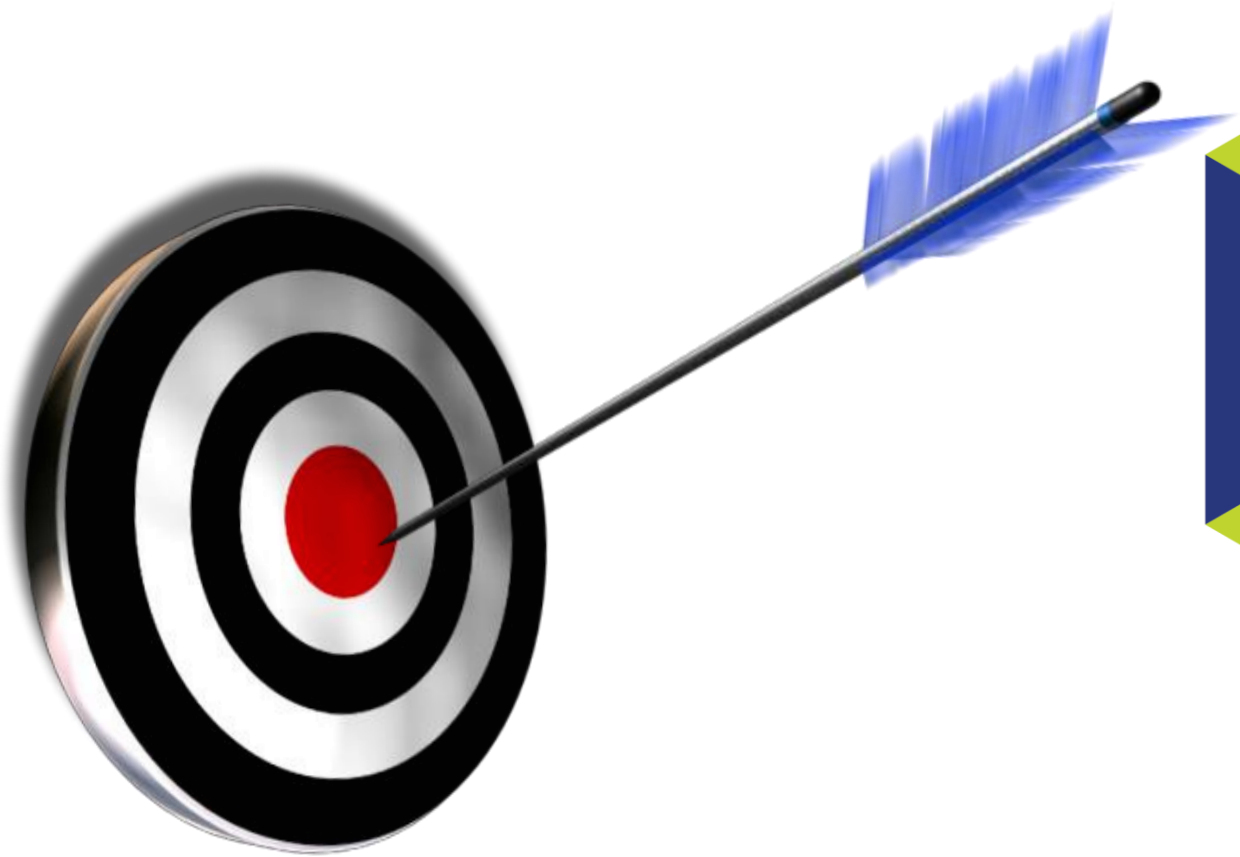
Target Zero: Utilizing a CAUTI Risk Framework to Help Reduce Infections



Kathleen Vollman
ADVANCING NURSING THROUGH KNOWLEDGE & INNOVATION

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Disclosures

- Consultant-Michigan Hospital Association Keystone Center
- Subject matter expert on CAUTI, CLABSI, HAPI, Safety culture for AHA
- Consultant and speaker bureau
  - Stryker's Sage business
  - LaJolla Pharmaceutical
  - Baxter healthcare
  - Potrero Medical

Objectives

- Describe the forces within the current healthcare environment that are targeting zero for device related infections.
- Identify and detail the evidence-based practices that go beyond the guidelines in preventing CAUTI's.
- Discuss possible barriers to practice changes and realistic solutions to assist the team in the implementation process.

Polling Question

- What is your role in your facility?
  - Infection preventionist
  - Nurse
  - Physician
  - Public health official
  - Epidemiologist
  - Medical technologist
  - Microbiologist
  - Other

Notes on Hospitals: 1859

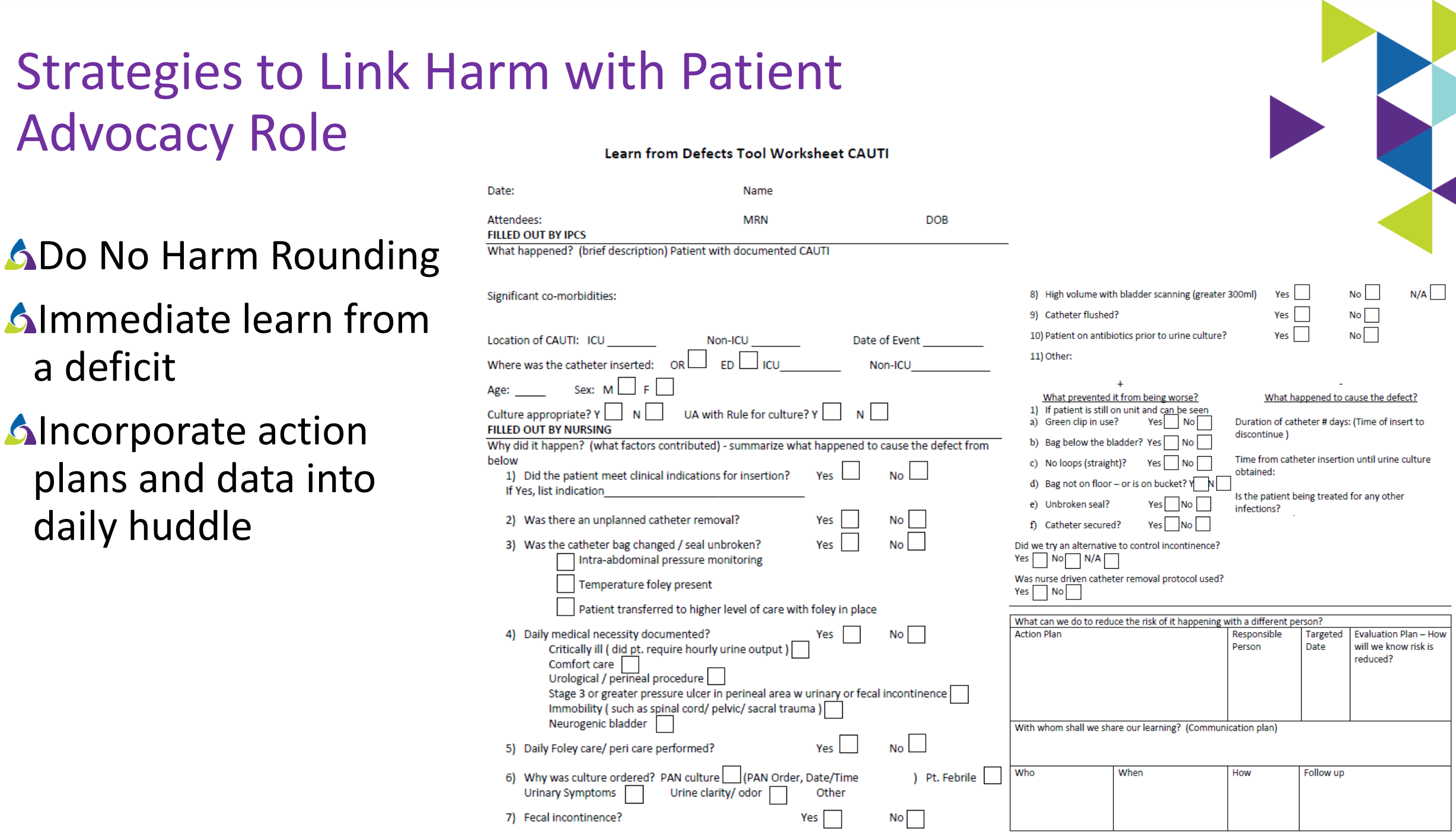
"It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm."

- Florence Nightingale

Advocacy = Safety

Strategies to Link Harm with Patient Advocacy Role

- Do No Harm Rounding
- Immediate learn from a deficit
- Incorporate action plans and data into daily huddle



Learn from Defects Tool Worksheet CAUTI

Date: Name

Attendees: MRN DOB

FILLED OUT BY IPCS

What happened? (brief description) Patient with documented CAUTI

Significant co-morbidities:

Location of CAUTI: ICU _____ Non-ICU _____ Date of Event _____

Where was the catheter inserted: OR ☐ ED ☐ ICU_____ Non-ICU_____

Age: _____ Sex: M ☐ F ☐

Culture appropriate? Y ☐ N ☐ UA with Rule for culture? Y ☐ N ☐

FILLED OUT BY NURSING

Why did it happen? (what factors contributed) - summarize what happened to cause the defect from below

1) Did the patient meet clinical indications for insertion? Yes ☐ No ☐
   If Yes, list indication_____
2) Was there an unplanned catheter removal? Yes ☐ No ☐
3) Was the catheter bag changed / seal unbroken? Yes ☐ No ☐
   - ☐ Intra-abdominal pressure monitoring
   - ☐ Temperature foley present
   - ☐ Patient transferred to higher level of care with foley in place
4) Daily medical necessity documented? Yes ☐ No ☐
   - Critically ill (did pt. require hourly urine output) ☐
   - Comfort care ☐
   - Urological / perineal procedure ☐
   - Stage 3 or greater pressure ulcer in perineal area w urinary or fecal incontinence ☐
   - Immobility (such as spinal cord/ pelvic/ sacral trauma) ☐
   - Neurogenic bladder ☐
5) Daily Foley care/ peri care performed? Yes ☐ No ☐
6) Why was culture ordered? PAN culture ☐ (PAN Order, Date/Time) Pt. Febrile ☐
   Urinary Symptoms ☐ Urine clarity/ odor ☐ Other
7) Fecal incontinence? Yes ☐ No ☐
8) High volume with bladder scanning (greater 300ml) Yes ☐ No ☐ N/A ☐
9) Catheter flushed? Yes ☐ No ☐
10) Patient on antibiotics prior to urine culture? Yes ☐ No ☐
11) Other:

+ What prevented it from being worse?	- What happened to cause the defect?
1) If patient is still on unit and can be seen a) Green clip in use? Yes ☐ No ☐ b) Bag below the bladder? Yes ☐ No ☐ c) No loops (straight)? Yes ☐ No ☐ d) Bag not on floor – or is on bucket? Y ☐ N ☐ e) Unbroken seal? Yes ☐ No ☐ f) Catheter secured? Yes ☐ No ☐	Duration of catheter # days: (Time of insert to discontinue) Time from catheter insertion until urine culture obtained: Is the patient being treated for any other infections?

