HIMSS19 CHAMPIONS OF HEALTH UNITE

Global Conference & Exhibition

FEB 11–15, 2019 | ORLANDO

Reducing Catheter-Associated Urinary Tract Infections

Session #299, February 15, 2019

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VCU Health

DISCLAIMER: The views and opinions expressed in this presentation are those of the author and do not necessarily represent official policy or position of HIMSS.

Conflict of Interest

Colin Banas, MD, MSHA

Shelley Knowlson, MS, RN, ACCNS-AG

No real or apparent conflicts of interest to report.

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Agenda

- Why CAUTI
- VCUHS baseline (pre-intervention)
- Interventions
- Results
- Impact
- Lessons learned

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Learning Objectives

- Recognize patient and organizational impacts associated with catheter-associated urinary tract infections (CAUTI)
- Identify evidence-based guidelines that have been shown to decrease incidence of CAUTI
- Understand the important role Information Technology has in reducing hospital acquired infections including CAUTI

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Agenda

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- VCUHS baseline (pre-intervention)
- Interventions
- Results
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- Lessons learned

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Why CAUTI?

- **Patient impact**
- Most common healthcare-associated infection (HAI)
- Accounts for more than 30% of all HAIs
- Most catheters inserted are unnecessary
- 13,000 deaths associated with UTIs each year
- Leading cause of secondary blood stream infections
- Antibiotic resistance

- **National focus**
- One of the first HAI selected for non-payment by Medicare
- 2016 HHS national goal to reduce CAUTI by 25% by 2020

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Why CAUTI?

Financial impact

- CDC national economic burden of $340 million annually
  - $1,000 is average cost associated with CAUTI
- 2018 study puts national cost closer to $1.7 billion[1]
- AHRQ cost for hospital-onset CAUTI $13,793[2] per event
- Increased length of stay
  - 2-4 extra hospital days[3] per CAUTI event
- Mortality: attributed to 36 deaths per 1,000 CAUTI[4]

1. Hollenbeak, CS, Schilling, AL. The attributable cost of catheter-associated urinary tract infection in the United States: A systematic review. American Journal of Infection Control, 2018; 46(7);751-757.
2. https://www.ahrq.gov/professionals/quality-patient-safety/pfp/haccost2017-results.html
3. Gould C. Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention. Catheter-associated urinary tract infection (CAUTI) toolkit. Activity C: ELC prevention collaboratives. http://www.cdc.gov/HAI/pdfs/toolkits/CAUTItoolkit_3_10.pdf.
4. CDC/NHSN – CMS hospital compare data - Scott, RD. The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention. http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf

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Agenda

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- VCUHS baseline (pre-intervention)
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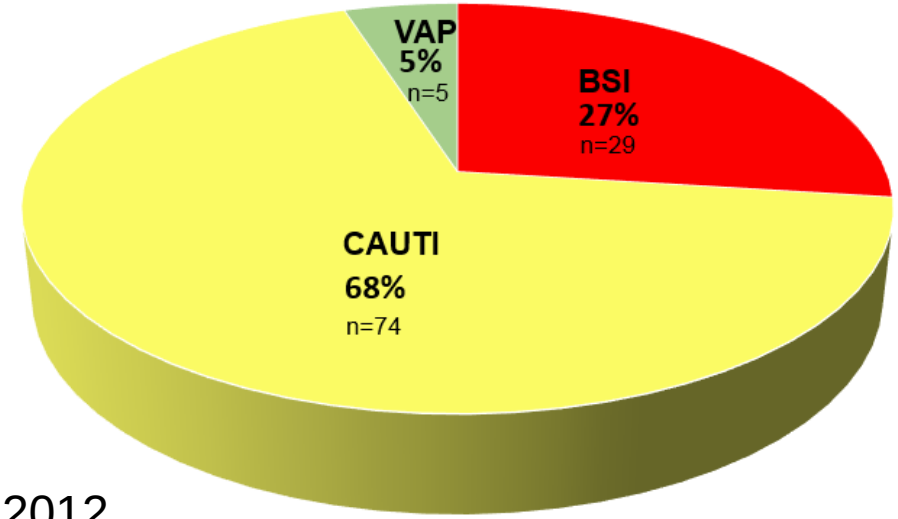
CAUTI Baseline Data – Adult ICUs 2012



