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



Kathleen M. Vollman MSN, RN, CCNS, FCCM, FCNS, FAAN Clinical Nurse Specialist / Educator / Consultant ADVANCING NURSING kvollman@comcast.net Northville Michigan www.Vollman.com

Disclosures

A Consultant-Michigan Hospital Association Keystone Center

Subject matter expert on CAUTI, CLABSI, HAPI, Safety culture for AHA

Paid consultant and speaker bureau

- \triangle Baxter healthcare
- \triangle LaJolla Pharmaceutical
- \triangle Potrero Medical*
- \triangle Stryker's Sage business

*Results from these case studies presented are not predictive of future results.



Objectives

Describe a risk framework that helps team target process improvements to reduce or eliminate CAUTI infections.

▲ Identify and detail the evidence-based practices that target major risk factors currently not addressed or evidence of variation in practice.



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







Strategies to l	_ink H	arm wi	th Pati	ent
Advocacy Role	9	Le	earn from Defects Too	l Worksheet

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

gnificant co-morbidities:	8) High volume with bladder scanning (greater sourni) Yes No No N/A
	9) Catheter flushed? Yes No
ocation of CAUTI: ICU Non-ICU Date of Event	10) Patient on antibiotics prior to urine culture? Yes No
/here was the catheter inserted: OR D ED ICU Non-ICU	11) Other:
ge:	+ Wat prevented it from being worse? 1) If patient is still on unit and can be seen Duration of catheter # days: (Time of insert to discontinue) a) Green clip in use? Yes No b) Bag below the bladder? Yes No Duration of catheter # days: (Time of insert to discontinue) c) No loops (straight)? Yes No Time from catheter insertion until urine culture obtained: d) Bag not on floor – or is on bucket? Y No Is the patient being treated for any other infections? f) Catheter secured? Yes No Is the patient being treated for any other infections? Did we try an alternative to control incontinence? Yes No Yes Was nurse driven catheter removal protocol used? Yes No
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	What can we do to reduce the risk of it happening with a different person? Action Plan Responsible Person Targeted Date Evaluation Plan – Ho will we know risk is reduced? With whom shall we share our learning? (Communication plan) Evaluation Plan Evaluation Plan
5) Daily Foley care/ peri care performed? Yes No	0 (
6) Why was culture ordered? PAN culture (PAN Order, Date/Time) Pt. Febrile Urinary Symptoms Urine clarity/ odor Other	Who When How Follow up
7) Fecal incontinence? Yes No	



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 setting²
- Approximately 20% of hospital patients have urinary catheter at some point in their stay³

▲ Specific patient impact⁴

- $\bigtriangleup\,$ Discomfort r/t to mild signs of infection
- \triangle Potential urethral trauma
- △ Embarrassment
- △ Pyelonephritis
- $\bigtriangleup\,$ Urosepsis leading to potential death

For Every 1000 in-hospital CAUTI cases, there are 36 excess deaths⁴

Catheter-Associated Urinary Tract Infections (CAUTI)⁴

 $\triangle 6$ studies

△ Cost range: \$4,694–\$29,743

 \triangle Average: \$13,793

- 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.

Addressing CAUTIs Through Eliminating Risk

CAUTI Risk Framework

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
- S Falsely low UO-resulting in errors in treatment decisions

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.

Reducing Device Risk

Active drain clearance

- △ Eliminates stagnate urine in the bladder
- \triangle Prevents black flow
- △ Prevents bladder wall trauma-no vacuum
- △ Greater accuracy of urine output measurement

CAUTI Risk Framework

APIC 2014 CAUTI Prevention Guidelines

Disrupting the Lifecycle of the Urinary Catheter

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
 - riangle Nurse driven protocol
 - \triangle 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

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

- ☆ Communication patterns and unit culture relative to urinary catheter use¹
- ∧ 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 collection¹
- ▲ Feedback using data on catheter use¹
- ▲ 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.