Did we try an alternative to control incontinence? Yes ☐ No ☐ N/A ☐

Was nurse driven catheter removal protocol used? Yes ☐ No ☐

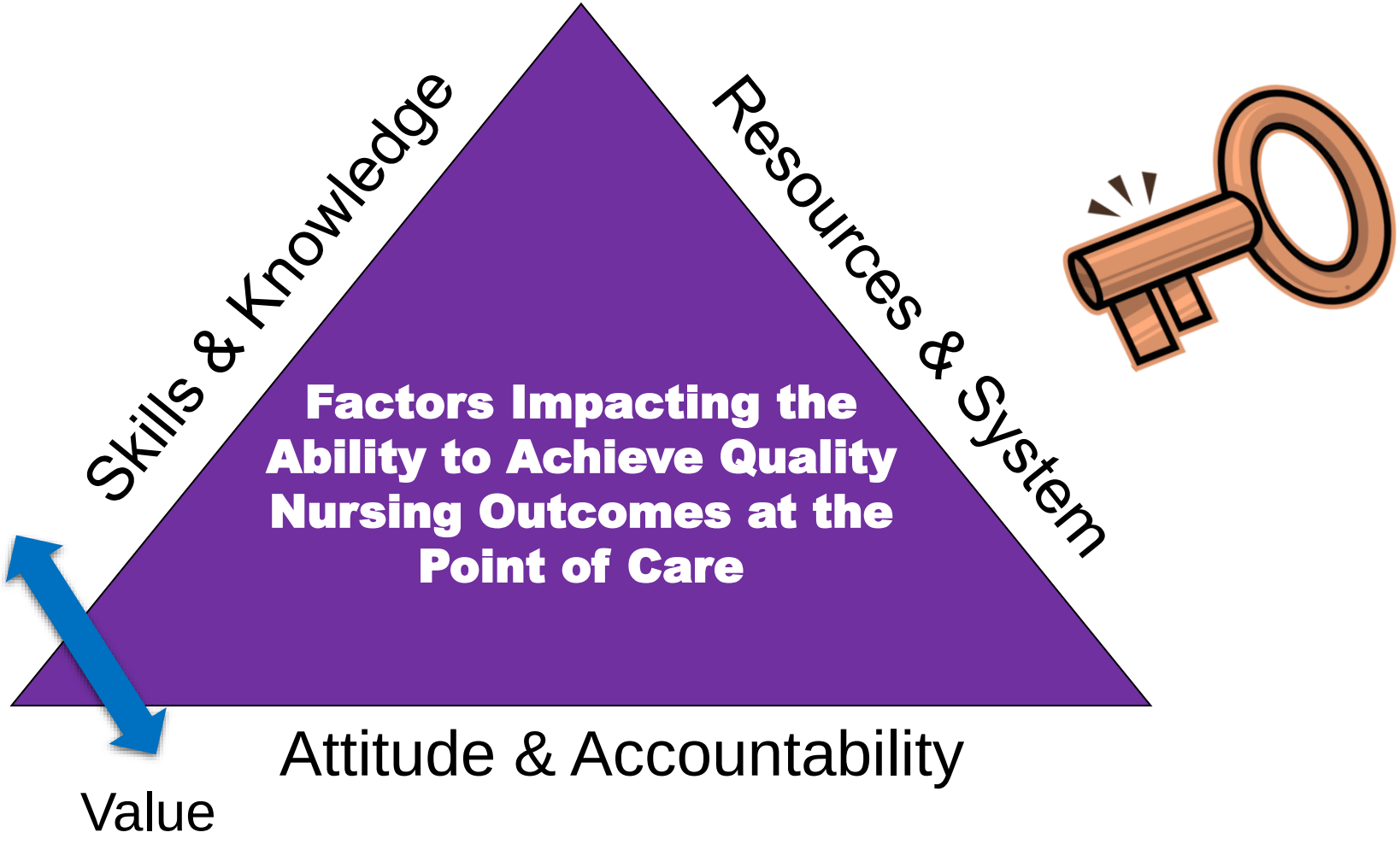
What can we do to reduce the risk of it happening with a different person?

Action Plan	Responsible Person	Targeted Date	Evaluation Plan – How will we know risk is reduced?

With whom shall we share our learning? (Communication plan)

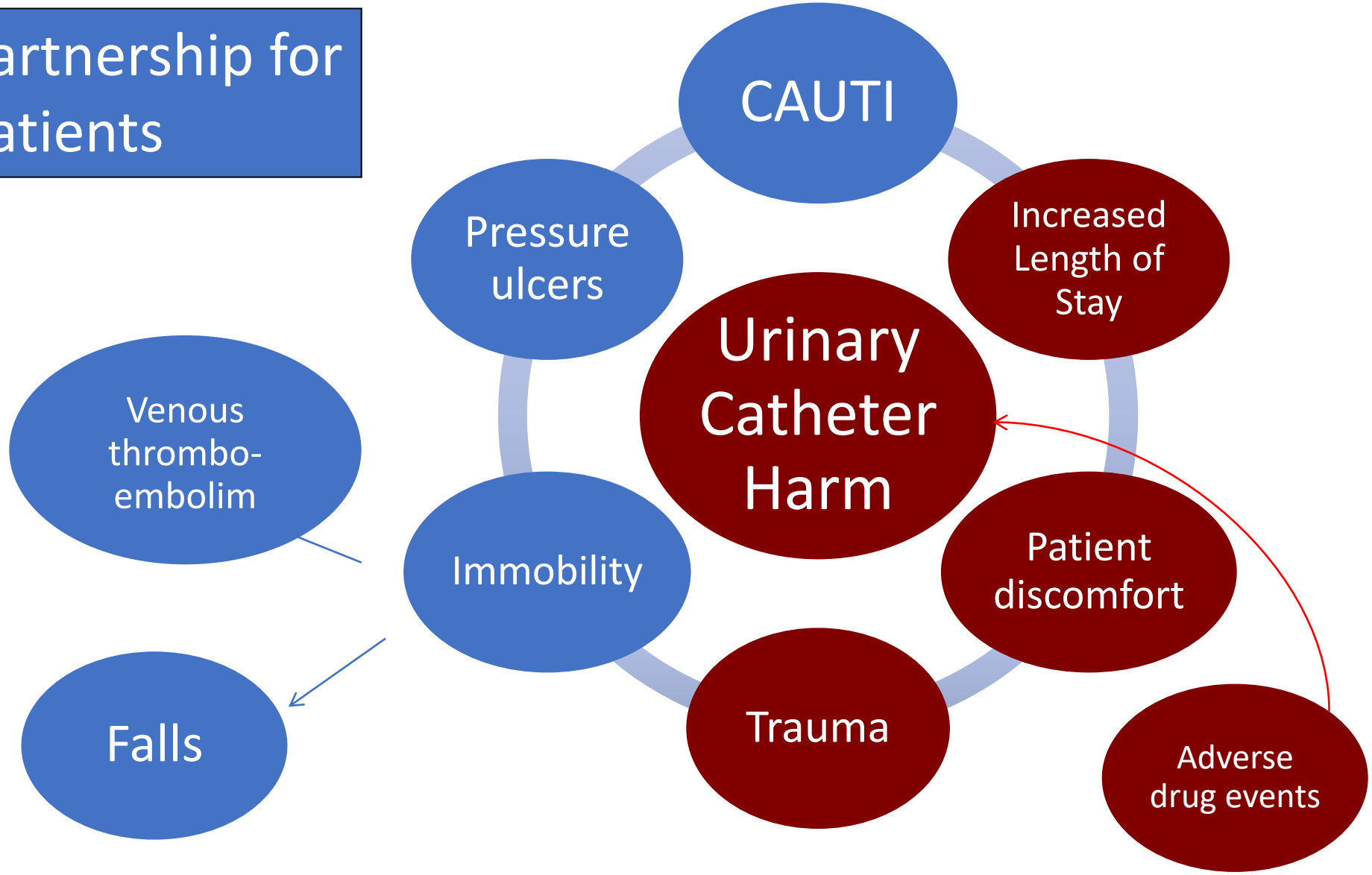
Who	When	How	Follow up

Achieving the Use of the Evidence



Vollman KM. Intensive Crit Care Nurs, 2013;22(4): 152-154

Partnership for Patients



Isn’t this a patient safety issue, not just CAUTI?

The Why: CAUTI Incidence

- One of the most common healthcare acquired infections (HAIs)- nearly up to 40% of all HAIs[1,2]
- 70% urinary catheter associated HAIs; up to 95% in the intensive care setting[2]
- Approximately 20% of hospital patients have urinary catheter at some point in their stay[3]
- Specific patient impact[4]
  - Discomfort r/t to mild signs of infection
  - Potential urethral trauma
  - Embarrassment
  - Pyelonephritis
  - Urosepsis leading to potential death

1. Magill et al NEJM 2014; APIC Guide to Prevention of CAUTI, 2014;
2. Chenoweth, C. et al. *Infectious Disease Clinics of North America*, 2014 28(1), pp.105-119.
3. Saint, S et al. *Clinical Infectious Diseases*, 2008 46(2), pp.243-250
4. Agency for Healthcare Research and Quality (2017). Retrieved from https://www.ahrq.gov/hai/pfp/haccost2017-results.html.

Excess Mortality Estimates for HAC's

	N	Range (RR)	Estimates of RR (95% CI)	Underlying Mortality	Estimates of Excess Mortality (95% CI)
Adverse Drug Events (ADE)	6	0.68–3.09	1.61 (1.14–2.27)	0.020	0.012 (0.003–0.025)
Cathether-Associated Urinary Tract Infections (CAUTI)	4	1.28–1.97	1.50 (1.06–2.11)	0.071	0.036 (0.004–0.079)
Central Line-Associated Bloodstream Infections (CLABSI)	5	1.86–4.88	2.72 (1.81–4.10)	0.086	0.150 (0.070–0.270)
Falls					(0.035–0.070)
Obstetric Adverse Events (OBAE)	—	—	—	—	0.005 (0.003–0.013)
Pressure Ulcers	3	2.42–5.06	3.26 (1.71–6.17)	0.018	0.041 (0.013–0.093)
Surgical Site Infections (SSI)	3	1.75–5.70	3.32 (1.79–6.18)	0.0114	0.026 (0.009–0.059)
Ventilator-Associated Pneumonia (VAP)	10	0.52–4.90	1.48 (0.64–3.42)	0.300	0.140 (-0.110–0.730)
Venous Thromboembolism (VTE)	9	1.01–13.63	3.15 (2.02–4.91)	0.020	0.043 (0.040–0.078)
***C. difficile* Infections (CDI)**	13	1.17–9.60	1.60 (1.38–1.87)	0.073	0.044 (0.028–0.064)

For Every 1000 in-hospital CAUTI cases, there are 36 excess deaths

http://www.ahrq.gov/hai/pfp/haccost2017-results.html

Additional Inpatient Costs & Mortality for HAC's: Building the Business Case

	Studies (n)	Range of Estimates	Estimate (95% CI)
Adverse Drug Events (ADE)	2	$1,277–$9,062	$5,746 (-$3,950–$15,441)
Catheter-Associated Urinary Tract Infections (CAUTI)	6	$4,694–$29,743	$13,793 ($5,019–$22,568)
Central Line-Associated Bloodstream Infections (CLABSI)	7	$17,896–$94,879	$48,108 ($27,232–$68,983)
Falls	3	$2,680–$15,491	$6,694 (-$1,277–$14,665)
Obstetric Adverse Events (OBAE)	2	$13–$1,190	$602 (-$578–$1,782)
Pressure Ulcers	4	$8,573–$21,075	$14,506 (-$14,506–$41,326)
Surgical Site Infections (SSI)	5	$11,778–$42,177	$28,219 ($18,237–$38,202)
Ventilator-Associated Pneumonia (VAP)	5	$19,325–$80,013	$47,238 ($21,890–$72,587)
Venous Thromboembolism (VTE)	4	$11,011–$31,687	$17,367 ($11,837–$22,898)
***C. difficile* Infections (CDI)**	9	$4,157–$32,394	$17,260 ($9,341–$25,180)

http://www.ahrq.gov/hai/pfp/haccost2017-results.html

Addressing CAUTIs Through Eliminating Risk

CAUTI Risk Framework

Device Risk

- Length of time/biofilm buildup
- Open drainage systems/no preconnected Urinometers
- Incomplete bladder emptying
- Air trapping/urine Backflow

Systems Risk

- Lack of nurse driven protocol use
- Insufficient number of bladder scanners
- Lack of appropriate external devices
- Urine culture process undefined