- 74 CAUTIs in 2012
- 68% (74/108) device associated HAI due to CAUTI
- CAUTI rate 3.1 per 1000 device days

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Agenda

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Timeline of Interventions

2013
- Creation of hospital policy to address insertion, maintenance, indications for use, and nurse-driven protocol for removal of unnecessary catheters
- EMR documentation section added in iView for nursing to document daily assessment of need for urinary catheter

2014
- Infection prevention begins monthly audit and feedback of urinary catheter daily assessment of need compliance

2015
- EMR documentation in iView revised for Nursing documentation - new drop-down fields for urinary catheter necessity criteria
- Reference hyperlink added into iView for end-users to review policy indications for appropriate criteria

2016
- EMR order set created for providers – must enter order for catheter, include indication for need, order for continuation of catheter after 72-hour removal
- EMR generated automatic order for nurses to discontinue urinary catheter 72 hours after insertion

2017
- Urine test stewardship beings in adult ICUs (assisted with Enterprise Analytic report)
- ICU Panculture Power Orders adjusted to remove UA with reflex as preselected item
- Updated intermittent catheterization algorithm hyperlinked into iView

2018
- EMR decision support for urine culture testing to align practice with IDSA/SCCM guidelines
- Care Compass task to fire to remind nurses to remove urinary catheter at 72-hour mark

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CAUTI Bundle

2013

Maintenance

- Review for necessity
- Maintain a closed system
- Unobstructed flow
- Hand hygiene

2015 & 2016

Insertion

- Only for appropriate indications
- Only properly trained personnel to insert/maintain
- Aseptic technique and sterile equipment
- Consider alternatives

2016

Removal

- Leave in place only as long as needed

AHRQ – *On the CUSP*: Stop CAUTI project: Technical Interventions To Prevent CAUTI. Content last reviewed October 2015. Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/professionals/quality-patient-safety/hais/cauti-tools/guides/implguide-pt3.html

2009 CDC/HICPAC Guidelines: http://www.cdc.gov/HAI/ca_uti/uti.html

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Clinician Awareness

Safety Dashboard

L/T/D	Inserted	Days Since Insertion
Arterial Line Right Radial artery	07/27/2018	4
Orogastric	Date Not Documented	
Pulmonary artery catheter Right Neck	07/27/2018	4
Cordis Right Neck	07/27/2018	4
Chest tube	Date Not Documented	
Foley catheter	07/27/2018	4
Peripheral access Left Forearm	07/26 Safety Dashboard	5

ICE				LAST WEIGHT	SKIN RISK
iac Surgery				0 days	
iac Surgery				0 days	
iac Surgery				0 days	
iac Surgery				8 days	
CVC	2	+2	0	3 days	
CVC	2	+4	0	1 days	
CVC	3	+2	0	4 days	
CVC	2	+4	7	5 days	U

CORES 4.0.0

PREVIOUS | RELOAD | SAVE | SAVE & EXIT | EXIT | Internal Med - IPA

SEX: M | BIRTH DATE: 26-JAN-1939 | AGE: 79 Years
LOCATION: N5C 041 A | ADMIT: 09-AUG-2018 | ADT SERVICE: IP-Medicine-Tea... | ATT: MARCELO MD, CATHERINE...

PATIENT CODE STATUS: Do Not Resuscitate, Start: 08/08/18 19:53:00 EDT (08/08/18 19:53)

Code Status Order (Pt.)

Days	Status
Patient Code Status	Do Not Resuscitate, Start: 08/08/18 19:53:00...

