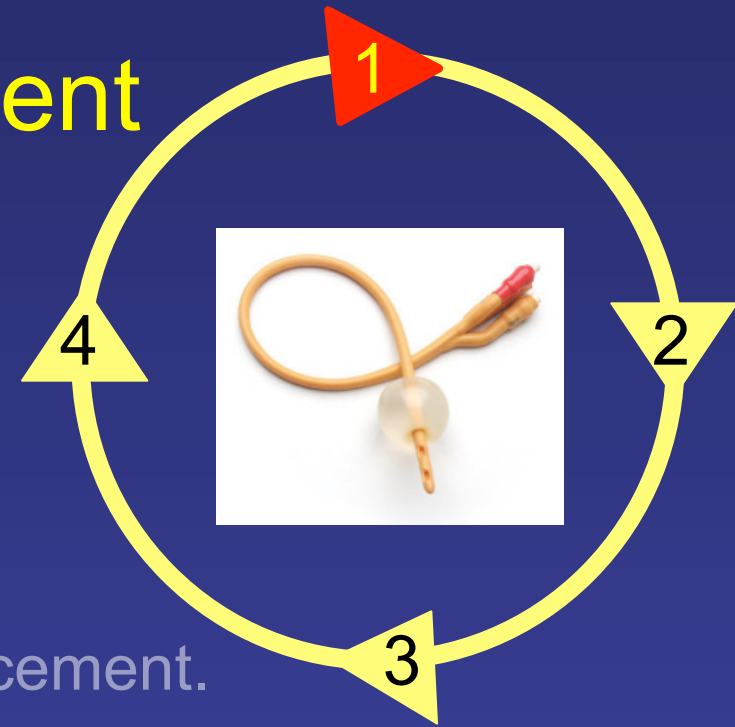
Require physician order for placement.

Require appropriate indications for catheter placement.

Bladder scanners to evaluate/confirm urinary retention.

Catheter Orders with Decision Support:

- Embed reminders for appropriate indications,
- Embed reminders about alternatives to indwelling catheter use,
- Start clock (24-48^o) for catheter removal reminders or stop orders.



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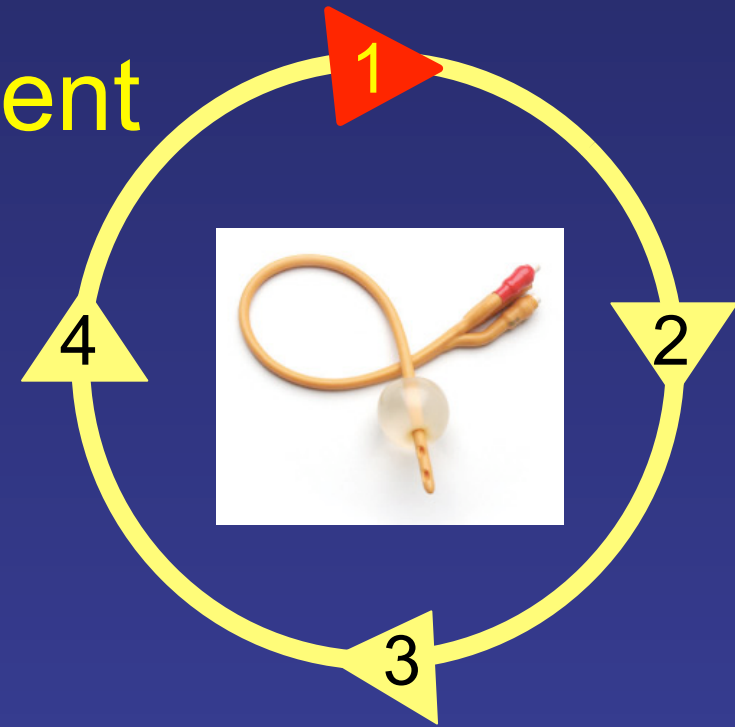
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Alternative to Consider	Indications
Bladder ultrasound	Urinary retention protocols, to avoid catheterization if no significant urine present
Intermittent catheterization	Chronic neurogenic bladder: spinal cord injury/disorder, other neurologic disease. Prostate enlargement Post-operative urinary retention
External catheters	“Condom” catheters: Cooperative male patients with other catheter indications, but no obstruction or urinary retention. Female external catheters: being tested
Other care strategies	Bedside commodes, garments/pads, barrier creams, prompted toileting, “people power”

What are Hospitals Using to Prevent CAUTI?

- National survey of U.S. hospitals (focused on device-related infection)
- 719 hospitals surveyed (Spring 2005)
- Lead Infection Control Professional filled out the survey
- 72% response rate

Snapshot of Hospital Practices to Prevent CAUTI

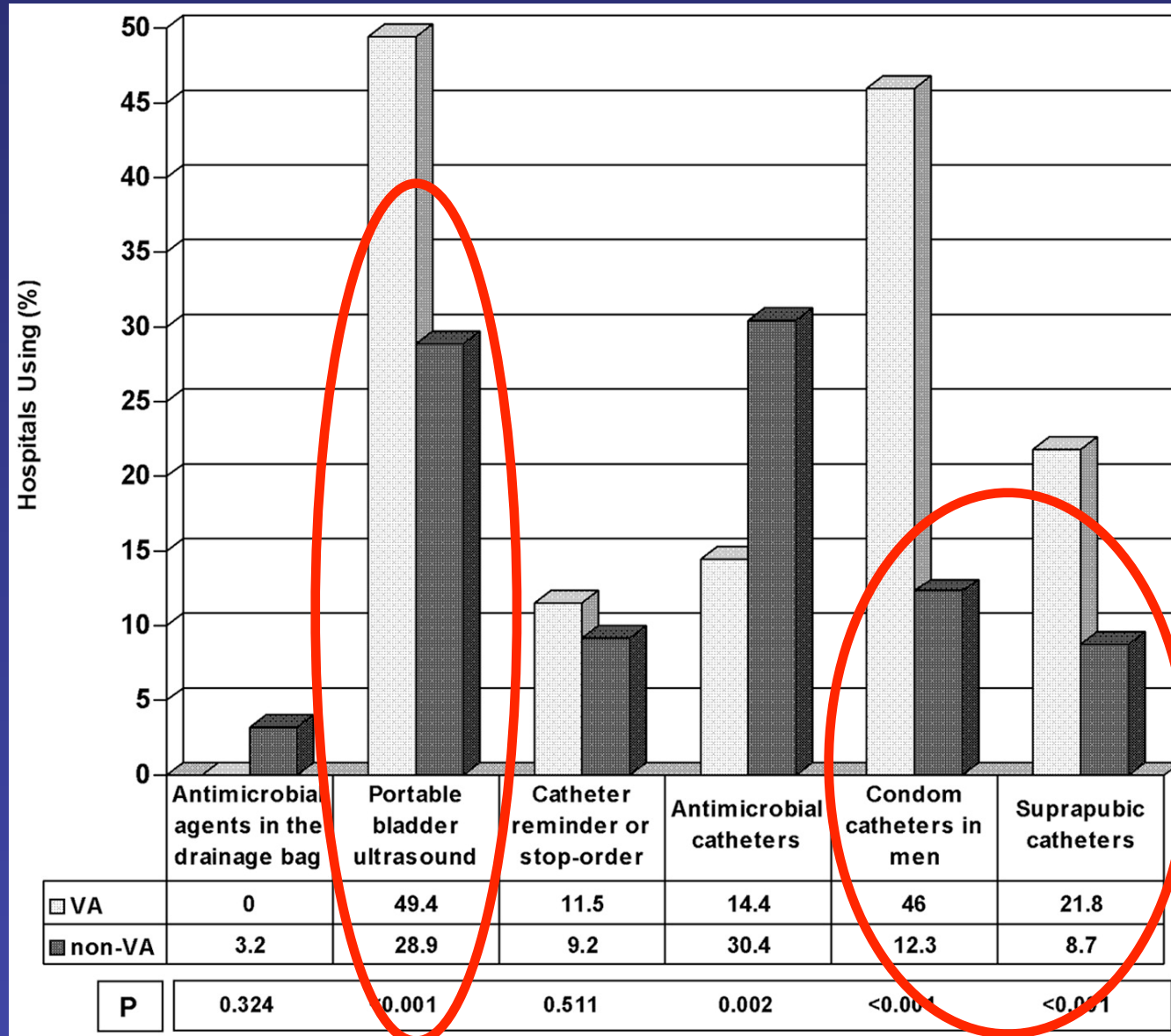
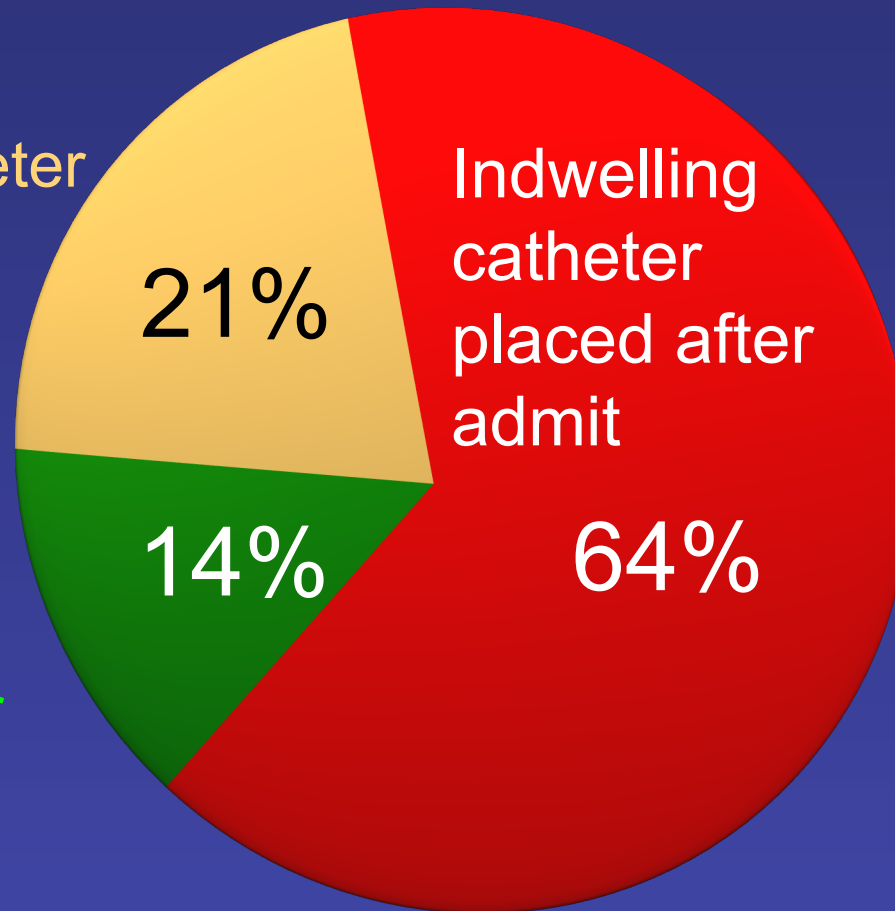