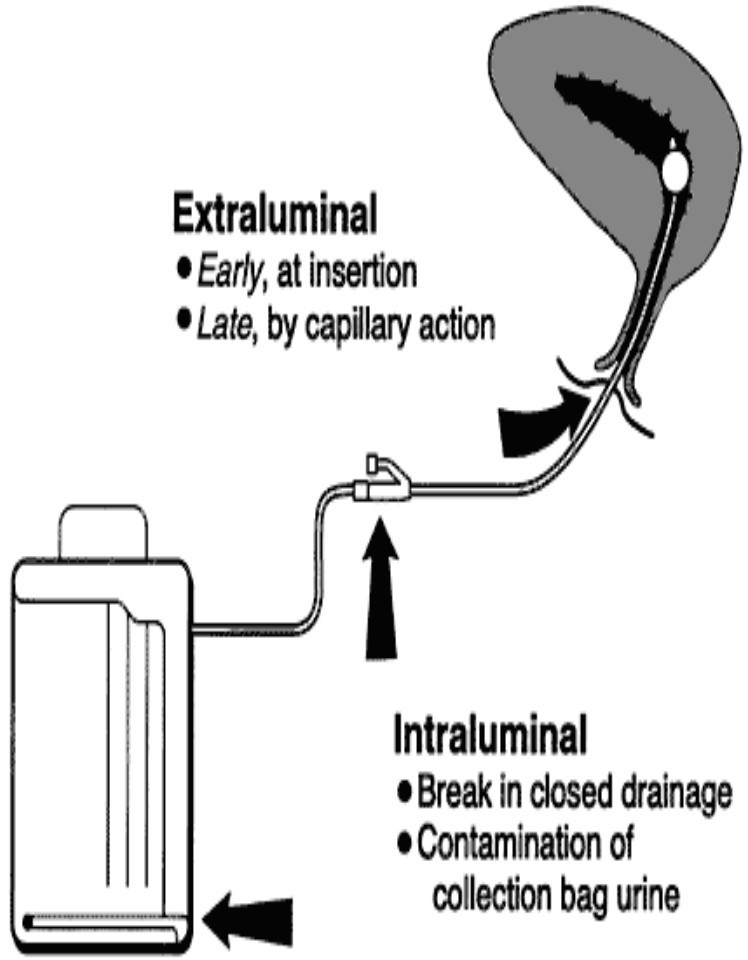
Care Giver/Human Factor Risk

- Inappropriate use of catheters/lack of speaking up for early removal
- Poor insertion techniques
- Catheter not secure/bag not below level of bladder
- Bathing and perineal cleansing not standardized

Adapted from APIC 2014 CAUTI Prevention Guidelines

Device Risk: Biofilm Buildup

- Source: colonic or perineal flora on hands of personnel
- Microbes enter the bladder via extraluminal {around the external surface} (proportion = 2/3) or intraluminal {inside the catheter} (1/3)-breaking the seal
- Daily risk of bacteriuria with catheterization is 3% to 10%; by day 30 = 100%



APIC Guide to Preventing CAUTI: 2014
Pelling H, et al. Lett Appl Microbiol. 2019 Apr;68(4):277-293

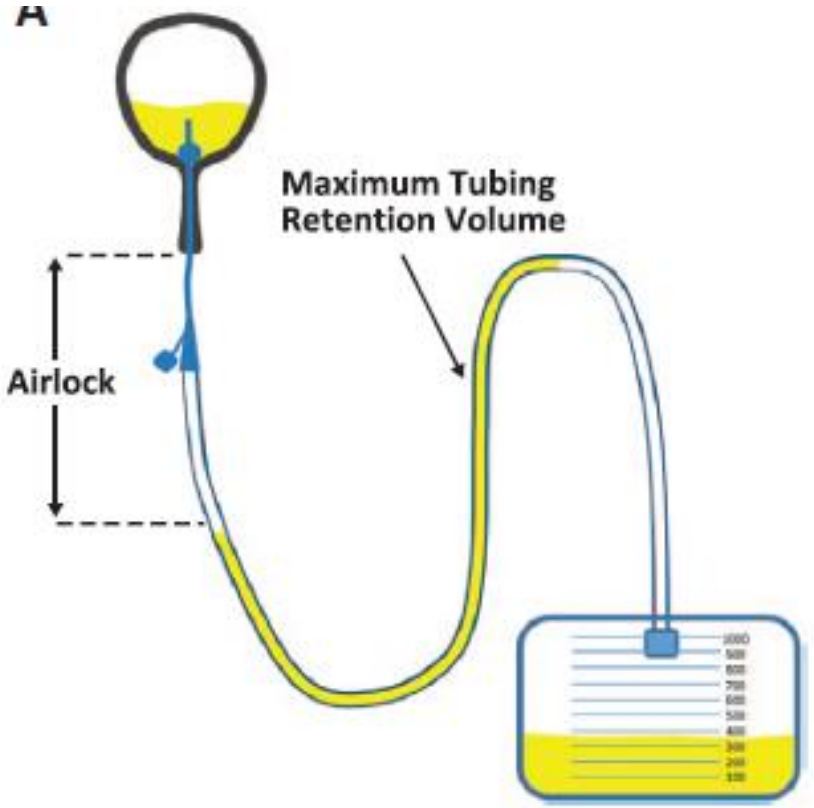
Device Risk: Incomplete Bladder Emptying

- Current catheter design and placement of the inflation balloon result in the formation of a residual pool of urine in the bladder
- Ideal environment for dense bacterial growth
- Increased risk for infection
- Falsely low UO-resulting in errors in treatment decisions

Pelling H, et al. Lett Appl Microbiol. 2019 Apr;68(4):277-293

Device Risk: Air Trapping (Lock)/Urine Backflow

- Presence of urine in dependent loops (94%)
- Dependent loops have been associated with an odds ratio of 2.1 for developing CAUTI.
- Milking required to get urine
- Falsely low UO-resulting in errors in treatment decisions

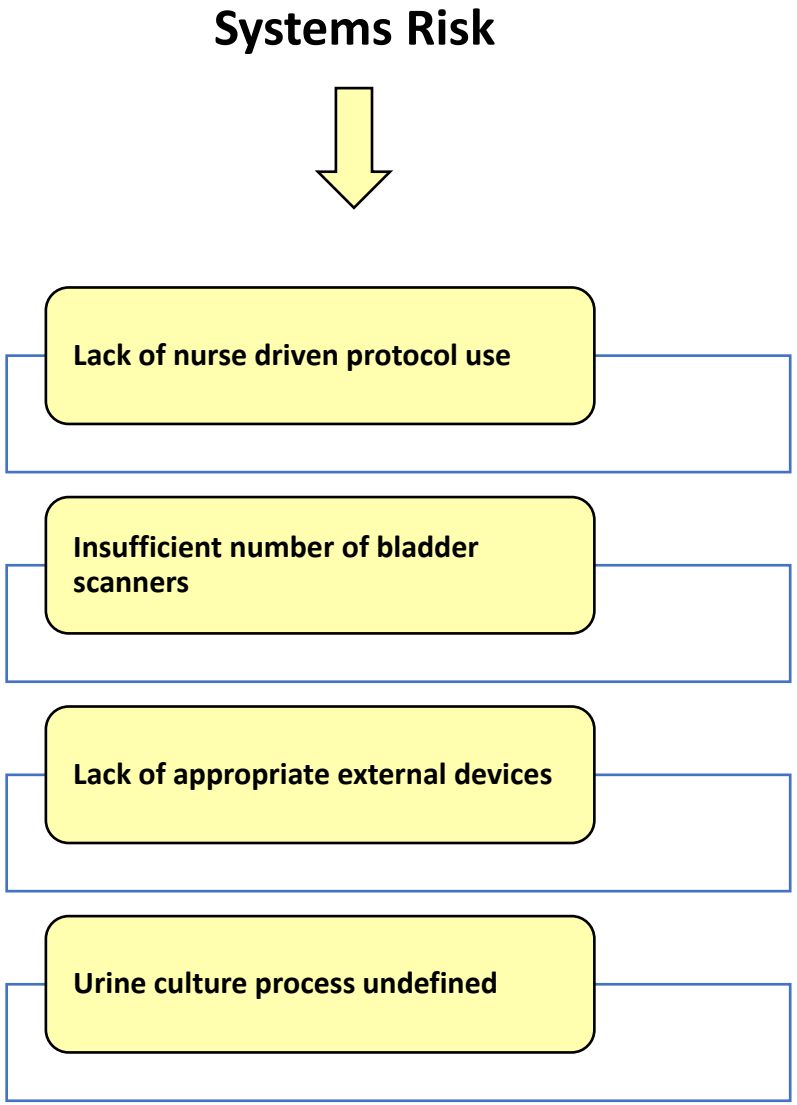


Danek G, et al. J Wound Ostomy Continence Nurs. 2015 May-Jun;42(3):273-8.
Maki DG, et al. Infect Control Hosp Epidemiol. 2000; 21:165
Maki DG, et al. Emerg Infect Dis. 2001;7: 1-6 .

The Problem

Solution: Active Drain Clearance

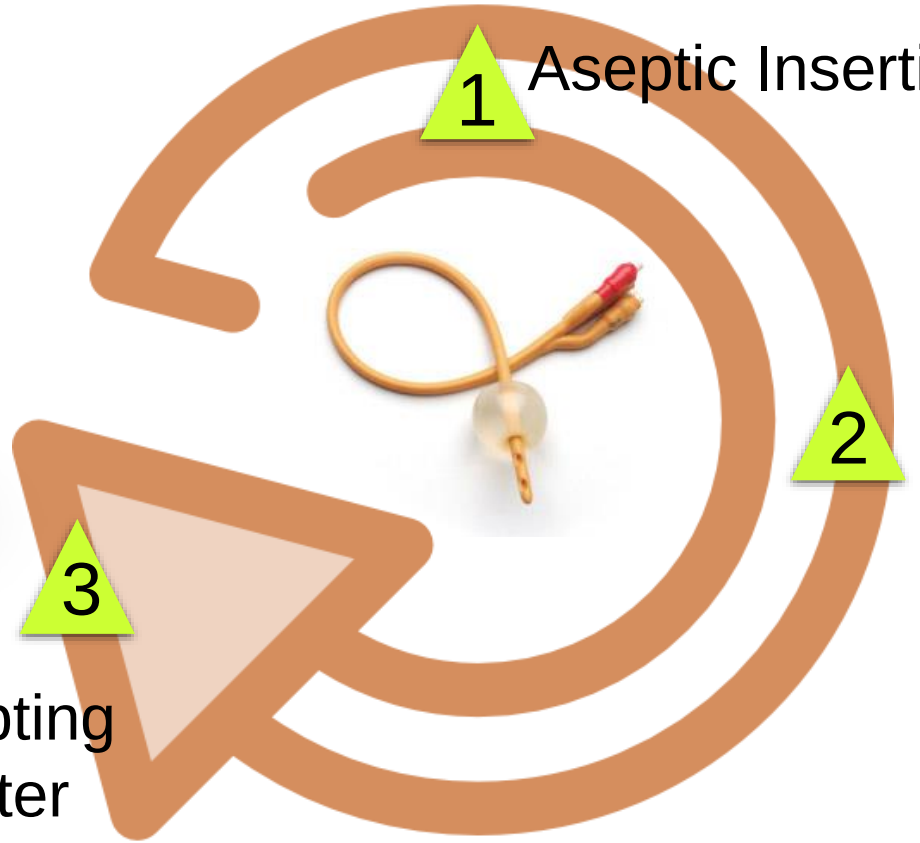
CAUTI Risk Framework



Disrupting the Lifecycle of the Urinary Catheter

Step 0:
Avoid
Catheter is
Possible

Lack of a Nurse Driven Protocol → Prompting Catheter Removal



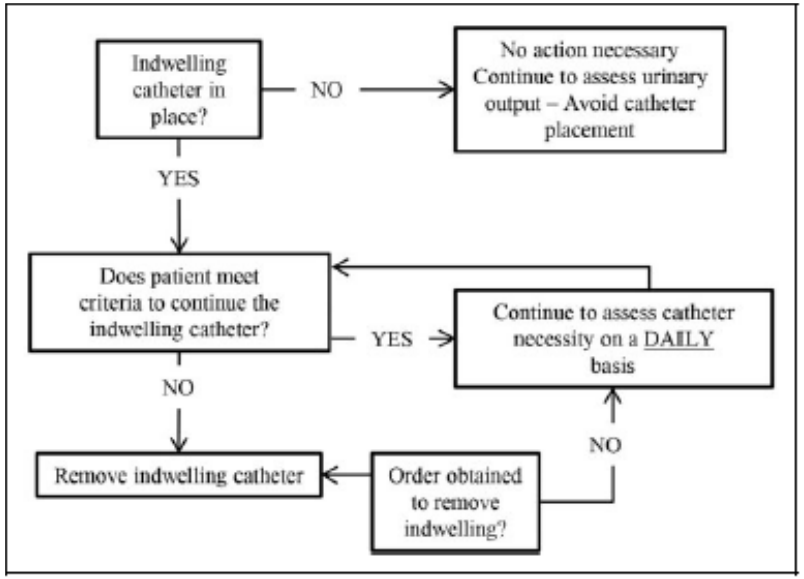
www.catheterout.org, (Adapted Meddings. Clin Infect Dis 2011)