SIT AWARE / ACTIONS / PLAN

Action List (Srv) (0 active tasks)

Add new task | - Due Date -

Active Tasks (0)
View Other Team's Tasks (0)
Completed Tasks (0)

Sit. Awareness / Cont. Plan (Team) Today 09:38

NF: f/u cardiology recommendations
f/u lactate, BMP, and cardiac enzymes
f/u family decision about moving to ACE/heart failure for dobutamine (call Chao)

Low threshold to consult MRICU for decompensated heart failure, acute liver

ISSUES

Patient Summary (Team) Today 09:38

Pt with acute liver failure, HFrEF s/p ICD. several days of nausea found to have acute liver injury in setting of daily APAP, acute decompensated heart failure.

I&O - TUBES/LINES/DRAINS

Intake and Output (Pt.)

Shift length: 8h / 12h

	08/10 Morning S	08/09 24h Total	08/09 Night Shift	08/09 Day Shift	08/09 Morning S
Intake (ml)	420.00	2455.80	427.80	924.00	1104.00
Infusion	0.00	653.80	227.80	142.00	284.00
Medication	100.00	602.00	200.00	302.00	100.00
Oral	320.00	1200.00	0.00	480.00	720.00
Output (ml)	400.00	1225.00	375.00	850.00	0.00
Urine Output	400.00	1225.00	375.00	850.00	0.00
Net (ml)	20.00	1230.80	52.80	74.00	1104.00

Diet Orders (Pt.)

Days	Status
Sodium diet: 2 grams	Start 08/09/18 15:43:00 EDT

Tubes/Lines/Drains (Team)

Lines: (selected visit)	24 hr. I/O:	Inserted:	Team Notes:
Peripheral access 08/9/2018 Right...		8/9 6:46	

Tubes: (selected visit)	24 hr. I/O:	Inserted:	Team Notes:

No active tubes found.

Drains: (selected visit)	24 hr. I/O:	Inserted:	Team Notes:
Foley catheter 08/8/2018 16 Fr fro... (1625)		8/9 6:00	

Tubes/Lines/Drains (Other) (Team) 08-10-2018

Provider sign-out tool

- includes lines and tubes

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Daily Assessment of Need
Nursing Documentation

2013

2014

2015

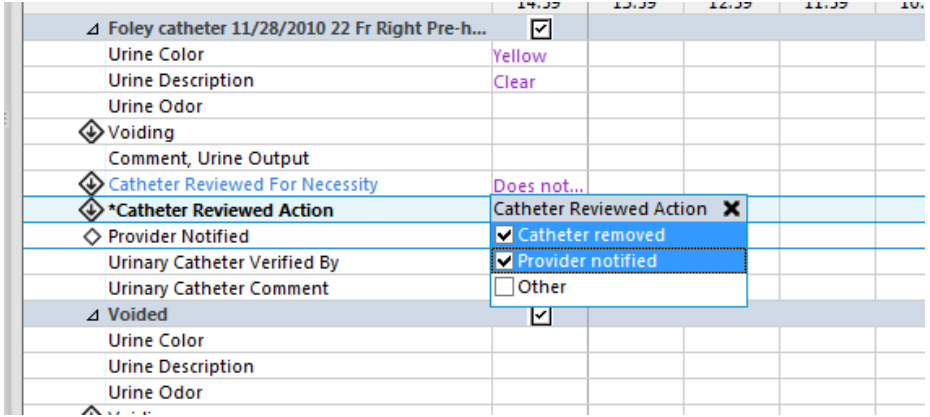
2016

2017

2018

2013 – Policy development for urinary catheters (UC)

- Insertion criteria
- Daily RN documentation of need
- Intermittent catheterization algorithm