Figure 2. Urinary catheter-related infection prevention practices for Veterans Affairs (VA) hospitals versus non-VA hospitals
 From Saint et al, CLIN INFECT DIS 2008;46(2):243-250. © 2007 by the Infectious Diseases Society of America. All rights reserved.

Patterns of Urinary Catheter Use in Hospital-Acquired CAUTI cases

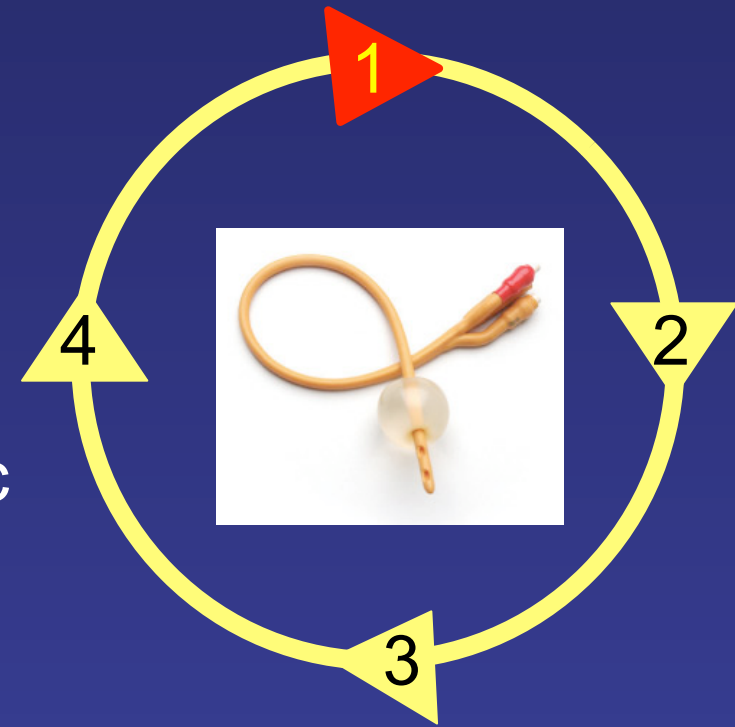
Non-Indwelling:
Intermittent straight catheter
or Condom/External

Indwelling
catheter in
place prior
to admit



1. Avoid Unnecessary and Improper Placement

“Ensure only properly trained persons insert catheters, and insert using aseptic technique and sterile equipment.”¹

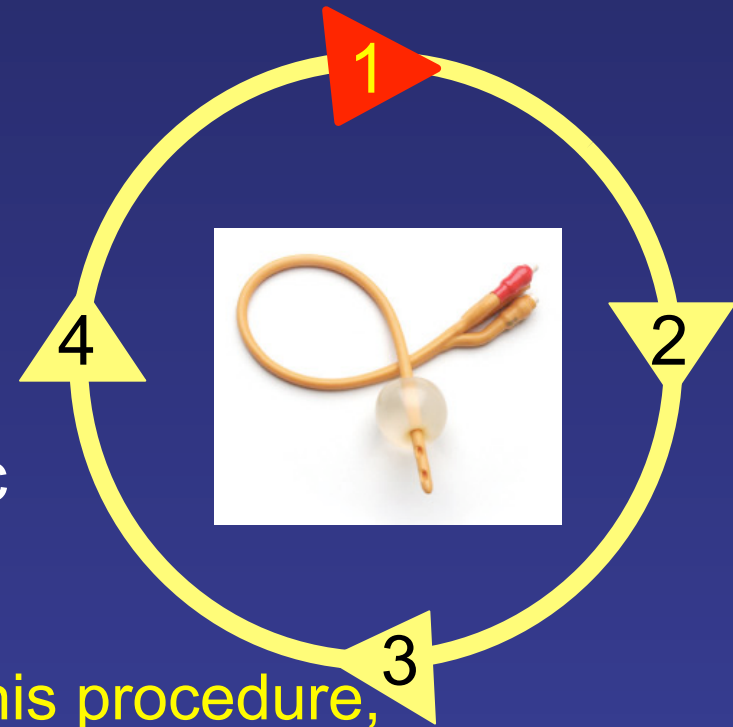


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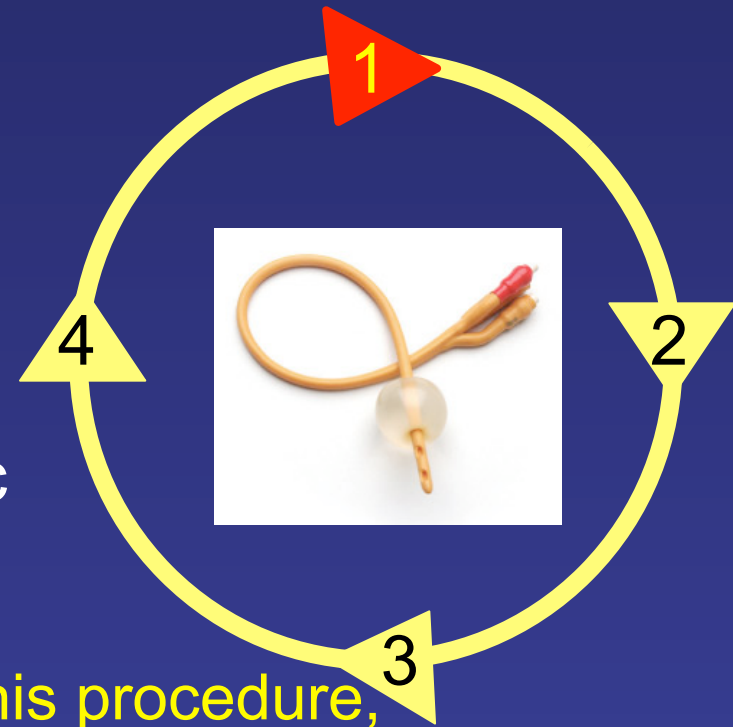
²North Carolina Manual to Prevent Catheter Associated Urinary Tract (CAUTI), Version 2.0, February 2008.

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“Operator has been deemed competent for this procedure, or is being supervised by a competent operator.”^{2,3}

- Hospital personnel who provide catheter care should be given *periodic in-service training* of correct technique.
- If patient/family perform catheterization at home, “*clean*” technique by patient/family can continue, with evaluation by nursing to ensure/reinforce correct technique.