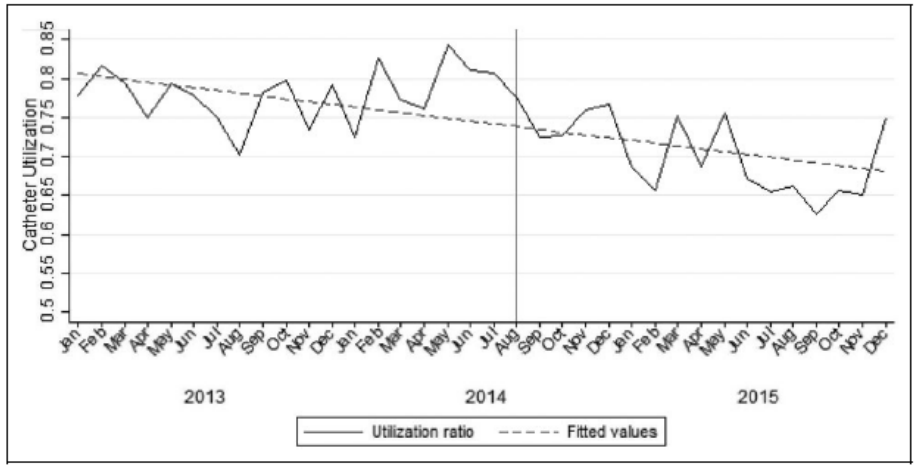
System Risk: Lack of Nurse Driven Protocol

- Retrospective study: 19-month pre and 15-month post intervention
- Implemented a multimodal CAUTI prevention bundle in STICU
  - Nurse driven protocol
  - Improve maintenance bundle

	Pre	Post	Risk Ratio Post vs Pre (95% Confidence Interval)	*P* Value
CAUTI rate per 1000 catheter-days (#CAUTIs/#catheter-days)	5.1 (59/11 490)	2.0 (16/8186)	0.38 (0.21-0.65)	.003
Catheter utilization (#catheter-days/#patient-days)	0.78 (11 490/14 732)	0.70 (8186/11 799)	0.89 (0.86-0.91)	<.0001
Urine cultures ordered per 1000 patient-days (#urine cultures/#patient-days)	70 (1035/14 732)	35.8 (293/8186)	0.51 (0.45-0.58)	<.0001

Twice daily CAUTI Rounds





Tyson AF, et. al. J of Intensive Care Med. 2020;35(8):738-744

System Risk: Missed Opportunities for Early Removal

	Example Strategy to Promote Early Removal
Physicians[1, 2]	• Daily physician assessment of catheter need • Computerized order entry system to prompt physicians to remove/reorder catheter if placed in ED or in place >24 hours • Orders in place for removal in the OR and/or length of time for catheter to remain in place.
Nurses[1,2]	• Nurse Driven protocol to remove all urinary catheters that do not meet criteria • Daily review by nurses for catheter indication to make recommendations for removal • Nurse-generated daily bedside reminders to encourage physicians to remove unnecessary urinary catheters • Nurse-to-nurse communication during transitions (ED, ICU): “Does this patient have a urinary catheter? Why?” If not indicated, ask for catheter to be removed before transfer.

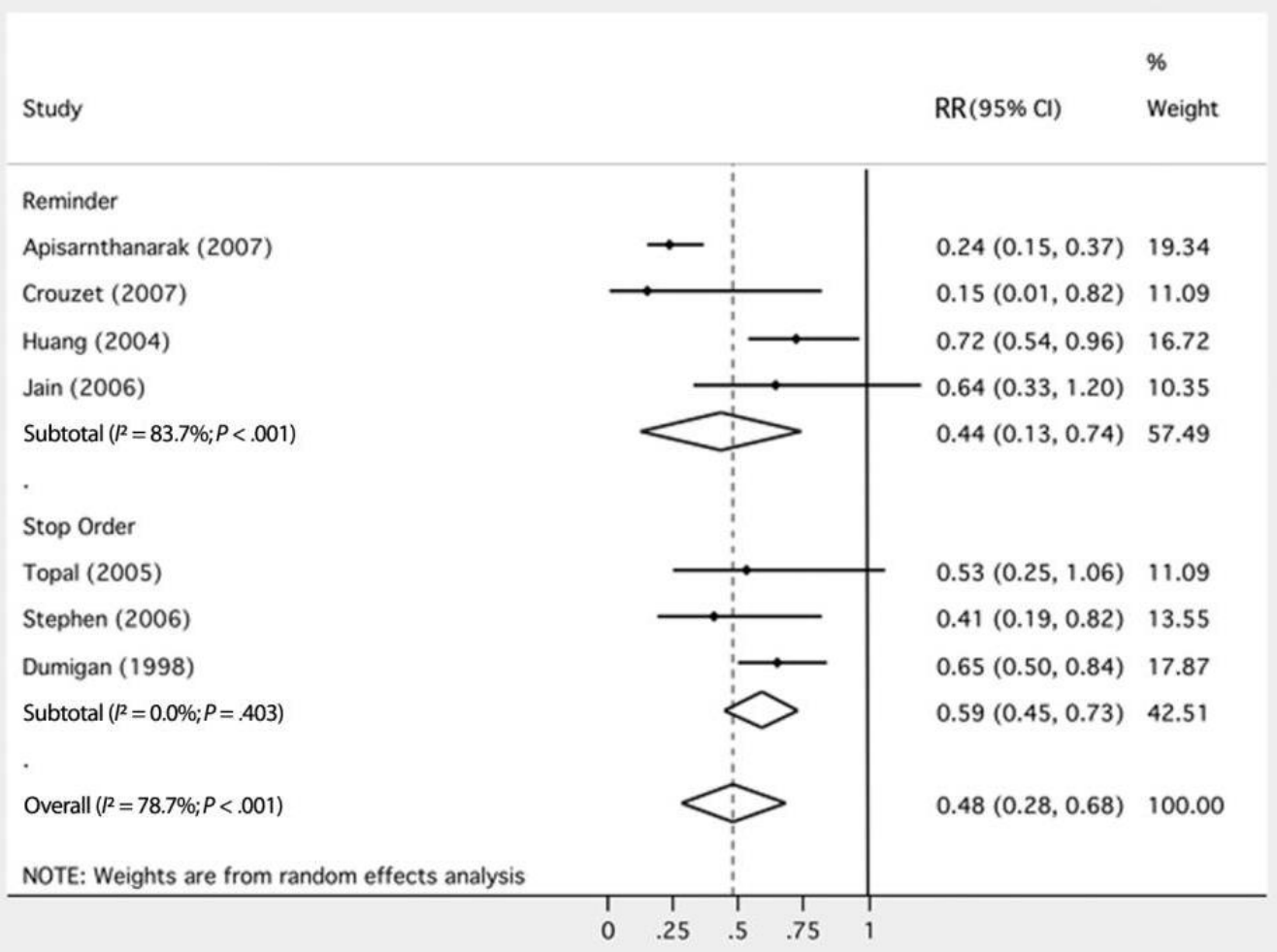
1. Mitchell B, et al. *Infection Control & Hospital Epidemiology, 2019 40*(4), 427-431.
2. Tyson AF, et al J Intensive Care Med. 2018 Jan 1

System Risk: Missed Opportunities for Early Removal

Strategy: Reminder Systems

Reminder
56% reduction

Stop Order
41% reduction



Meddings J et al. Clin Infect Dis, 2010;51:550-560

Engage the Patient & Family

- Educate patients and families about the steps that are being taken to minimize the risk of CAUTI.
- Education: purpose, current indications for use, expected duration of the catheter, why it is important to remove as soon as possible & catheter alternatives
- Catheter removal goal on whiteboard & include in rounds

Health Research & Educational Trust (2017). : 2017. Chicago, IL: Health Research & Educational Trust. Accessed at www.hret-hiin.org

On Transfer

- What devices can be removed before the patient is transferred to a different level of care?

Factors That Affect Success of Reminders, Stop Orders and Nurse Driven Protocols

- Communication patterns and unit culture relative to urinary catheter use[1]
- Nurse comfort with urinary catheter removal protocols [1,2]
- Right urine collection alternatives [1,2]
- Staff knowledge and skills [1,2]
- Respect among nurses and physicians [1,2]
- Ownership by frontline staff, local leadership and quality to review, remind, and reinforce using RCA's or learn from a defect [1,2]
- Information technology support for data collection[1]
- Feedback using data on catheter use[1]
- ICU team's recognition of the hazard of urinary catheters[1,2]

1. Meddings J, et al. BMJ Qual Saf. 2014 Apr;23:277-89.
2. Quinn M, et al Jt Comm J Qual Patient Saf. 2019 Dec 23.

Nurse Driven Removal Protocol:
ER/ICU/OR & Floor

- Assessment of criteria for insertion
- Use of the bedside bladder ultrasound to assess urinary retention (reduce rates by 30-50%)[1]
  - If minimal or no urine found in the bladder alternative strategies should be considered prior to catheterization
- Examine alternatives to indwelling catheters
  - Intermittent catheterization several times per day (post –op)
  - External catheters for male patients or female patients without urinary retention or bladder outlet obstruction[2]
- Prevalence evaluation to determine number of catheters versus the number of catheters that met criteria[1]

1. Saint S, et al. Clin Infect Dis. 2008;46(2):243-250,
2. *Saint S, et al. J am Geriatr Sco. 2006;54(7)1055-1061

Intermittent Catheterization Program

If retention is suspected pre or post catheter:

- If no voiding within 4-6 hours of assessment pre insertion or post removal, a bladder scan ultrasound used
- Volume < 500mL, encourage the patient to void by using techniques to stimulate bladder reflex (cold water to abdomen, stroke inner thigh, run water, flush toilet)
- Continue to assess the patient and repeat the bladder scan in 2 hours if no voiding
- If the bladder volume > 500mL, and intake is less than 3 L a day-catheterize for residual urine volume rather than place an indwelling catheter
- If volumes are greater/catheter goes back in 24hrs

STOP CAUTI Sample Policy and Procedure
http://www.ucdenver.edu/academics/colleges/medicalschool/departments/medicine/hcpr/cauti/documents/Sample%20Policy%20and%20Procedures.pdf
University of Virginia Health System nurse driven intermittent cath program

System Risk : Lack of Appropriate Alternatives

Challenges with Current Male Appropriate Alternatives:
External Catheters for the Male Anatomy

1 out of every 200 men is born with what's medically known as 'micro-penis'

Buried & Micro Penis

Condom Catheter

Common Problems with Current Male Extenal

- Most common problems are:
  - Skin irritation and maceration
  - Difficult to keep the condom from falling off/retraction of the penis or decrease size
  - Ischemia and penile obstruction/tightness
  - Adherence: required to secure on the shaft & adhesive mechanisms are challenging

Gray M. AACN Adv Crit Care. 2010;21(3):247-257.