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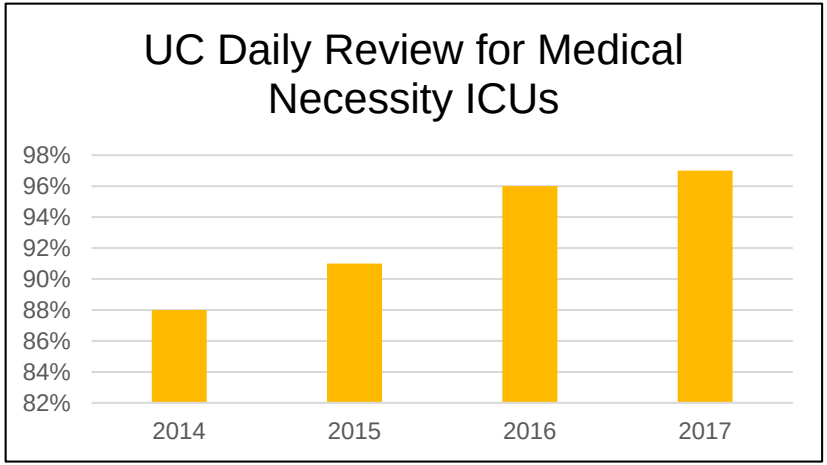
Daily Review for Necessity

2013
2014
2015
2016
2017
2018

Point prevalence surveillance

- IT support daily through Enterprise Analytics Report

C10D			Number Of	6							
Patient	MRN	Date	Med Svc	Unit Date	Bed Days	Central Line	PICC	Fem	UC	FOLEY	Vent
		08/09/2018	IP-Cardiac Surgery	08/09/2018	1	1	0	0	0	1	1
		08/09/2018	IP-Cardiac Surgery	07/24/2018	17	1	0	1	0	0	1
		08/09/2018	IP-Thoracic	08/07/2018	3	1	0	0	0	1	1
		08/09/2018	IP-Cardiac Surgery	08/04/2018	6	1	0	0	0	1	1
		08/09/2018	IP-Vascular	08/09/2018	1	0	0	0	0	0	0
		08/09/2018	IP-Cardiac Surgery	08/09/2018	1	1	0	0	0	1	1
					Sum:	5	0	1	0	4	5



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iView Urinary Catheter Documentation

2013

2014

2015

2016

2017

2018

- Added drop-down menu of approved indications for UC
- Policy hyperlinked

Urine Output Descri...							
Foley catheter 08/9/...							
Urine Color			Yellow				Yellow
Urine Description			Clear				Clear
Urine Odor			Odorless				Odorless
Voiding							
Comment, Urine Out...							
Catheter Reviewed F...			Meets cri...				Meets cri...
*Meets Criteria for C...							
Urinary Catheter Ver...							
Urinary Catheter Co...							
Integumentary							
Integumentary System Reas...		No chan...					
Skin Integrity Head							
Skin Integrity Torso							
Skin Integrity Pelvic Region							
Skin Integrity Extremities							
Nsg Comment, Integ							
SCT Braden Assessment							

***Meets Criteria for Catheter**

- [ ] Accurate urine output monitoring
- [ ] Chemically paralyzed
- [ ] Stage III/IV pressure ulcers with incontinence
- [ ] Incontinence associated dermatitis with incontinence
- [ ] Urinary obstruction
- [ ] Strict intake and output
- [ ] Surgical procedure
- [ ] Medical condition
- [ ] Patient comfort - end of life care
- [ ] Urinary retention