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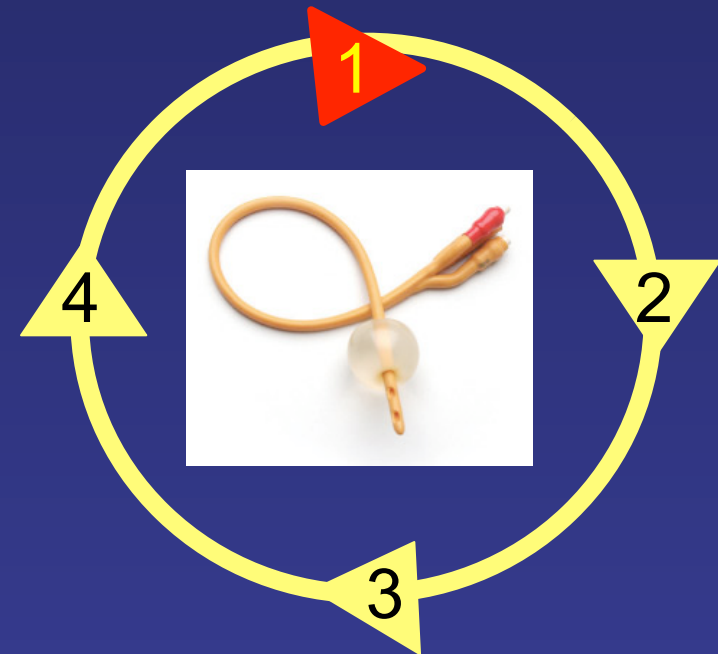
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1. Avoid Unnecessary and Improper Placement

Ensure only properly trained persons insert catheters, and insert using “*aseptic technique and sterile equipment.*”¹⁻³

- **Supplies:** sterile catheter (smallest bore)/gloves/drape/sponges, antiseptic or sterile solution for periurethral cleaning, single use lubricant jelly.
- **Hand Hygiene** immediately before and after insertion.
- **Secure** catheter to leg to prevent movement, urethral trauma/irritation.
- **Position** bag below bladder (“dependent”) with closed unobstructed tubing.



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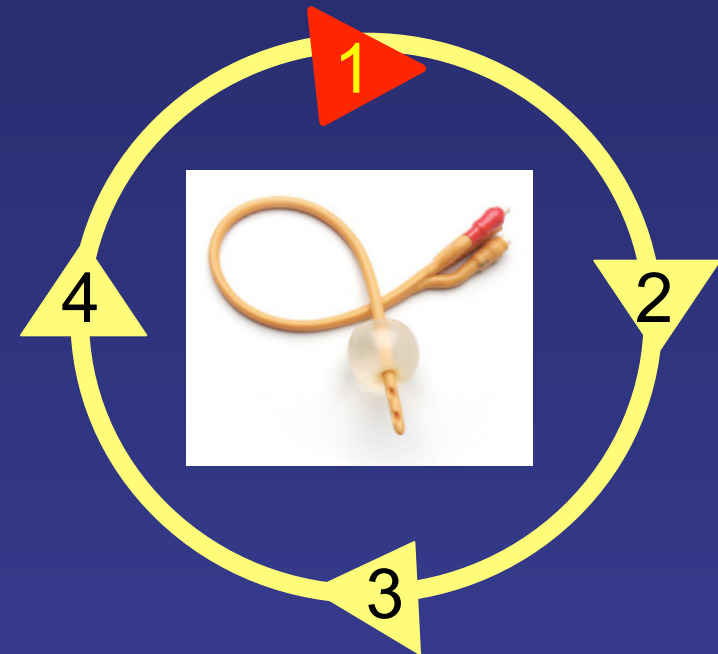
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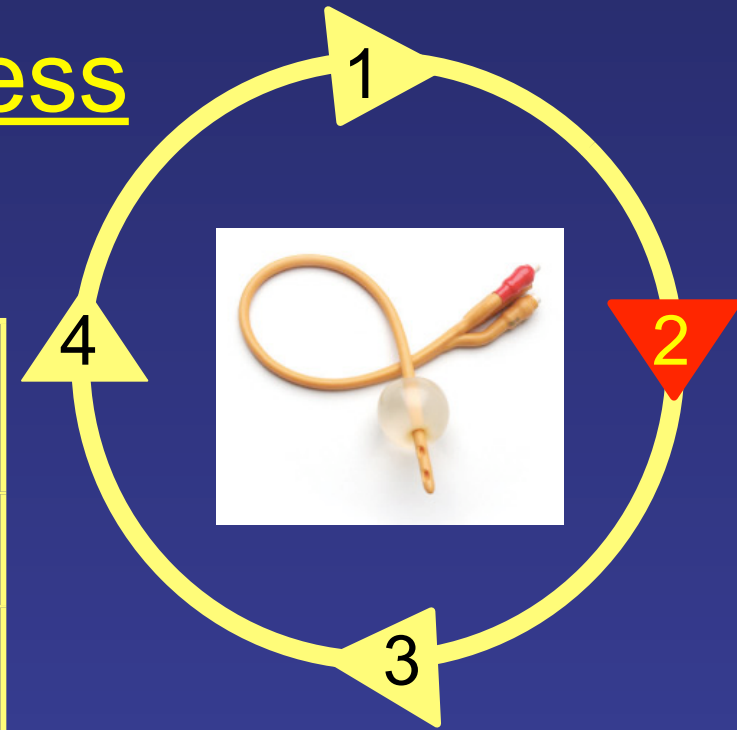
****Consider Catheter Insertion Checklists****



2. Maintain Catheter Awareness and Proper Care

Level of Training	Proportion Unaware of Catheter Status ¹
Medical Students	18%
House Officers	25%
Attending Physicians	38%

¹Saint et al. The American Journal of Medicine, Oct 15 2000; 109(6):476-480.



Options: Daily care checklists, more obvious catheter documentation,
Routine reminders of catheter presence to physicians/nurses

2. Maintain Catheter Awareness and Proper Care

Catheter Maintenance Care:

Properly Secured catheters.

Maintain closed drainage system.

Obtain urine samples aseptically.

Maintain unobstructed urine flow.

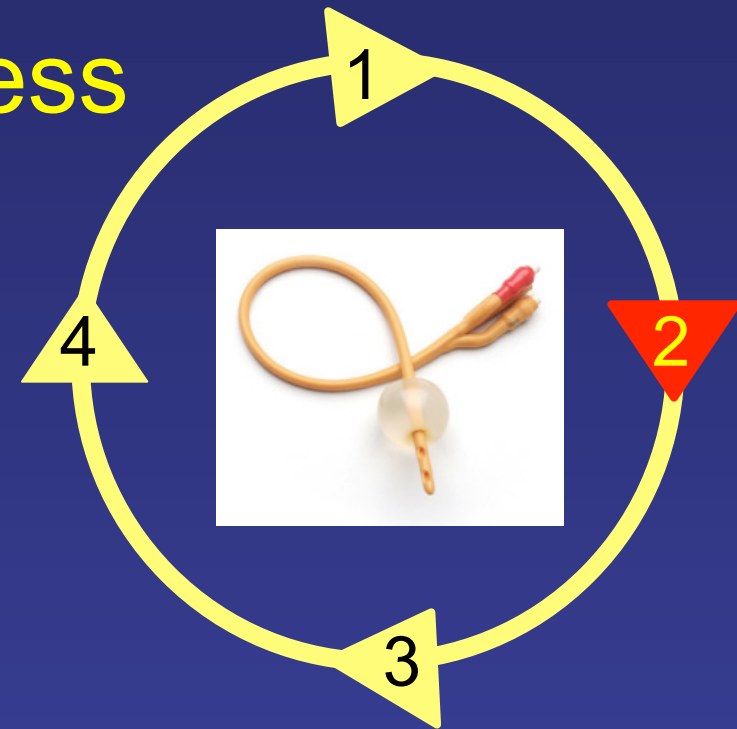
- No kinking of catheter tube.

- Keep bag below bladder at all times.

- Empty into separate clean container for each patient, with **no contact with non-sterile container.**

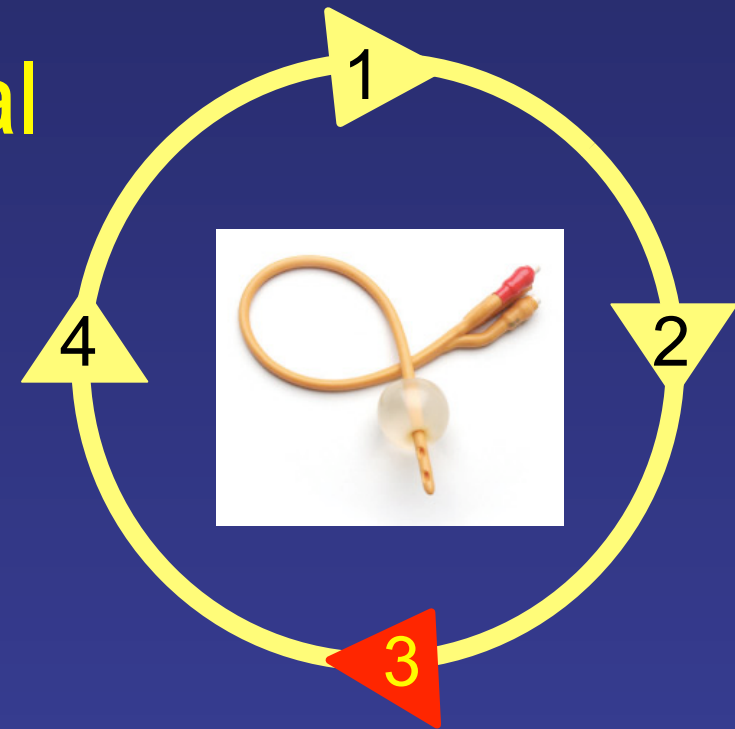
Who impacts this?