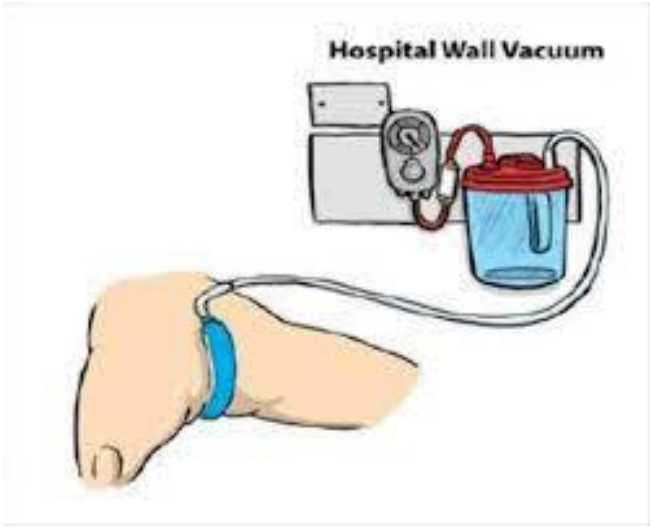
Strategy: New Male Devices

- Adjusts to different sized penises
  - No sizing chart required
- Prevents backflow with continuous suction
- Diverts urine away from the skin - addressing the risk factors of IAD

System Risk : Lack of Appropriate Alternatives for Females

Alternative External Collection Devices for the Female Anatomy

- **How do they work?**
  - They are placed between the labia and the urethral opening
  - The devices are attached to wall suction



Quality Improvement Project

- 18 bed adult SICU
- 10 month pre/post QI study
- Utilization of an external female collection device
- Daily rounds discussion
  - Inter-professional discussion regarding indications
    - Avoid placement
    - Early removal
- Measurement: CAUTI & SIR rates

Beeson T, Davis C & Vollman K. Presented at the NACNS Meeting in Austin Tx, March 2, 2018

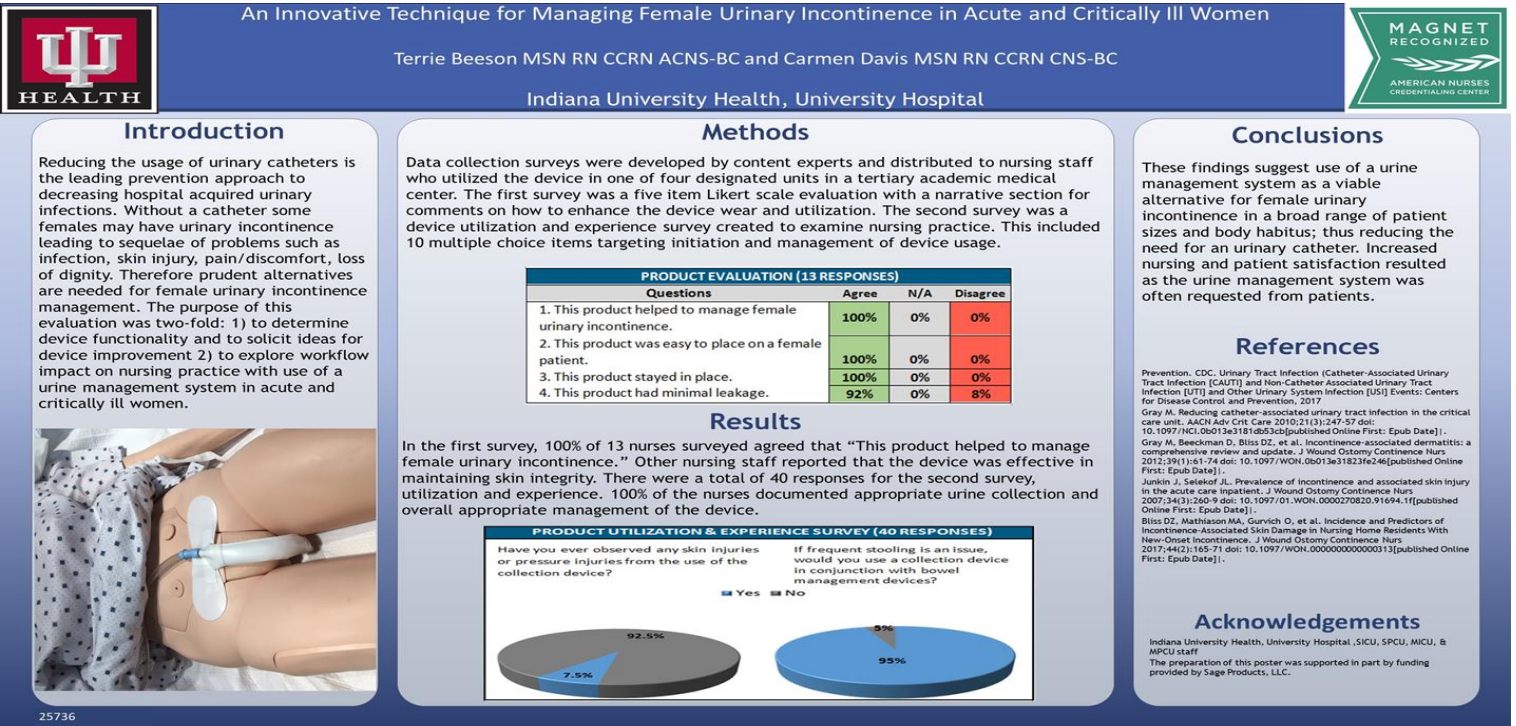
Outcomes

Pre/Post Comparison Using Female External Device

	Before	After
CAUTI Rate	2.55	0.7
Standardized Infection Ratio (SIR)	1.395	0.381

Indwelling Catheter Days ↓ 9%

Beeson T, Davis C & Vollman K. Presented at the NACNS Meeting in Austin TX, March 2, 2018



An Innovative Technique for Managing Female Urinary Incontinence in Acute and Critically Ill Women

Terrie Beeson MSN RN CCRN ACNS-BC and Carmen Davis MSN RN CCRN CNS-BC

Indiana University Health, University Hospital

Introduction

Reducing the usage of urinary catheters is the leading prevention approach to decreasing hospital acquired urinary infections. Without a catheter some females may have urinary incontinence leading to sequelae of problems such as infection, skin injury, pain/discomfort, loss of dignity. Therefore prudent alternatives are needed for female urinary incontinence management. The purpose of this evaluation was two-fold: 1) to determine device functionality and to solicit ideas for device improvement 2) to explore workflow impact on nursing practice with use of a urine management system in acute and critically ill women.

Methods

Data collection surveys were developed by content experts and distributed to nursing staff who utilized the device in one of four designated units in a tertiary academic medical center. The first survey was a five item Likert scale evaluation with a narrative section for comments on how to enhance the device wear and utilization. The second survey was a device utilization and experience survey created to examine nursing practice. This included 10 multiple choice items targeting initiation and management of device usage.

PRODUCT EVALUATION (13 RESPONSES)

Questions	Agree	N/A	Disagree
1. This product helped to manage female urinary incontinence.	100%	0%	0%
2. This product was easy to place on a female patient.	100%	0%	0%
3. This product stayed in place.	100%	0%	0%
4. This product had minimal leakage.	92%	0%	8%

Results

In the first survey, 100% of 13 nurses surveyed agreed that "This product helped to manage female urinary incontinence." Other nursing staff reported that the device was effective in maintaining skin integrity. There were a total of 40 responses for the second survey, utilization and experience. 100% of the nurses documented appropriate urine collection and overall appropriate management of the device.

PRODUCT UTILIZATION & EXPERIENCE SURVEY (40 RESPONSES)

Conclusions

These findings suggest use of a urine management system as a viable alternative for female urinary incontinence in a broad range of patient sizes and body habitus; thus reducing the need for an urinary catheter. Increased nursing and patient satisfaction resulted as the urine management system was often requested from patients.

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Beeson, T. & Davis, C. Poster Abstract at the Wound Ostomy Continence Society Meeting in Philadelphia, PA., June 3-6, 2018.

iPCaRe: Evidence-Based Algorithms

Continence Care

J Wound Ostomy Continence Nurs. 2020;47(6):601-618.
Published by Lippincott Williams & Wilkins

Interventions Post Catheter Removal (iPCaRe) in the Acute Care Setting

An Evidence- and Consensus-Based Algorithm

Mikel Gray ◆ Terrie Beeson ◆ Dea Kent ◆ Dianne Mackey ◆ Laurie McNichol ◆ Donna L. Thompson ◆ Sandra Engberg

iPCaRe
Interventions Post Catheter Removal

Image retrieved from https://www.wocn.org/blog/the-latest-decision-support-tool-from-wocn/.


“Even if you are on the right track, you will get run over if you just sit there.”
Will Rogers

Systems Risk:
Culturing Process Undefined

Asymptomatic bacteriuria" (ASB) is the condition of having a specified count of bacteria in an appropriately collected urine sample obtained from a person without clinical signs and symptoms of urinary tract infection.

1. Overuse of antibiotics that can potentially cause complications in the individual patient, including *C. difficile*
2. ↑increase in resistant pathogens impact the individual, organization & community patterns of resistance. [1]
3. Falsely inflates an organization's CAUTI rate as bacteremia is unnecessarily treated[2]
4. 23% to 50% antibiotic days for UTI are from ASB [2]

1. Health Research & Educational Trust (2017). : 2017. Chicago, IL: Health Research & Educational Trust. Accessed at www.hret-hiin.org
2. Garcia, R & Spitzer ED. American J of Infect. Control. 2017;45(10):1143-1153.

Survey of Doctors and Nurses for Indications to Urine Culture

Order Indication	Physicians	Nurses
Appearance	23%	61%
Odor	42%	74%
Dysuria	54%	35%
Pan culture	38%	45%
UA > 100 WBCs/hpf	58%	43%

Advani SD, et al. Open Forum Infect Dis. 2019 Aug 1;6(8).

Stratégies to Eliminate System Risk:
Recommandations on Urine Culture Management

- Establish a preculture strategy that directs efforts at how cultures are ordered rather than solely addressing issues after a UA or UC test is finalized:
  - Modify the electronic medical record to include appropriate and inappropriate indications for UAs/UCs that address patient symptomology
  - Eliminate automatic orders in care plans where appropriate
  - Provide education for all clinicians who order UCs with emphasis on appropriate indications for UCs and UTI symptoms in catheterized and non-catheterized patients
  - Carefully evaluate patients with fever and order UCs as appropriate
  - Reflex urine testing should be considered only if used in conjunction with careful clinical evaluation for signs and symptoms of UT

Garcia, R & Spitzer ED. American J of Infect. Control. 2017;45(10):1143-1153.

Stratégies to Eliminate System Risk:
Modify Your EMR Ordering Process

- Incorporated mandatory selection of standardized indications in EMR for ordering a UC in catheterized patients:
  - △ Suprapubic pain/tenderness
  - △ Acute gross hematuria
  - △ Costovertebral angle tenderness
  - △ New fever/rigors with clinical assessment negative for more likely etiology
  - △ Acute alteration of mental status with clinical assessment negative for more likely etiology
  - △ Alteration in medical condition with clinical assessment negative for more likely etiology in patient whom fever may not be a reliable sign
  - △ Increased spasticity or autonomic dysreflexia in patients with altered neurologic sensation

Lowers urine cultures and CAUTI rates

Garcia, R & Spitzer ED. American J of Infect. Control. 2017;45(10):1143-1153.

Example:
St. Joseph Mercy Hospital Urine Culturing Tool

***SHOULD THIS PATIENT BE EVALUATED FOR A URINARY TRACT INFECTION?**

Does the patient have any of the following **without alternate explanation**?

1. Urgency, frequency, dysuria
2. Suprapubic pain/tenderness
3. Flank pain or tenderness
4. New onset delirium
5. Fever >38 C/Rigors
6. Acute hematuria
7. Increased spasticity or autonomic dysreflexia in a spinal cord injury patient
8. ≥2 SIRS criteria (T > 38 C or < 35 C, HR > 90, RR >20 or PaCO2< 32 mmHg, WBC >12 K/mm^3 or <4 K/mm^3 or > 10% bands) OR shock with concerns for sepsis

YES

Send U/A & urine culture

Document indication for sending urine culture

Start empiric therapy (see reverse side)

NO

Do NOT send urine culture

*Symptom based screening is not reliable in the following cases: pregnancy, prior to urologic procedures, patients with complex urinary anatomy (i.e., nephrostomy tubes, urinary tract stents, h/o urinary diversion surgery in the past, or renal transplant), patients admitted to the ICU, or neutropenia. Use your clinical judgment for this population.

Version date: 9/19/2012

EMPIRIC THERAPY BASED ON CLASSIFICATION OF URINARY TRACT INFECTION (UTI)

Empiric choices should take into account recent previous cultures

If urine culture is negative & patient was on antibiotics at the time of the culture & patient has symptoms (1-8 on the reverse side) it may be appropriate to treat

PATIENT CATEGORY	PREFERRED	2ND LINE	DURATION
ASYMPTOMATIC BACTERIURIA Defined as having NONE of symptoms 1-8 on the reverse side	Do not treat except in pregnancy, prior to urologic procedures, or neutropenia Candiduria: Change catheter. Do not treat except prior to urologic procedures or in neutropenia		
UNCOMPLICATED LOWER TRACT UTI	TMP/SMX or Nitrofurantoin	Ciprofloxacin or Cephalexin	TMP/SMX x 3 days Nitrofurantoin x 5 days (contraindicated if CrCl <60 mL/min) Ciprofloxacin x 3 days Cephalexin x 7 days
COMPLICATED LOWER TRACT UTI Male, urinary catheter present or removal within the last 48 hrs., GU instrumentation, anatomic abnormality or obstruction, significant co-morbidities	Ceftriaxone or TMP/SMX or Cefepime (if risk for resistant gram negatives) or Piperacillin-tazobactam (if risk for resistant gram negatives and enterococcus)	Ciprofloxacin	7 days if prompt resolution 5 days if quinolone used 14 days if delayed response to therapy or bacteremia
SEPSIS WITH UTI, PYELONEPHRITIS, PERINEPHRIC ABSCESS	Ceftriaxone or Cefepime ((if critically ill, septic or recently hospitalized) or Piperacillin-tazobactam (if critically ill, septic or recently hospitalized and concern for enterococcus)	Severe PCN allergy Vancomycin PLUS Aztreonam	Sepsis: 10-14 days Sepsis with gram negative bacteremia: IV antibiotics or step down to oral quinolone if susceptible Sepsis without bacteremia: Change to oral therapy when stable Uncomplicated pyelonephritis (i.e., healthy young female): Ciprofloxacin x 7 days TMP/SMX x 14 days Beta-lactams x 10-14 days Perinephric abscess: prolonged duration - consult ID and urology

Follow culture results and de-escalate therapy based on final results and sensitivities.