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Provider Order Entry

2013

2014

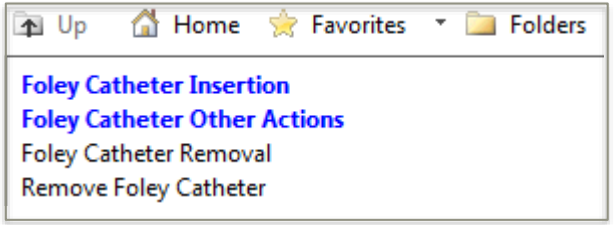
2015

2016

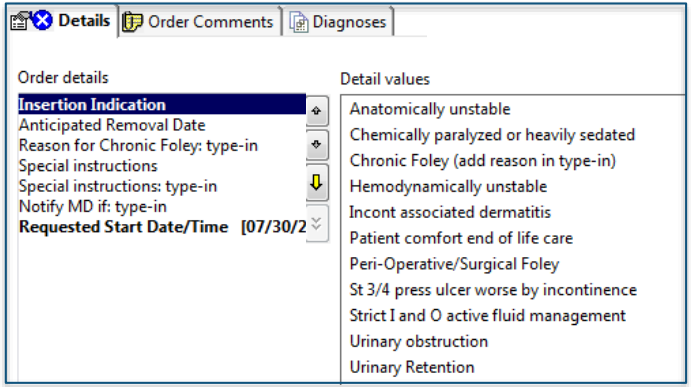
2017

2018

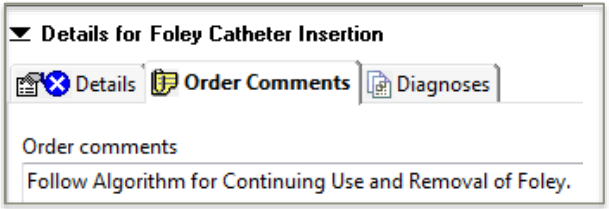
- Provider must enter order for insertion



- With an approved indication



- Detail statement maintains independent RN removal, per policy



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Automated Removal Order

2013

2014

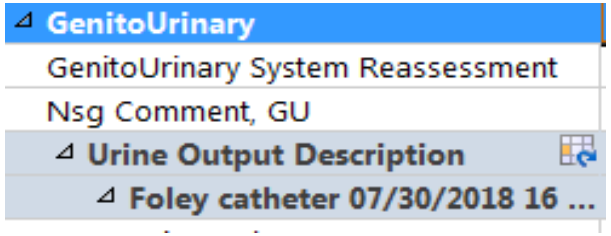
2015

2016

2017

2018

When nurses create the Foley catheter band, an automated removal order is generated for 72 hours after insertion



✓	Foley Catheter Removal	Ordered	Start: 08/02/18 12:23:31 EDT

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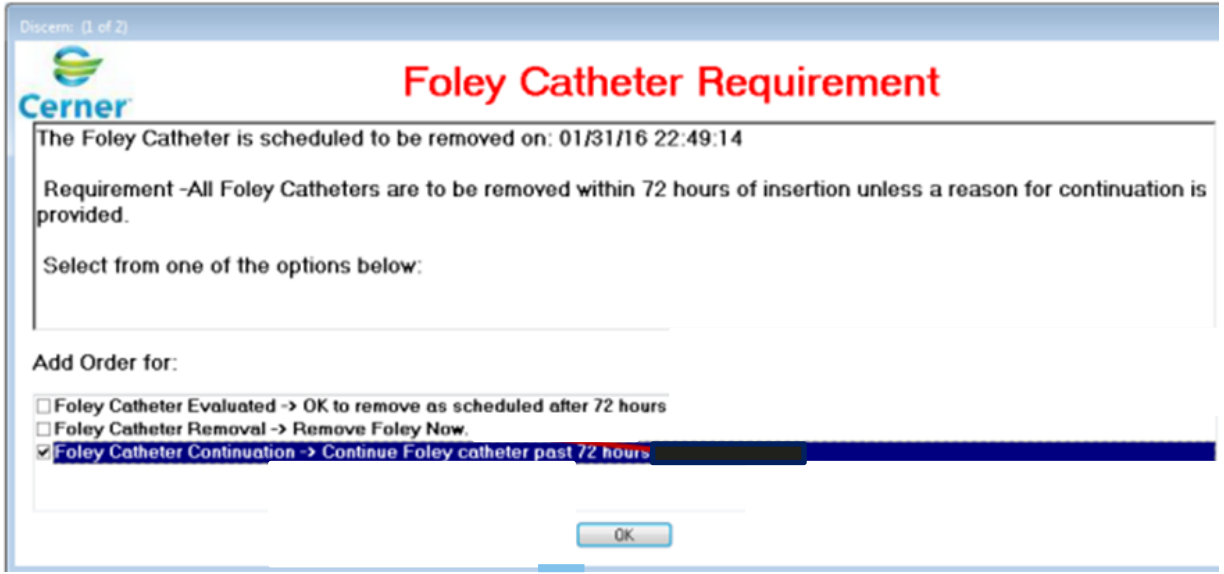
Provider Alerts

2013
2014
2015
2016
2017
2018

24 hours after UC has been inserted, providers receive an alert

- Remove catheter as ordered (72 hours)
- Remove catheter immediately (*new order fires to remove*)
- Continue use after 72 hours



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Provider Continuation Order

2013

2014

2015

2016

2017

2018

Cerner

Foley Catheter Requirement

The patient has a Foley Catheter without a removal date .