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?

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*
- 1. The provide a structure of the individual of the i
- Falsely inflates an organization's CAUTI rate as bacteremia is unnecessarily treated²
- 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 <u>www.hret-hiin.org</u>
 - 2. Garcia, R & Spitzer ED. American J of Infect. Control. 2017;45(10):1143-1153.

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
 - \bigtriangleup 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
 - \bigtriangleup 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

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:

- \triangle Suprapubic pain/tenderness
- \triangle Acute gross hematuria
- \triangle Costovertebral angle tenderness
- \triangle New fever/rigors with clinical assessment negative for more likely etiology
- \triangle Acute alteration of mental status with clinical assessment negative for more likely etiology
- \bigtriangleup Alteration in medical condition with clinical assessment negative for more likely etiology in patient whom fever may not be a reliable sign
- \triangle Increased spasticity or autonomic dysreflexia in patients with altered neurologic sensation

Lowers urine cultures and CAUTI rates

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

> ▲If a catheter placed > 2 weeks, change the catheter before collecting a specimen¹

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

refrigerated.³

▲To overcome logistic barriers: most use urine collection tubes with preservatives.³

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

CAUTI Risk Framework

APIC 2014 CAUTI Prevention Guidelines

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

A Perioperative use for selected surgical procedures

A Urine output in critically ill patients

A 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

3. Meddings J. et al. Ann Intern Med. 2015 May 5:162(9 Suppl):S1-34.

safety/infection-prevention/ana-cauti-prevention-tool/

Types Of Treatments Requiring Q 1-2 hr UO Monitoring

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

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

https://www.ahrq.gov/hai/tools/clabsi-cauti-icu/index.html Meddings J, et al. Ann Internal Med. 2015;162(9 Suppl):S1-34.

Patients at Risk for AKI related to Intraabdominal Pressure

- A Patients at risk:
 - $\triangle \uparrow BMI$
 - \triangle Presence of abdominal distension
 - \triangle PEEP > 7cm
 - \triangle Positive fluid balance
- Increased IAP results in widespread adverse effects to the abdominal organs
 - \bigtriangleup Leads to impaired tissue perfusion
 - \triangle Mesenteric ischemia
 - \bigtriangleup Decreased renal perfusion—oliguria when IAP >15, an uria when IAP >30
- ▲ Underrecognized and under treated-IAH rates reported btwn 30%-49% in general critical care units, ACS 1.1% to 6.1%

How to Reduce CAUTI risk:

- Systems that don't require opening and closing of ports
- Systems that don't require injection of fluid

Care Giver/Human Factor Risk:

Bathing & Perineal Cleansing Not Standardized

How We Bathe May Impact CAUTI's

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 infection¹
- A However, contact or ingestion of such water may cause infection in immunocompromised persons or when applied to non-intact skin¹
- ▲ Transmission of these pathogens from a water reservoir may occur by direct and indirect contact, ingestion and aspiration of contaminated water, or inhalation of aerosols²

2. *Decker BK, et al. Opin Infect Dis 2013; 26:345-51.

Impact on UTI with Basin Bathing

UTI Rate- Removal of Prepackaged Bath Product QTR 3 FY05

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	Median⁴ 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

¹Based on 3 packages of 8 towels each ²Based on product cost of towels, soap, and basin³ Difference between phase I pre-package/phase II basin water⁴