FOR EACH ANTIBIOTIC: DOCUMENT INDICATION AND PLANNED DURATION FOR ALL PATIENTS

Stratégies to Eliminate System Risk:
Collection & Transport to Reduce Contamination

- If a catheter placed > 2 weeks, change the catheter before collecting a specimen[1]
- [illegible]
- [illegible]
- [illegible] medium within 2 hrs. of collection, then specimen should be refrigerated. [3]
- To overcome logistic barriers: most use urine collection tubes with preservatives.[3]

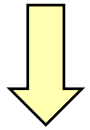
Contaminated urine cultures lead to additional diagnostic evaluation and inappropriate antibiotic administration > 40%

Klausing BT, et al. American Journal of Infection Control.2016;44:1166-1167

1. www.apic.org/implementationguides April 2014,
2. Lo E, et al. Infect Contr & Hosp Epidemiol. 2014;35(5):464-479,
3. Garcia, R & Spitzer ED. American J of Infect. Control. 2017;45(10):1143-1153

CAUTI Risk Framework

Care Giver/Human Factor Risk



- Inappropriate use of catheters/lack of speaking up for early removal
- Poor insertion techniques
- Catheter not secure/bag not below level of bladder
- Bathing and perineal cleansing not standardized

Care Giver/Human Factor Risk

Core Recommendations

- Insert catheters only for appropriate indications (1B)
- Leave catheters in only as long as needed (1B)
- Ensure that only properly trained persons insert and maintain catheters (1B)
- Insert catheters using aseptic technique and sterile equipment (1C)
- Consider use of alternatives (II)
- Maintain a close drainage system (1B)
- Secure the system (1B)
- Maintain unobstructed urine flow (1B)
- Key the collecting bag below the level of the bladder at all times (1B)
- Unresolved:
  - Antiseptic or sterile saline for meatal cleaning before insertion

Lo E, et al. Infect Contr & Hosp Epidemiol. 2014;35(5):464-479

CDC, SHEA, IDSA and NHS:
Indications for Placement of Indwelling Catheter

- Perioperative use for selected surgical procedures
- **Urine output in critically ill patients**
- Management of acute urinary retention and urinary obstruction
- Assistance in pressure ulcer healing for incontinent patients
- At a patient request to improve comfort(SHEA) or for comfort during end of life care (CDC)

How-to Guide: *Prevent Catheter-Associated Urinary Tract Infections*. Cambridge, MA: Institute for Healthcare Improvement; 2011. (Available at www.ihi.org).

Examples of Indications for Urinary Catheters

	2009 HICPAC Guidelines[1]	American Nurses Association's Streamlined Evidence-Based RN Tool: CAUTI Prevention[2]	Ann Arbor Criteria for Appropriate Urinary Catheter Use in Hospitalized Medical Patients[3]
Example Indications	• Acute urinary retention/obstruction • Perioperative use for selected surgeries • To assist with healing of open wounds in incontinent patients • End-of-life care • Accurate measurement of urinary output in critically ill patients	• Acute urinary retention/obstruction • Perioperative use for selected surgeries • To assist with healing of open wounds in incontinent patients • End-of-life care • Critically ill and need for accurate measurements of I&O (e.g., hourly monitoring)	• Indwelling catheters are appropriate for measuring and collecting urine only when fluid status or urine CANNOT be assessed by other means. • Location in an ICU alone is NOT an appropriate indication. • Criteria for 3 catheter types: indwelling, external and intermittent use catheters
Comments	• Appropriate use in critically ill patients has varied interpretations	• Helpful algorithm to make decisions • Based on 2009 Guidelines • Use in critically ill patients still ambiguous	• Provides clarification to the 2009 guidelines on use for specific clinical scenarios • Includes ICU Daily Checklist for indwelling catheter use

1. Gould CV,et al. *Infect Control Hosp Epidemiol*. 2010;31(4):319-326.
2. ANA: https://www.nursingworld.org/practice-policy/work-environment/health-safety/infection-prevention/ana-cauti-prevention-tool/
3. Meddings J, et al. Ann Intern Med. 2015 May 5;162(9 Suppl):S1-34.

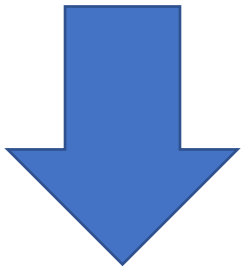
Types Of Treatments Requiring Close UO Monitoring

- Bolus fluid resuscitation
- Vasopressors
- Inotropes
- High dose diuretics
- Hourly urine studies to measure life threatening laboratory abnormalities

Are you responding hourly to the patient's urine output??

Care Giver/Human Factor Risk:
Core Recommendations

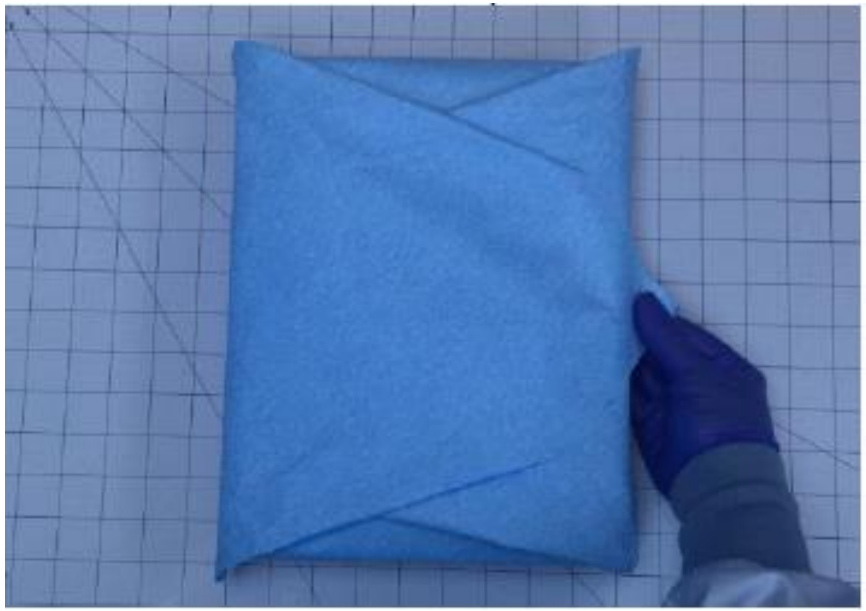
- Insert catheters only for appropriate indications (1B)
- Leave catheters in only as long as needed (1B)
- Ensure that only properly trained persons insert and maintain catheters (1B)
- Insert catheters using aseptic technique and sterile equipment (1C)



What is your process to achieve this?

Lo E, et al. Infect Contr & Hosp Epidemiol. 2014;35(5):464-479

Care Giver/Human Factor Risk:
Strategy: Force Function Insertion



Simplified Insertion Checklist for Urinary Catheter

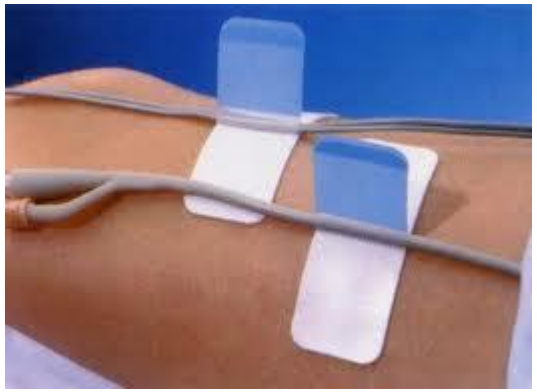
Components of Checklist	Compliant	
	Yes	Yes, after correction
Hand hygiene before and after procedure		
Sterile gloves, drapes, sponges, aseptic sterile solution for cleaning, and single use packet lubricant used		
Aseptic insertion technique (no contamination during placement)		
Proper securement of urinary catheter post-procedure		
Closed drainage system and bag below patient post-procedure		

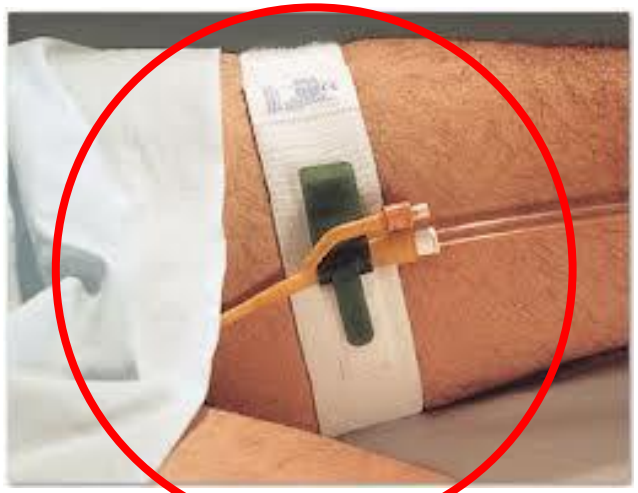
Care Giver/Human Factor Risk:
Core Recommendations

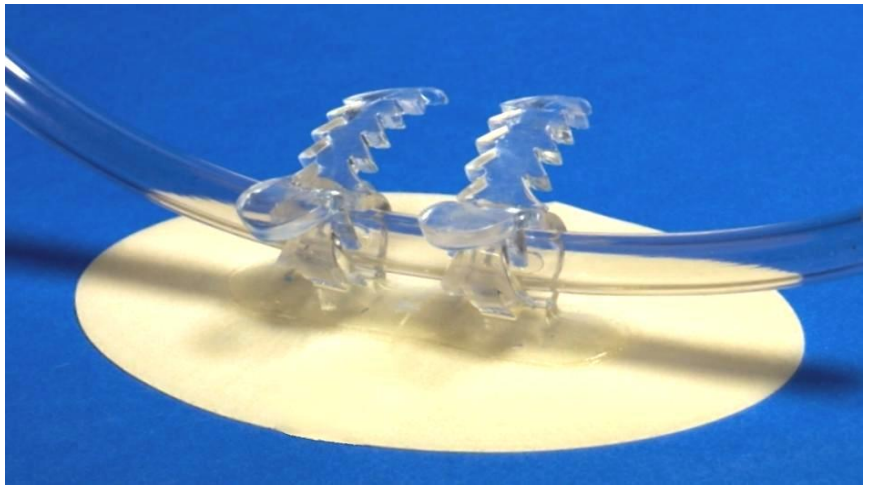
- Insert catheters only for appropriate indications (1B)
- Leave catheters in only as long as needed (1B)
- Ensure that only properly trained persons insert and maintain catheters (1B)
- Insert catheters using aseptic technique and sterile equipment (1C)
- Consider use of alternatives (II)
- Maintain a close drainage system (1B)
- Secure the system (1B)
- Maintain unobstructed urine flow (1B)-device risk factor
- Key the collecting bag below the level of the bladder at all times (1B) device risk factor
- Unresolved:
  - Antiseptic or sterile saline for meatal cleaning before insertion

Lo E, et al. Infect Contr & Hosp Epidemiol. 2014;35(5):464-479

Securement Devices







Care Giver/Human Factor Risk:
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Lo E, et al. Infect Contr & Hosp Epidemiol. 2014;35(5):464-479

Care Giver/Human Factor Risk:

Bathing & Perineal Cleansing Not Standardized

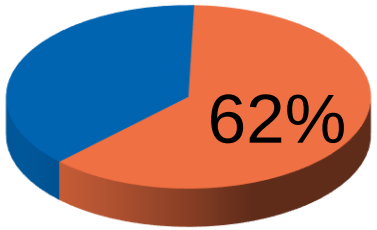
How We Bathe May Impact CAUTI's

Bath Basins
Potential Source of Infection

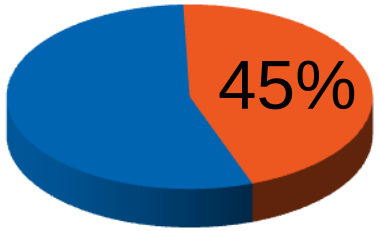
Large multi-center study evaluates presence of multi-drug resistant organisms