Requirement - All Foley Catheters are to be removed within 72 hours of insertion unless a reason for continuation is provided.

Select from one of the options below:

Add Order for:

- [ ] Foley Catheter Removal -> Remove Foley Now.
- [ ] Foley Catheter Continuation -> Continue Foley

OK

Alert will fire every 24 hours if details are not entered for continuation

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Provider Continuation Order

2013

2014

2015

2016

2017

2018

Order Name | S

Foley Catheter Continuation | Mt: 10/15/15 8:12:00, Constant Indicator

Details for Foley Catheter Continuation

Details | Order Comments | Diagnoses

Order details

Continuation Indication [Hemodynamically unstable]
Reason for Chronic Foley: type-in
Special instructions
Special instructions: type-in [Continue Foley ...]
Continue Foley another
Continue Foley until?
Requested Start Date/Time [10/15/15 8:12:00]

Detail values

Anatomically unstable
Chemically paralyzed or heavily sedated
Chronic Foley (add reason in type-in)
Hemodynamically unstable
Incont associated dermatitis
Patient comfort end of life care
Required for medical condition
St 3/4 press ulcer worse by incontinence
Strict I and O active fluid management
Urinary obstruction
Urinary Retention

Details for Foley Catheter Continuation

Details | Order Comments | Diagnoses

Order details

Continuation Indication [Hemodynamically unstable]
Reason for Chronic Foley: type-in
Special instructions
Special instructions: type-in [Continue Foley ...]
Continue Foley another
Continue Foley until?
Requested Start Date/Time [10/15/15 8:12:00]

Detail values

Details for Foley Catheter Continuation

Details | Order Comments | Diagnoses

Order details

Continuation Indication [Hemodynamically unstable]
Reason for Chronic Foley: type-in
Special instructions
Special instructions: type-in [Continue Foley ...]
Continue Foley another
Continue Foley until?

Detail values

(None)
24 hours
48 hours
72 hours
Indefinite

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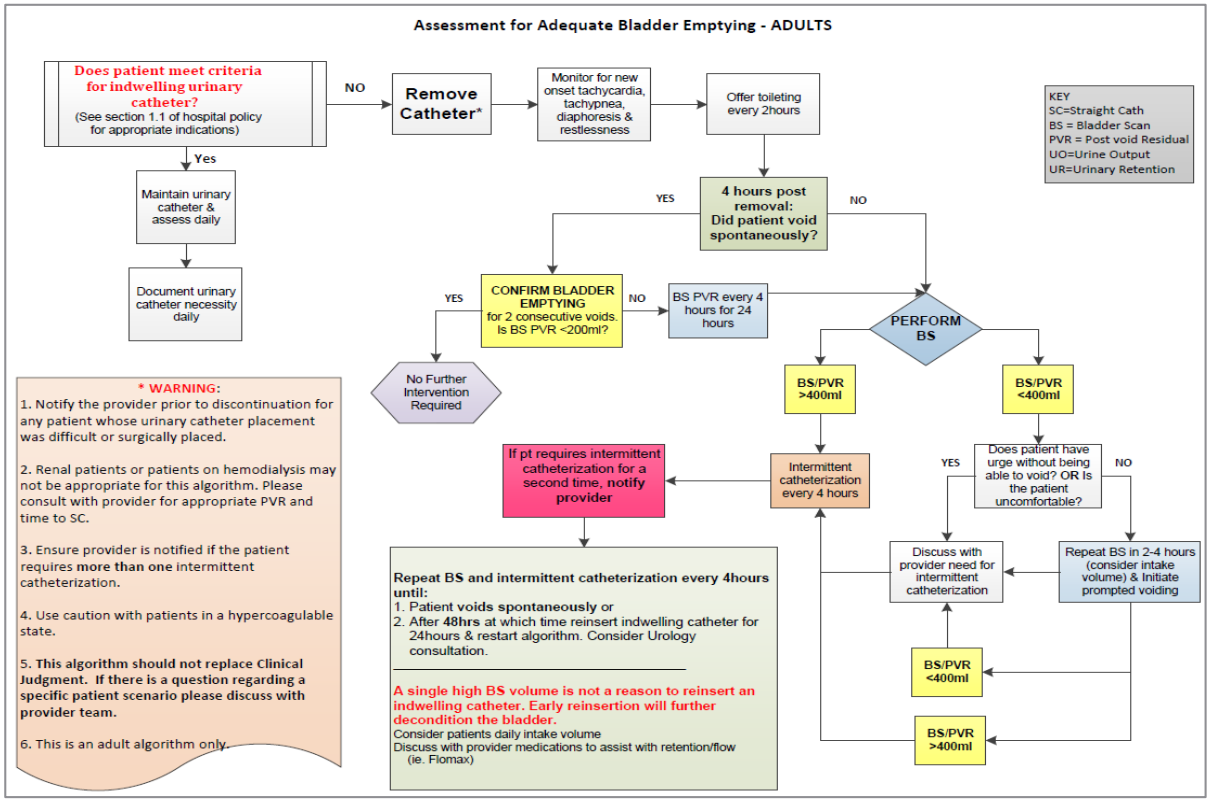
Updated Intermittent Catheterization
Algorithm Embedded into iView