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
- A There is no evidence to support 2x a day indwelling catheter care

at at	OR (OFK CI) Trent	B, Events,	%
saudy	OR (55% CI) TRa	ment Contro	weg
Povidone-iodine vs routine meatal care			
Burke et al., 1981a	1.35 (0.76, 2.39) 32/20	0 24/194	8.87
Classen et al., 1991b	0.95 (0.45, 2.00) 14/30	0 15/306	5.67
Subtotal (1-squared = 0.0%, p = 0.464)	1.19 (0.75, 1.87) 46/50	0 39/500	14.54
Green soap & water vs routine meatal care			
Burke et al., 1981b	1.59 (0.85, 2.96) 28/22	9 18/223	7.69
+==	1.59 (0.85, 2.96) 28/22	9 18/223	7.69
Antibacterial vs routine mestal care			
Burke et al., 1983	0.87 (0.41, 1.82) 14/21	4 16/214	5.70
Classen et al., 1991a	0.64 (0.38, 1.09) 26/38	3 37/364	10.15
Huth et al. 1992	0.85/0.54 1.34) 38/33	2 48/384	12.51
whether at all 1001	0.49 (0.16 1.43) 6/50	11/50	2.80
Subtatal (I-sausred = 0.0%, p = 0.706)	0.75 (0.55, 1.01) 84/97	9 112/992	31.25
			10000000
Chlorhexidine vs tap water	0.85 (0.30 2.40) 7/74	9/82	3.11
Webster at al. 2001	1 13 (0 58 2 21) 20/21	7 18/210	6.99
Schedul (Leasand = 0.0% a = 0.65)	104 (0 50 1 83) 27/20	27/301	0.00
Sandia (Fisquared - down, p - dowd)	104 (0.05, 100) 21/29	20301	0.00
Povidone-iodine vs scap and water	1 22/0 54 2 211 22/02	21/20	4.10
Duny et al., 1990	1.32 (0.54, 3.21) 2042	21/30	4.13
Jeong et al., 2010	0.57 (0.18, 1.80) 9/28	10/22	2.56
King et al., 1992	0.69 (0.21, 2.28) 13/23	15/23	2.42
Subtotal (1-squared = 0.0%, p = 0.476)	0.88 (0.48, 1.62) 48/93	46/83	9.11
Chlorhevidine vs saline			1000
Fasugba et al., 2019	0.40 (0.21, 0.74) 16/94	5 29/697	7.79
	0.40 (0.21, 0.74) 16/94	5 29/697	7.79
Pavidane-iadine vs saline		al allow	100.000
Ibrahim and Rashid, 2002	1.13 (0.53, 2.41) 19/64	18/66	5.47
	1.13 (0.53, 2.41) 19/64	18/66	5.47
Povidone-iodine vs sterile water			
Kara and Ozyurek, 2017	0.49 (0.13, 1.88) 4/33	7/32	1.93
Nugraha et al., 2019	0.31 (0.05, 1.94) 2/16	5/16	1.07
Subtotal (1-squared = 0.0%, p = 0.697)	0.42 (0.14, 1.24) 6/49	12/48	3.00
Povidone-iodine vs tap water			
Nasiriani et al., 2009	0.80 (0.22, 2.97) 5/30	6/30	2.01
	0.80 (0.22, 2.97) 5/30	6/30	2.01
Chlorhexidine vs nonantimicrobial cloths			
Noto et al., 2015	0.67 (0.39, 1.18) 20/44	88 32/4852	9.14
	0.67 (0.39, 1.18) 20/44	88 32/4852	9.14
Overall (I-squared = 13.2%, p = 0.296)	0.84 (0.69, 1.02) 299/7	668 339/7792	100.0
NOTE: Weights are from random effects analysis			
.0509 1	196 holl D. at al DNAL anan. 2021-11		
IVIIC	nen B. et al Bivij open, 2021;11		
Fasu	gba O, et al. J of Hosp Infection, 20)17;95:23	3-24

CAUTI Risk Framework

APIC 2014 CAUTI Prevention Guidelines

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 M. Vollman MSN, RN, CCNS, FCCM, FCNS, FAAN Clinical Nurse Specialist / Educator / Consultant ADVANCING NURSING kvollman@comcast.net Northville Michigan www.Vollman.com HAI Prevention courses by Kathleen Vollman

https://www.medbridgeeducation.com /advancing-nursing