Total hospitals: 88

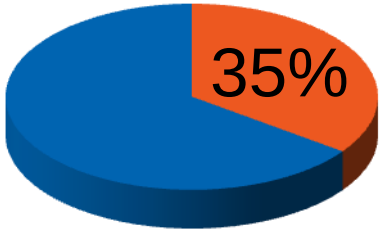
Total basins: 1,103



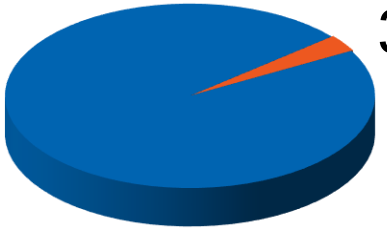
Contaminated
686 basins/88 Hospital



Gram negative bacilli
495 basins/86 hospitals



Colonized w/ VRE
385 basins/80 hospitals



MRSA
36 basins/28 hospitals

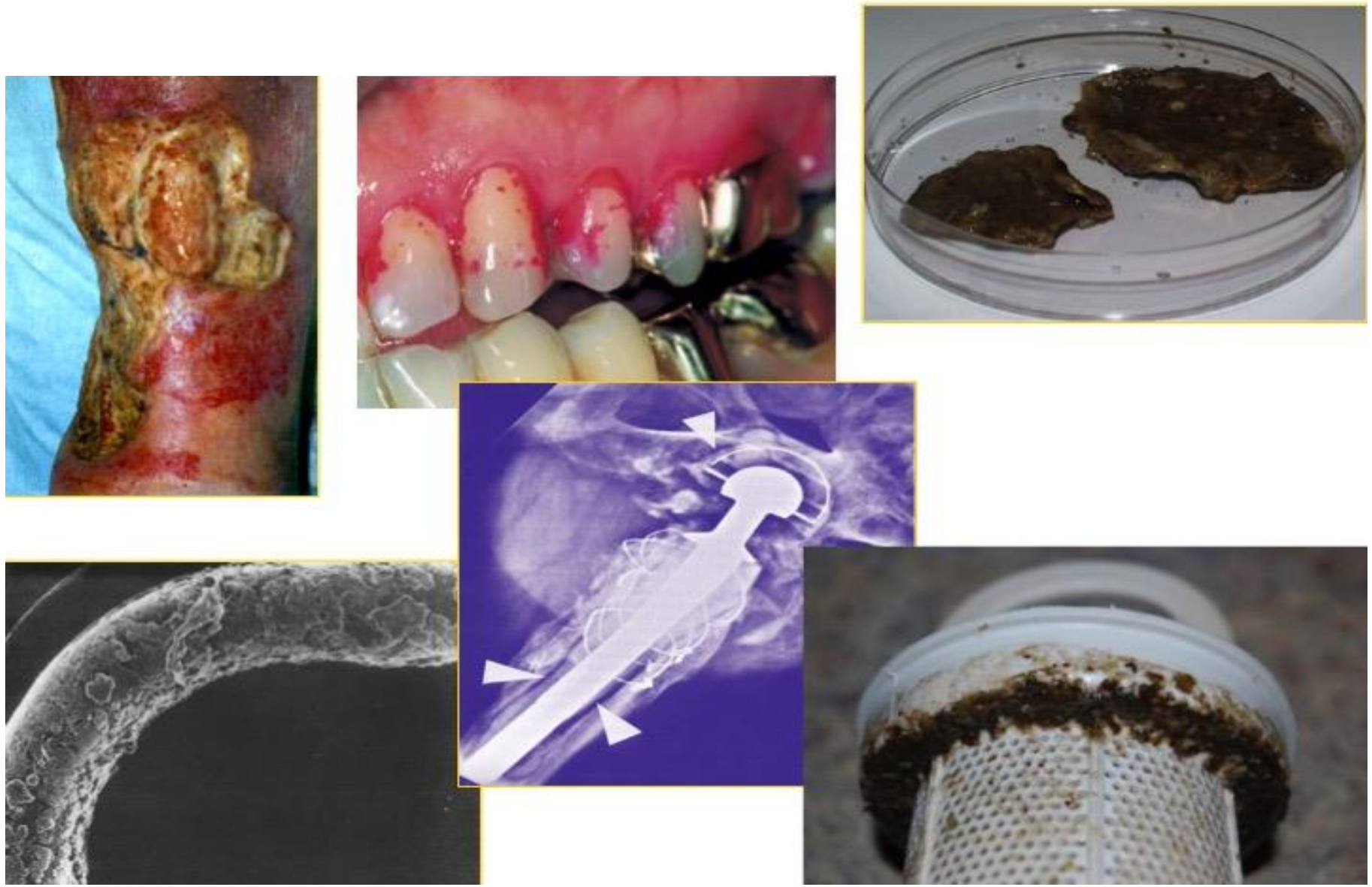
Marchaim D, et al. *Am J of Infect Control*. 2012;40(6):562-564

Mechanisms of Contamination

- Skin flora[1]
- Multiple-use basins[2,3,4]
  - Incontinence cleansing
  - Emesis
  - Product storage
- Bacterial biofilm from tap water[1-4]

1. Larson EL, et al. *J Clin Microbiol*. 1986;23(3):604-608
2. Johnson D, et al. *Am J Crit Care*, 2009;18(1):31-38, 41
3. Marchaim D, et al. *Am J Infect Control*. 2012;40(6):562-564.
4. Shannon RJ, et al. J Health Care Safety Compliance Infect Control. 1999;3:180-1

Biofilms are Ubiquitous



Water Source

Hospital Tap Water

- Bacterial biofilm
- Most overlooked source for pathogens[2]
- 29 studies demonstrate an association with HAIs and outbreaks[2]
- Transmission:[1-3]
  - Drinking
  - Bathing
  - Rinsing items
  - Contaminated environmental surfaces
- Immunocompromised patients at greatest risk[1]

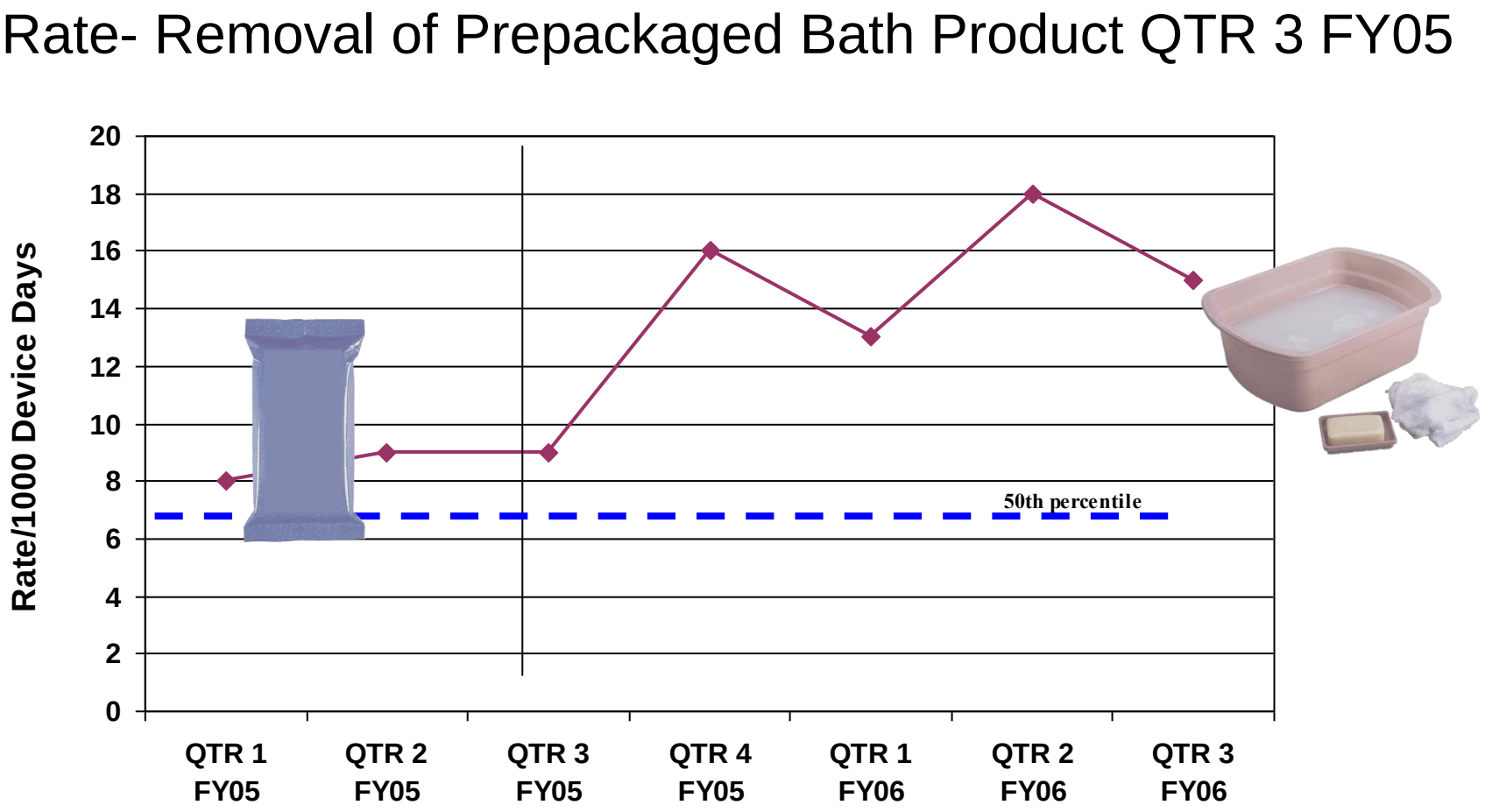
1. Anaissie EJ, et al. *Arch Intern Med*. 2002;162(13):1483-1492.,
2. Cervia JS, et al. Arch Intern Med, 2007;167:92-93,
3. Trautmann M, et al. Am J of Infect Control, 2005;33(5):S41-S49,

Understanding Water

- All water except for sterile water and filtered water is contaminated with microbes (e.g., potable water, tap water, showers, and ice)[1]
- In healthy persons, contact or ingestion of such water rarely leads to infection[1]
- However, contact or ingestion of such water may cause infection in immunocompromised persons or when applied to non-intact skin[1]
- Transmission of these pathogens from a water reservoir may occur by direct and indirect contact, ingestion and aspiration of contaminated water, or inhalation of aerosols[2]

1. Presented at MSIPC October 6th, 2016, Lansing MI by Dorine Berriel-Cass
2. *Decker BK, et al. Opin Infect Dis 2013; 26:345–51.