Nurses, patient care assistants, patient, family members, transporters



3. Prompt Catheter Removal

- ~30-50% of continued catheterization days were unnecessary¹
- Prolonged catheterization is the #1 risk factor for catheter-associated urinary tract infection.²



Traditional Steps to Catheter Removal:

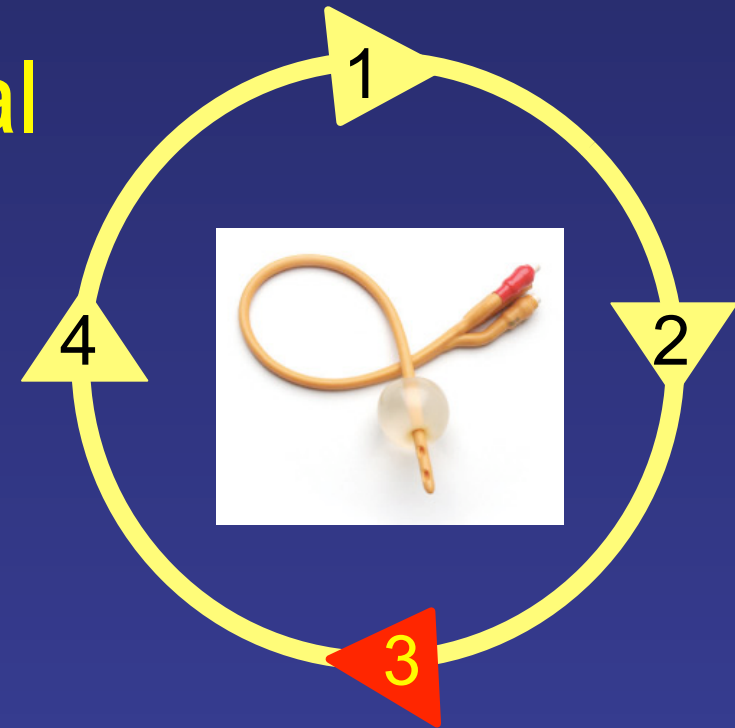
1. Physician recognizes catheter is present.
2. Physician recognizes catheter is no longer needed.
3. Physician writes order to remove catheter.
4. Nurse sees order and plans to remove the catheter.
5. Urinary catheter is removed.

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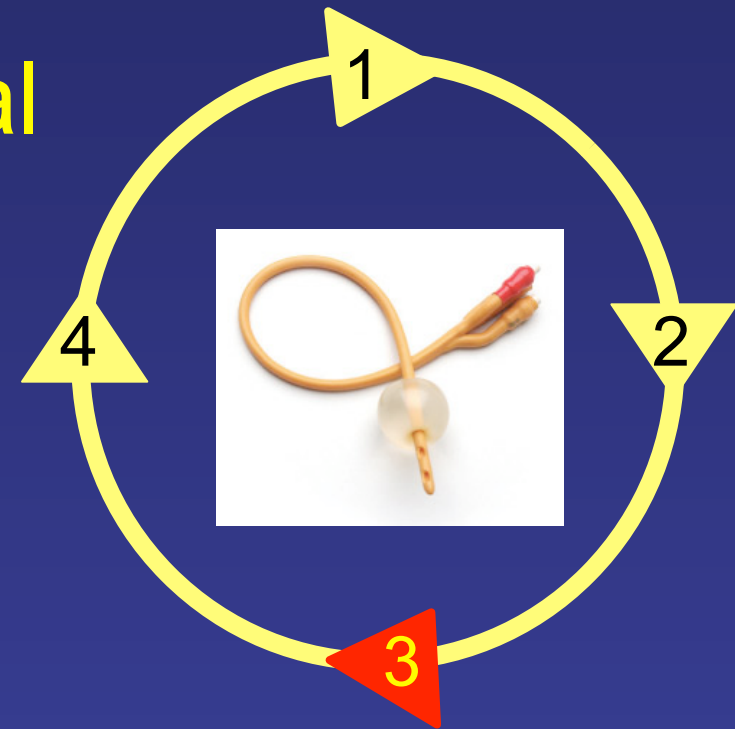
3. Prompt Catheter Removal

- **Reminder:** reminds that a urinary catheter is still in use; may also remind of appropriate indications to continue catheterization.
- **Stop Order:** prompts removal of urinary catheter based upon specified time after placement (e.g., 24 hours), based upon clinical criteria.
- Can be directed at physicians or nurses (reminder vs. empowered)
- Can be written, verbal, or electronic (computer order entry)



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- Can be directed at physicians or nurses (reminder vs. empowered)
- Can be written, verbal, or electronic (computer order entry)
- **Nurse to Nurse communication during transitions (ED, ICU):** “Does this patient have a foley? Why?” If not indicated, ask for foley to be removed before transfer.



**** URINARY CATHETER REMINDER ****

Date: __ __ / __ __ / __ __

This patient has had an indwelling urethral catheter since __ __ / __ __ / __ __.

Please indicate below **EITHER** (1) that the catheter should be removed **OR** (2) that the catheter should be retained. If the catheter should be retained, please state **ALL** of the reasons that apply.

- Please discontinue indwelling urethral catheter; **OR**
- Please continue indwelling urethral catheter because patient requires indwelling catheterization for the following reasons (please check **all** that apply):
- Urinary retention
 - Very close monitoring of urine output and patient unable to use urinal or bedpan
 - Open wound in sacral or perineal area and patient has urinary incontinence
 - Patient too ill or fatigued to use any other type of urinary collection strategy
 - Patient had recent surgery
 - Management of urinary incontinence on patient's request
 - Other - please specify: _____