2013
2014
2015
2016
2017
2018



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Urine Test Stewardship – Adult ICUs

2013

2014

2015

2016

2017

2018

Reduce unnecessary urine testing

Test only patients at high risk for invasive infection

- Kidney transplant
- Neutropenic
- Recent GU surgery
- History or evidence of urinary obstruction

1. Mullin KM et al. *Infect Control Hosp Epidemiol*. 2017 Feb;38(2):186-188 DOI: 10.1017/ice.2016.266
2. O'Grady NP et al. *Crit Care Med*. 2008 Jun; 36(4): 1330-1349 DOI:10.1097/CCM.0b013e318169eda9

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Urine Test Stewardship – Adult ICUs

2013

2014

2015

2016

2017

2018

ICU pan culture order set

ICU: Pan Culture Labs (Initiated Pending)

Laboratory

- [x] Blood Culture (Culture, Blood)
- [x] Blood Culture (Culture, Blood)
- Select the following UA with reflex order if patient meets one of the following criteria:
  - Kidney transplant recipient
  - Neutropenia
  - Recent GU surgery
  - Evidence of urinary obstruction
- [ ] UA Stat w mic on Pos refex Ur Culture
- [ ] Respiratory Culture

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Dashboard for Adult ICU Urine Cultures

2013
2014
2015
2016
2017
2018

Urine Culture Stewardship

Health System Infection Prevention Program Monthly Dashboard

For additional information:

Mullin KM et al. *Infect Control Hosp Epidemiol.* 2017 Feb;38(2):186-188 DOI: 10.1017/ice.2016.266
O'Grady NP et al. *Crit Care Med.* 2008 Jun; 36(4): 1330-1349 DOI:10.1097/CCM.0b013e318169eda9

June 2018

2017 Baseline Urine Culture rates p/100 device days						
	CICU	CSICU	MRICU	NSICU	STICU	Average
2017 Baseline	23.0	10.4	21.4	23.0	17.8	19.6
2018 Goal 20% reduction	18.4	8.6	17.1	18.4	14.2	15.7
2018 Urine Culture rates p/100 device days						
January	25.7	11.8	15.1	29.7	15.4	19.5
February	27.3	15.4	17.8	24.1	14.6	19.8
March	24.2	8.0	18.0	28.4	17.5	19.2
April	31.8	7.5	14.9	23.5	12.0	17.9
May	25.3	11.1	16.5	18.2	12.8	16.8
June	22.1 ▼	10.2 ▼	16.8 □	14.9 ▽	15.9 ▲	16.0 ▼
July						
Aug						

One CAUTI in JUNE for these units!!!