Impact on UTI with Basin Bathing



McGuckin M, et al. AJIC, 2008;36:59-62

The Effect of Bathing with Basin and Water and UTI Rate, LOS and Costs

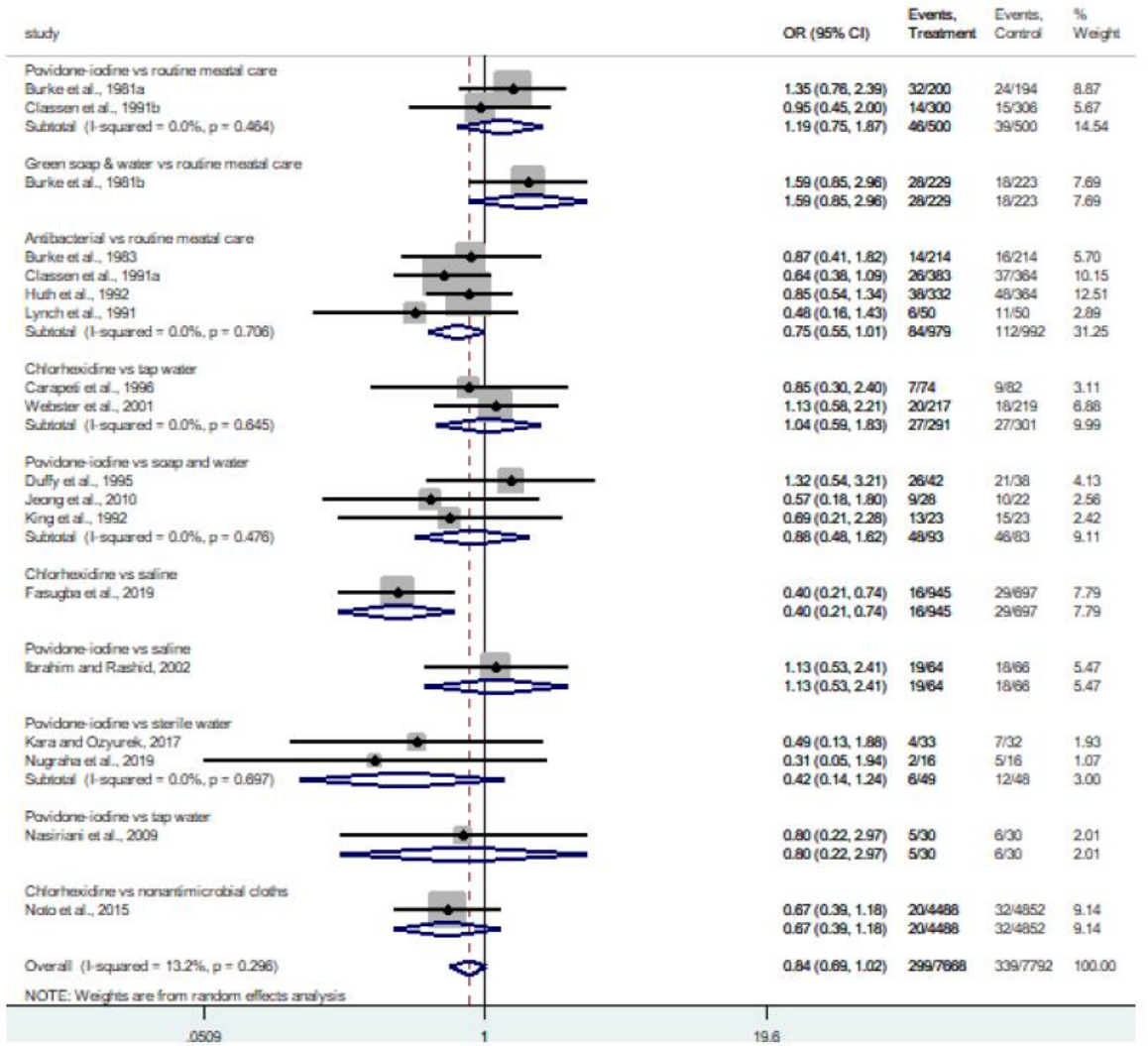
Unit Census: 14				
Phases	**Product Cost**	**No. of UTI**	**Median[4] LOS 17 Days**	**Median[4] Cost (4857.00)**
I- Pre-Packaged Bathing Washcloths (9 months)	$10,530[1] ($3.00)	25	175	$117,175
II- Basin/Water (9 months)	$3,510[2] ($1.00)	48	336	$224,916
III- Additional Product Cost, UTI, LOS, COSTS	$7,020	23[3]	151	$107,741

[1]Based on 3 packages of 8 towels each [2]Based on product cost of towels, soap, and basin[3] Difference between phase I pre-package/phase II basin water[4]

McGuckin M, et al. AJIC, 2008;36:59-62

Cleansing of Patients with Indwelling Catheter

- Antiseptic cleaning of the meatal area (CHG or Povidone-iodine) before and during catheter use compared to soap and water or saline may reduce the risk of CAUTIs. (OR=0.65, 95%CI 0.42 to .99; p=0.047)
- Indwelling catheter care should occur with the daily bath (basinless bathing), as a separate procedure using clean technique
- There is no evidence to support 2x a day indwelling catheter care



Mitchell B. et al BMJ open, 2021;11
Fasugba O, et al. J of Hosp Infection, 2017;95:233-242

CAUTI Risk Framework

Device Risk

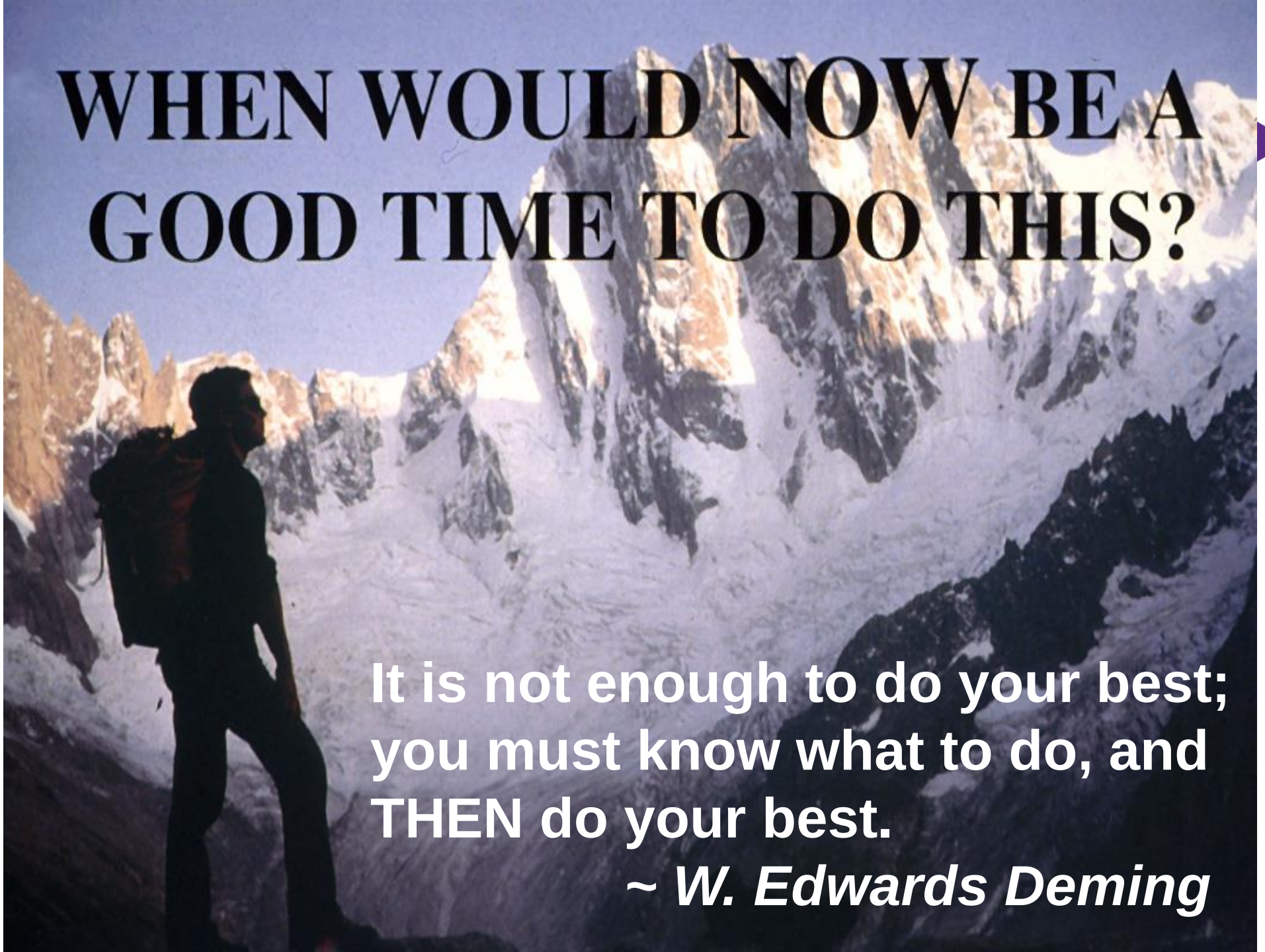
- Length of time/biofilm buildup
- Open drainage systems/Purchase preconnected
- Incomplete bladder emptying/Active drain clearance
- Air Trapping and urine backflow/Active drain clearance

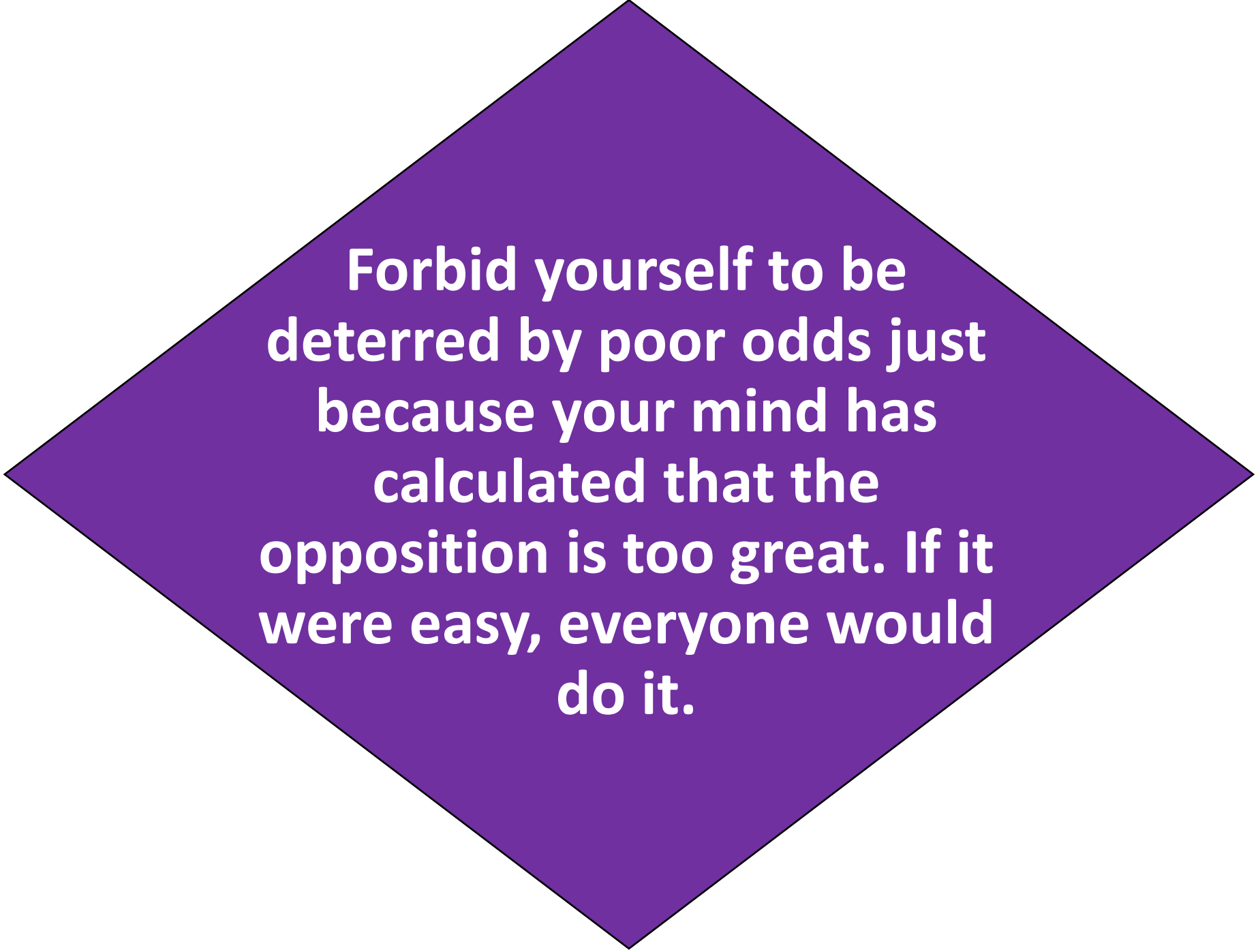
Systems Risk

- Appropriate external device
- Strategies for nurse driven protocol use.
- Insufficient number of bladder scanners/Cost Benefit
- Urine culture process defined

Care Giver/Human Factor Risk

- Inappropriate use of catheters: Strategies for I & O and speaking up
- Poor insertion practice, formulated tray, 2-person insertion, yearly competencies
- Catheter not secured/bag below level of bladder (Active drain clearance)
- Bathing/Perineal Cleansing not standardized/Cloth bathing, Cloth perineal cleansing


WHEN WOULD NOW BE A GOOD TIME TO DO THIS?
It is not enough to do your best; you must know what to do, and THEN do your best.
~ W. Edwards Deming


Forbid yourself to be deterred by poor odds just because your mind has calculated that the opposition is too great. If it were easy, everyone would do it.

Kathleen Vollman
ADVANCING NURSING THROUGH KNOWLEDGE & INNOVATION

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