Physician's Signature

Doctor Number

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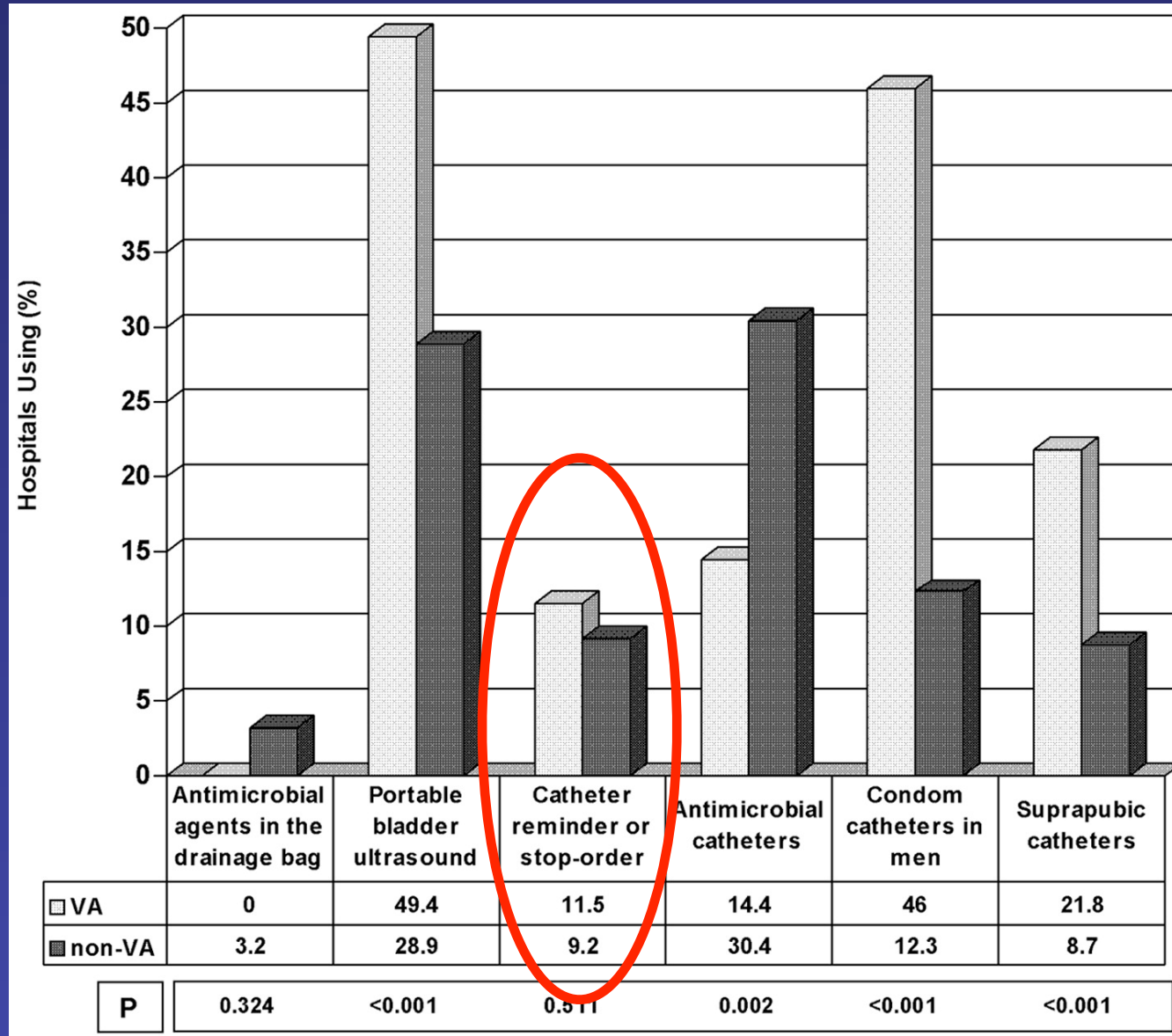
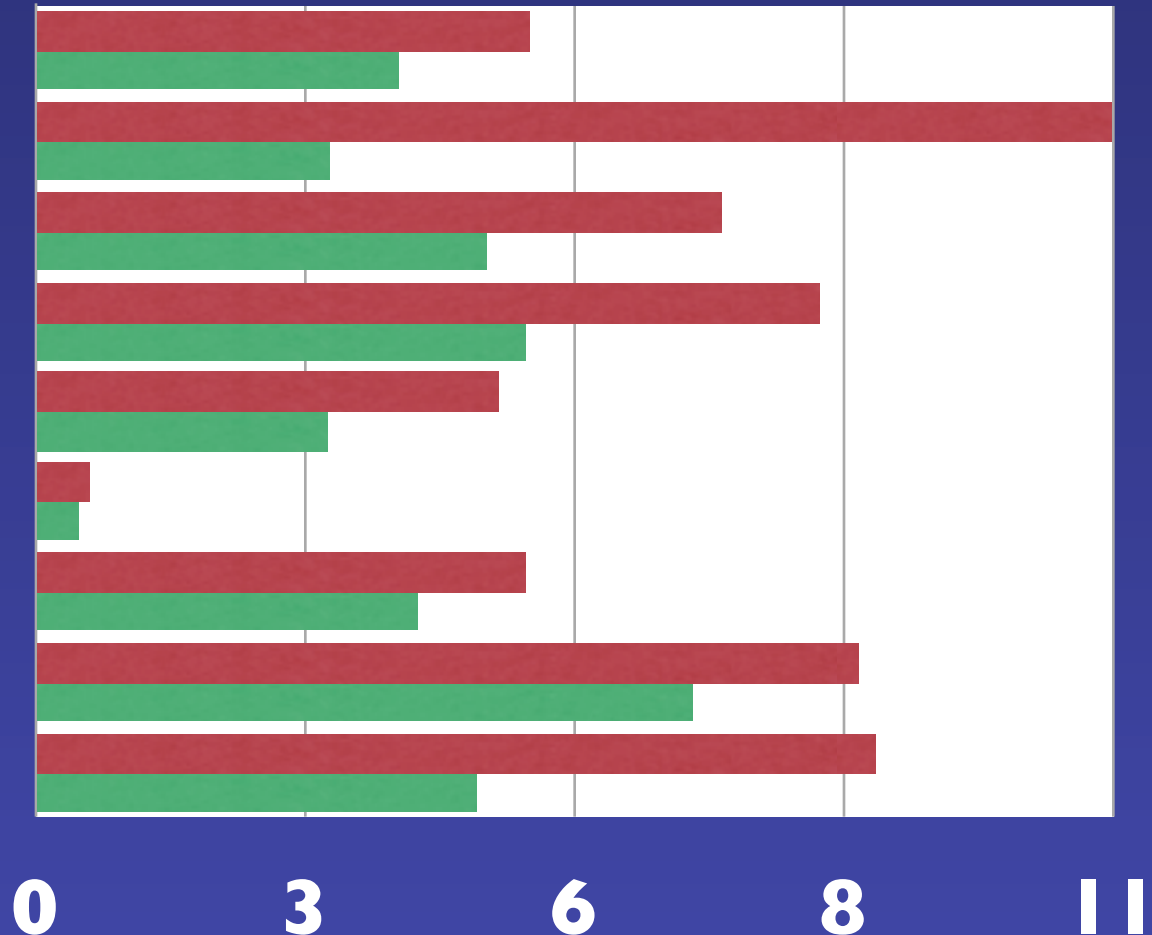


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 From Saint et al, CLIN INFECT DIS 2008;46(2):243-250. © 2007 by the Infectious Diseases Society of America. All rights reserved.

Catheter Reminders & Stop Orders: Impact on Days of Catheter Use (Mean Duration)

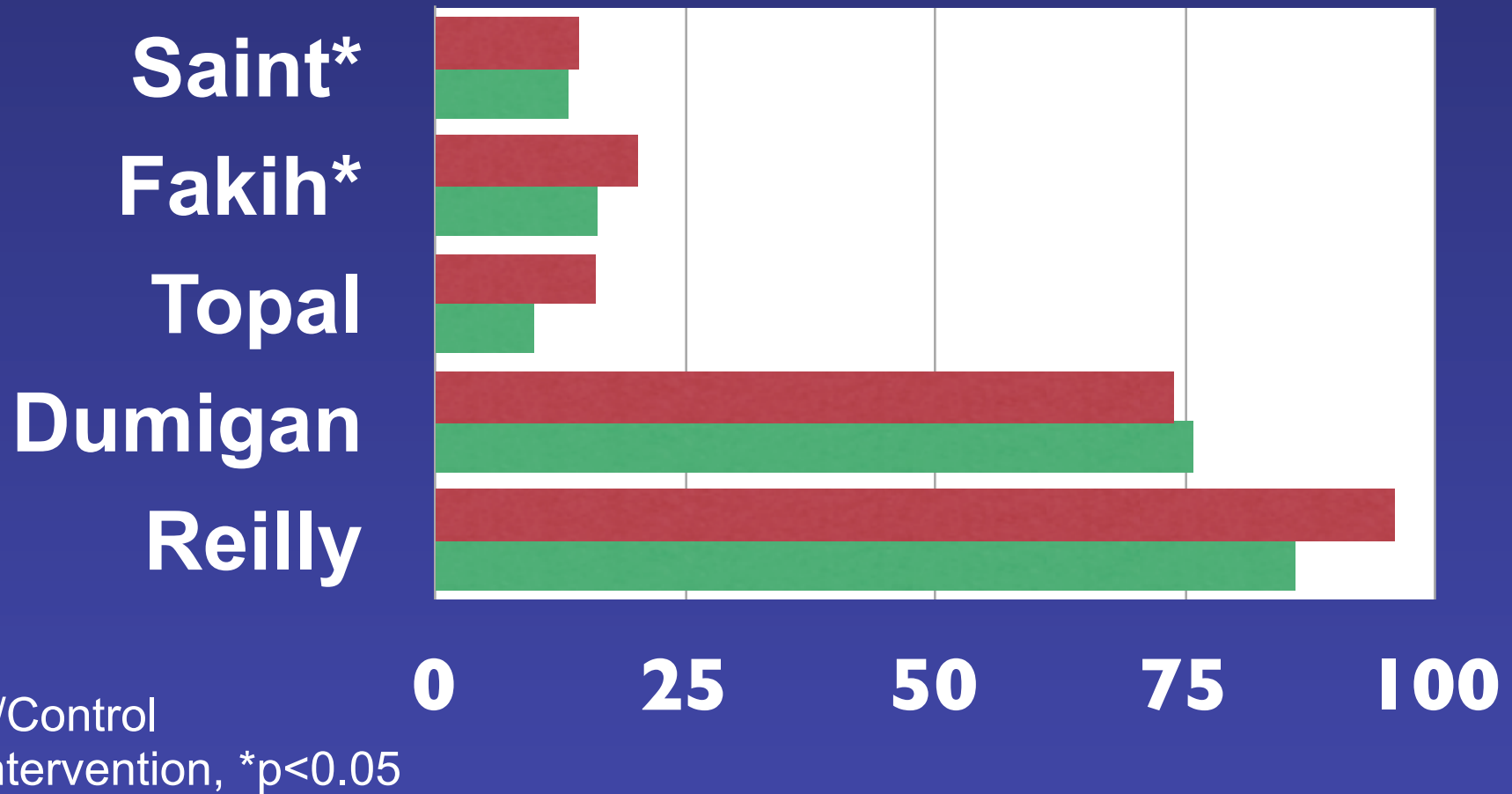
Loeb*
Apisarnthanark*
Huang*
Cornia*
Reilly
Saint*
Stephan
Crouzet
Weitzel



Before/Control

After Intervention, *p<0.05

Catheter Reminders & Stop Orders: Impact on Catheter Use (% Days Catheterized)



Catheter Reminders & Stop Orders: Impact on CAUTI rates

Overall, the rate of CAUTI (episodes per 1000 catheter-days) was reduced by **52%** with use of a reminder or stop order (95% CI: 32% to 72% reduction).

Apisarnthanark*

Crouzet*

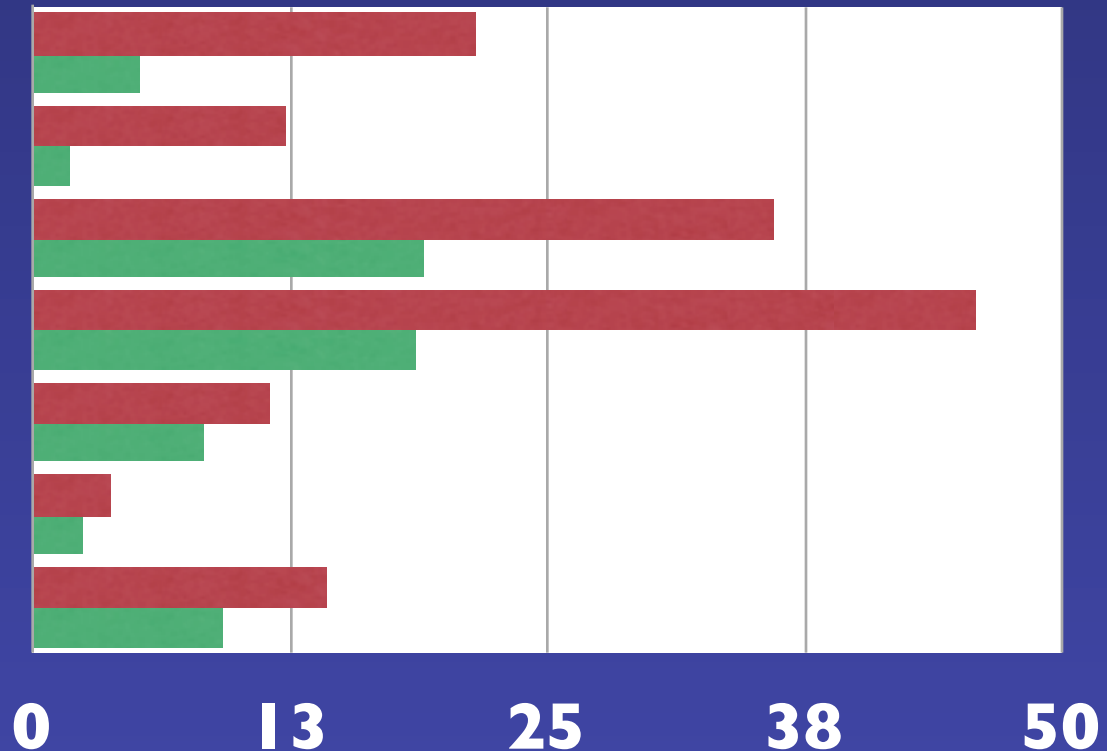
Topal*

Stephan*

Huang*

Jain

Dumigan*



■ Before/Control

■ After Intervention, *p<0.05

Catheter Reminders & Stop Orders: Pearls and Pitfalls

Pearls:

- Tailor reminder type to care setting (stickers, electronic, etc),
- Embed appropriate indications to guide catheter use,
- Remember to include catheter alternatives,
- Automated, timed reminders/stop orders,
- Direct to primary care team (not consultants, etc),
- Empower nurses to remove without obtaining additional order from physician team.

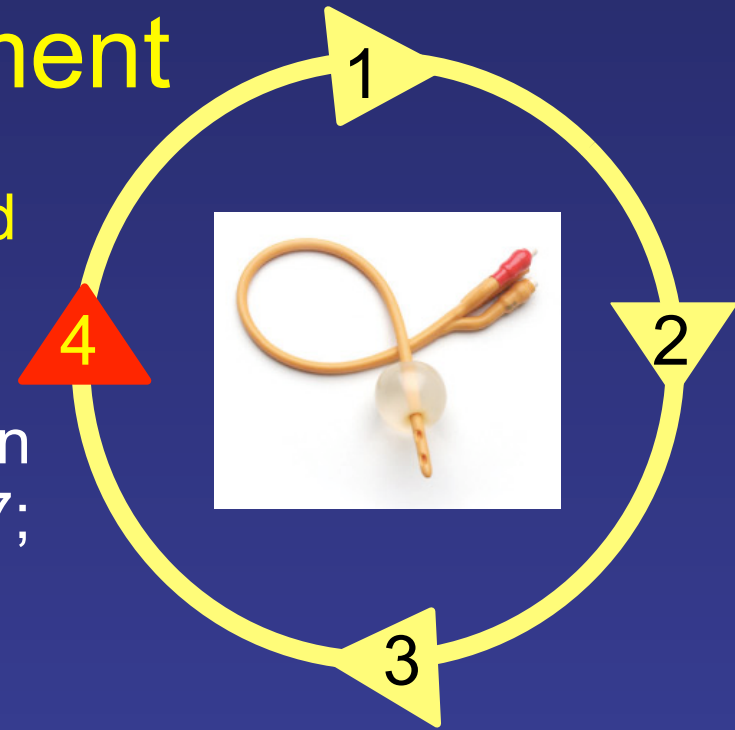
Pitfalls:

- Reminders often ignored.
- Some catheter orders can increase catheter use.
- Challenging to sustain impact of reminders/stop orders.

4. Prevent Catheter Replacement

Do Reminders or Stop Orders lead to increased need for re-catheterization?

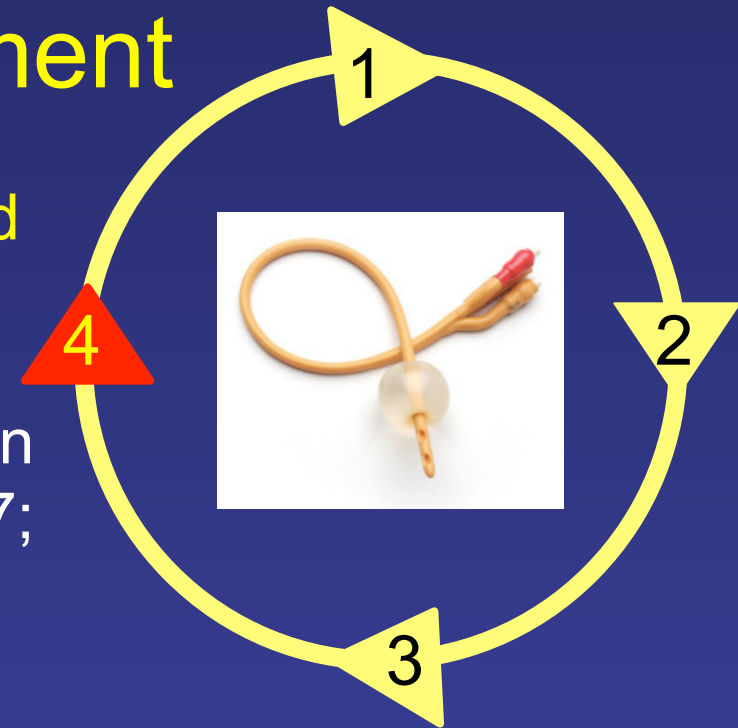
No evidence to support higher re-catheterization needs, by 4 studies (Loeb, 2008; Crouzet, 2007; Saint, 2005; Cornia, 2003).



4. Prevent Catheter Replacement

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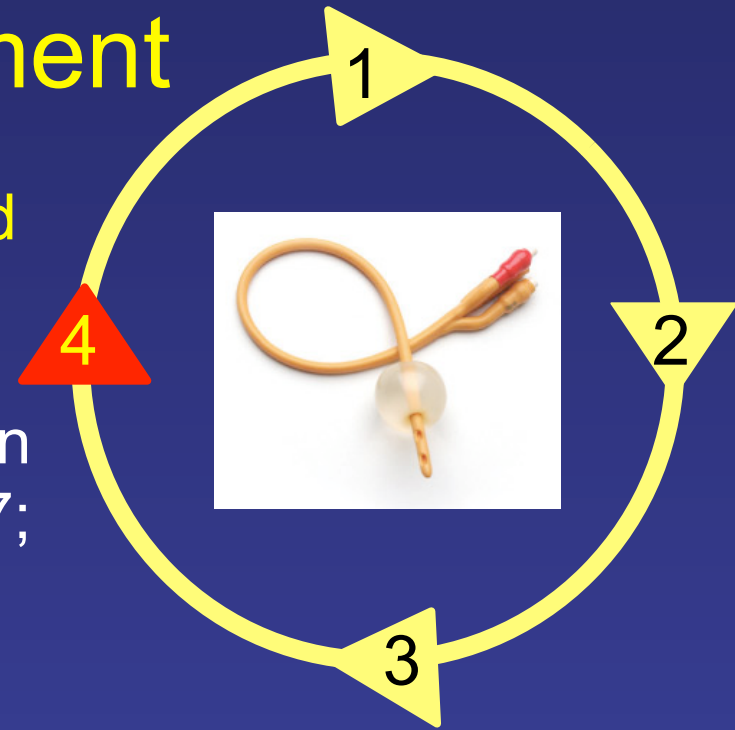
Tools to prevent catheter replacement:

- Urinary retention evaluation protocols: use of bladder scan, straight catheters, without requiring contact with physicians.
- Same tools as preventing initial placement: Catheter-order restrictions, indication guidance

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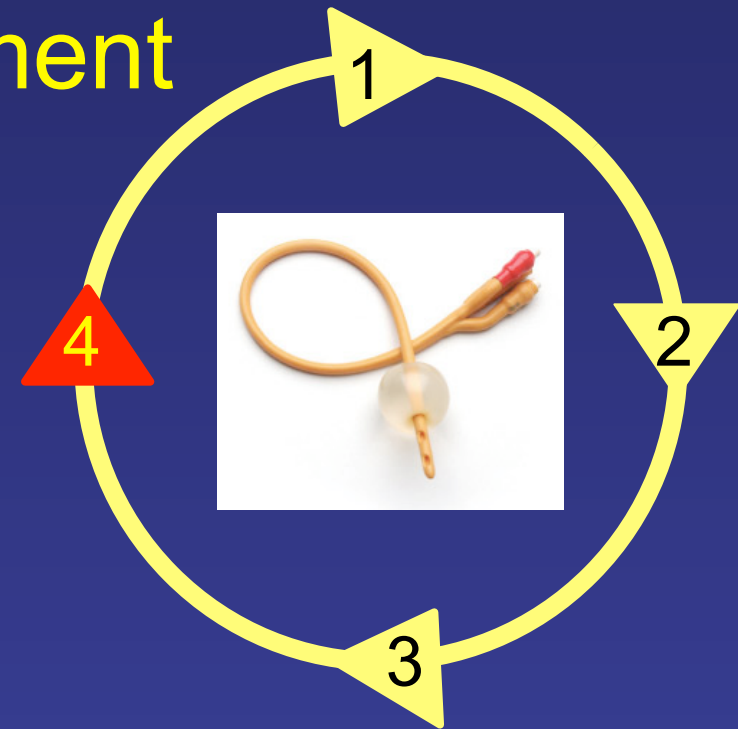
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Translating Recommendations into Practice: assembling and using the tools

- The Importance of Champions
- Examples of Successful Projects
- Bladder Bundles: Defining, Early Results
- Cautions: What is Not Recommended?
- Take-Home Points

Champions

Definition: Advocate who takes ownership of the problem (hospital-acquired CAUTI) and is willing to use his or her position to get a practice implemented by rallying others to help solve the problem.

- Respected by others at the hospital,
- Persuasive,
- Value of **nurse champions**: any staff nurse viewed on the unit as the “go to” RN.



Prior Success Stories

- Focused on **non-infectious complications of urinary catheters**: patient discomfort, impaired patient mobility, delayed discharge.
- **Team-based financial incentives** to decrease catheter use and reduce CAUTI rates.
- **Nurse-initiated Projects** to remove urinary catheters: increase nurse awareness of which patients have catheters, educate that decreasing catheter use will decrease UTI rates.

Nurse buy-in is crucial!

A physician administrator: “Because the nurses on the geriatrics unit wanted to have their patients regain mobility...they viewed ambulation and mobility as a very important goal...versus the other units where the nurses didn’t necessarily feel that was a real goal in the patient’s plan for that day.”

Use of “Bladder Bundles”

Aseptic insertion and proper maintenance is paramount

Bladder ultrasound may avoid indwelling catheterization

Condom or intermittent catheterization in appropriate patients

Do not use the indwelling catheter unless you must!

Early removal of the catheter using reminders or stop-orders appears warranted.

Implementing “Bladder Bundles”

Diagnose the Problem: Perform a Needs Assessment to “diagnosis the hospital”: What is the current status of UTI prevention, resources, technology? This information is needed to tailor strategies to address each hospital’s needs.

Treat the Problem: Using the Johns Hopkins University “4E’s” collaborative model for transformational change:

- **Engage and Educate**: participating hospitals receive info by presentations, conference calls, website, face-to-face workshops, including bundle toolkit to describe intervention steps and measures.
- **Execute**: identify at enlist at least one nurse champion to lead the initiative and organize a bladder bundle team, usually with 1 physician.
- **Evaluate**: 1) conduct baseline assessment, including point-prevalence study of catheter use, 2) daily patient rounds (“catheter patrol”), 3) routine feedback on catheter use rates and necessity.

Use of Bladder Bundles: Early Results

From Michigan Health & Hospital Association
Keystone Project for Hospital-Acquired Infection:

- Early 2008: 16 early implementer hospitals, resulted in estimated reduction of catheter use from 32,000 patients to 29,000 patients, reducing more than 1000 unnecessary hospital days and estimated 1 million avoided costs.
- On-line survey 2009, 2nd Qtr: 72% participants reported that implementing CAUTI prevention made a positive difference in reducing the use of foley catheters

Not Recommended

- Routine screening for UTI in asymptomatic patients.
- Routine antimicrobial prophylaxis.
- Bladder irrigation as method to prevent infection.
- Adding antimicrobials to urine collection bags.
- Routinely changing catheters or collection bags.
- Vigorous periurethral cleaning.

So what about antimicrobial coated catheters?

What about antimicrobial coated catheters?

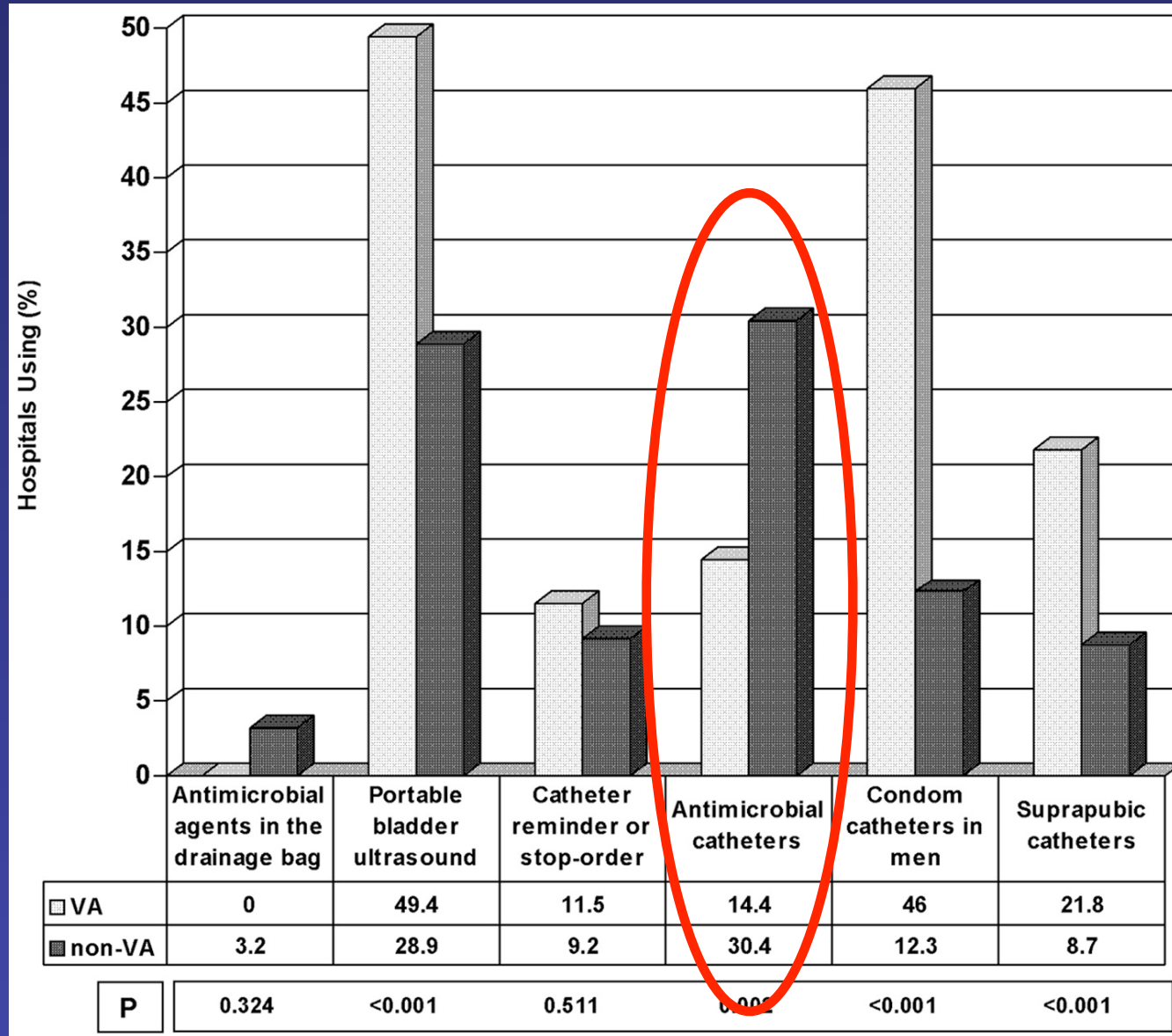


Figure 2. Urinary catheter-related infection prevention practices for Veterans Affairs (VA) hospitals versus non-VA hospitals
 From Saint et al, CLIN INFECT DIS 2008;46(2):243-250. © 2007 by the Infectious Diseases Society of America. All rights reserved.

Antimicrobial coated catheters

- Options: Antiseptic: Silver alloy (note: silver oxide is no longer marketed), Antibiotic: Nitrofurazone-releasing/impregnated/coated.
- Cost: ~ \$5 more than non-coated catheter (latex or silicone)

Evidence (summarized from >20 RCT trials):

- Silver alloy^{1,2} and nitrofurzone-coated catheters¹⁻³ had decreased risk of **asymptomatic** bacteriuria in hospitalized adults with short-term catheter use (most effective <1 week).
- Caveats: Studies have not been powered to study impact of catheters on **symptomatic** UTI, or bacteremia related to UTI. No head-to-head trials have compared silver alloy with nitrofurazone-coated catheters.

CDC/HICPAC guideline: “should be considered if CAUTI rates are not decreasing after implementing a comprehensive strategy” regarding use, insertion, maintenance care.

¹ Schumm and Lam, Cochrane Database of Systematic Reviews 2008, Issue 2.

² Johnson et al, Annals of Internal Medicine 2006;144:116-126.

³ Stensballe et al, Annals of Internal Medicine 2007;147:285-293.

Take-Home Points

- Nurse “buy-in” is extremely important.
- Reminders and Stop Orders can disrupt the catheter “lifecycle” at all stages: placement, awareness of continued use, prompting removal, and preventing replacement.
- Champions are crucial for implementation; all these improvements require *behavior change*.
- Sustaining change requires monitoring and feedback of catheter use and CAUTI rates.
- Avoid screening for asymptomatic UTIs, to prevent unintended patient harm.

Thank you!

Questions?

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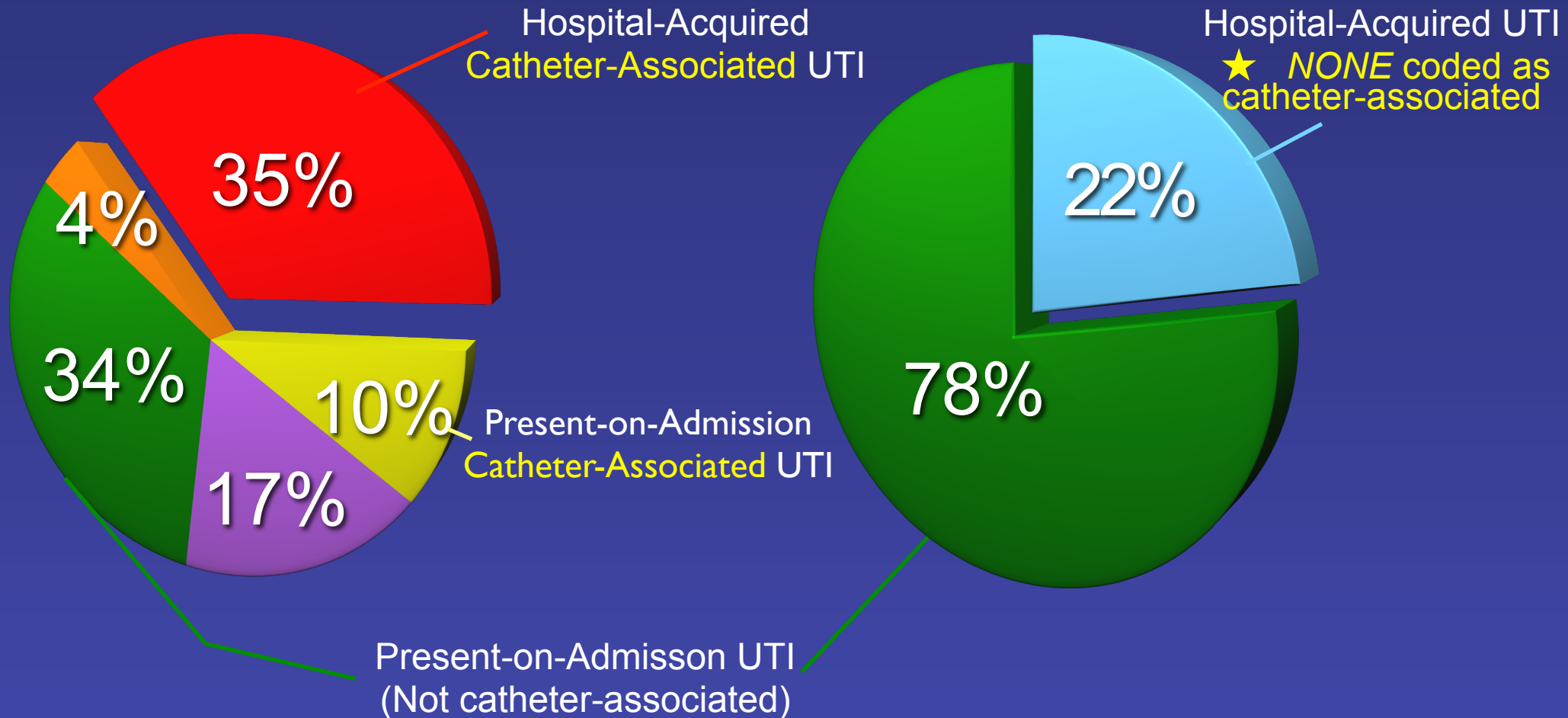


Extra Slides for Discussion if Interested

Developing/Implementing Interventions at Health System Level

- CAUTI Prevention Committee: multi-disciplinary, pooling clinical, data collection and technology resources.
- Gather Data on Catheter Use, CAUTI rates:
 - For baseline, surveillance, and feedback,
 - By setting/unit, by service,
 - Used to pilot interventions: to develop champions, increase “buy-in” on smaller scales to start
 - Needed to monitor for unintended consequences for patients, such as inappropriate screening and treatment for asymptomatic bacteriuria for UTIs.

Comparing UTI Categorization by Physician-Abstractor vs. Hospital Coder



New Motivation to Prevent CAUTI

1. **Hospital-Acquired Conditions Initiative** (October 2008):¹ no additional payment for diagnosis of hospital-acquired CAUTI.



2. **Surgical Care Improvement Project, Infection Process of Care Measure 9 (SCIP-Inf-9):** Urinary catheter removed on Postoperative Day 1 or 2 with day of surgery being zero.

Rate of Postop Catheter removal =

Number of surgical patients whose catheter is removed on POD 1 or 2
All selected surgical patients with a catheter in place post-operatively

¹Saint S, Meddings J, et al. Annals of Internal Medicine, Jun 16 2009;150(12):877-884.

SCIP-Inf-9 details

Rate of Postop Urinary Catheter removal =

Number of surgical patients whose catheter is removed on POD 1 or 2

All **selected** surgical patients *with a catheter in place post-operatively*

Excluded patients: <18 years old, LOS >120days or <2 days, clinical trial,

- principal procedure was entirely laparoscopic (identified by ICD-9-CM),
- had other procedures with general or spinal anesthesia within 3 days (4 if cardiac surgery) during this hospitalization,
- surgery was urological, gynecological or perineal procedure,
- patient had suprapubic or intermittent catheterization (IC) preoperatively, or had urethral, suprapubic, or IC prior to the perioperative period,
- physician/APN/PA documented reason for not removing catheter postop,
- patient expired peri-operatively,
- patient did not have catheter post-operatively.

Rationale behind SCIP-Inf-9

- Indwelling urinary catheters are *routinely* used >2 days postoperatively, often without clinical necessity.
- Postop catheterization >2 days is associated with increased likelihood of hospital-acquired UTI, 30-day mortality, and lower likelihood of discharge home.¹
- Extended postoperative use of indwelling catheters is associated with poor outcomes for older patients: greater odds of re-hospitalization for UTI and death within 30 days.²

¹Wald et al. Archives of Surgery. 2008;143(6):551-557.

²Wald et al, Infection Control and Hospital Epidemiology. 2008; 29:116-124.

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