Recommendation: use ACCCM/IDSA Guidelines for new fever work-up [2]

Obtain urine cultures only in patients at high risk for invasive infection:

- Kidney Transplant recipients
- Neutropenia
- Recent GU surgery
- Patients with evidence of Urinary obstruction

* Updated

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Urine Test Stewardship - EMR decision support

2013

2014

2015

2016

2017

2018

Cerner

Urine Culture Alert

Urine Culture (UA w/reflex) should NOT be routinely ordered 48 hours AFTER admission UNLESS there is a valid indication.

Valid indications are listed below.

Select an appropriate indication to test, or action from the list below:

- (●) **DO NOT ORDER culture**

Order Culture due to:

- ( ) Pregnancy
- ( ) Fever in neutropenia
- ( ) Fever with a kidney transplant
- ( ) Fever with known urinary obstruction/indwelling stent
- ( ) Fever with a recent urological procedure
- ( ) Fever with classic UTI signs: unexplained flank/suprapubic pain, dysuria
- ( ) Spinal cord injury with NEW or WORSENING urinary symptoms
- ( ) Order culture for another reason not listed (Please enter reason)

OK

*Updated

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Care Compass – RN Task for Removal

2013

2014

2015

2016

2017

2018

Virginia Commonwealth University Medical Center

one PATIENT RECORD TEAM

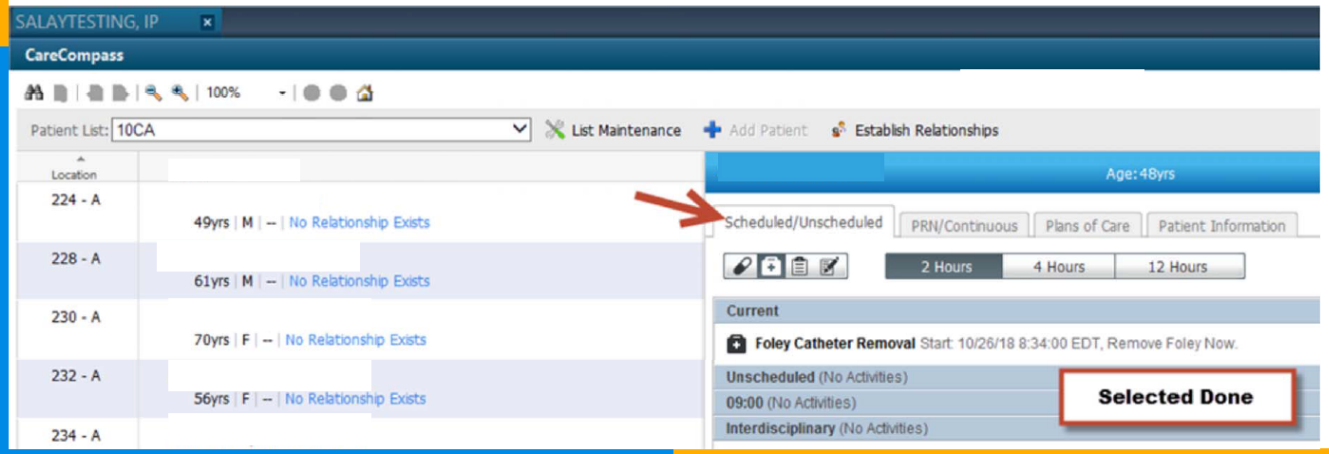
New Foley Removal Task for Nursing

Starting November 26, 2018 there will be a new tasks associated to the Foley removal order. This is to provide additional reminders for nursing to remove the Foley. The task will be generated when the Foley removal is ordered and will be dated/time based on the details in the order.

The tasks will be displayed on care compass under scheduled/unscheduled. To complete the task, nursing will select the task and document "Done" and the task will no longer appear on care compass.

The tasks will become overdue after 8 hours from the removal time indicated on the order.

The task will be retained for 24 hours, meaning after 24 hours, if not completed, the task will drop off of Care Compass



*Updated

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- VCUHS baseline (pre-intervention)
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- Lessons learned

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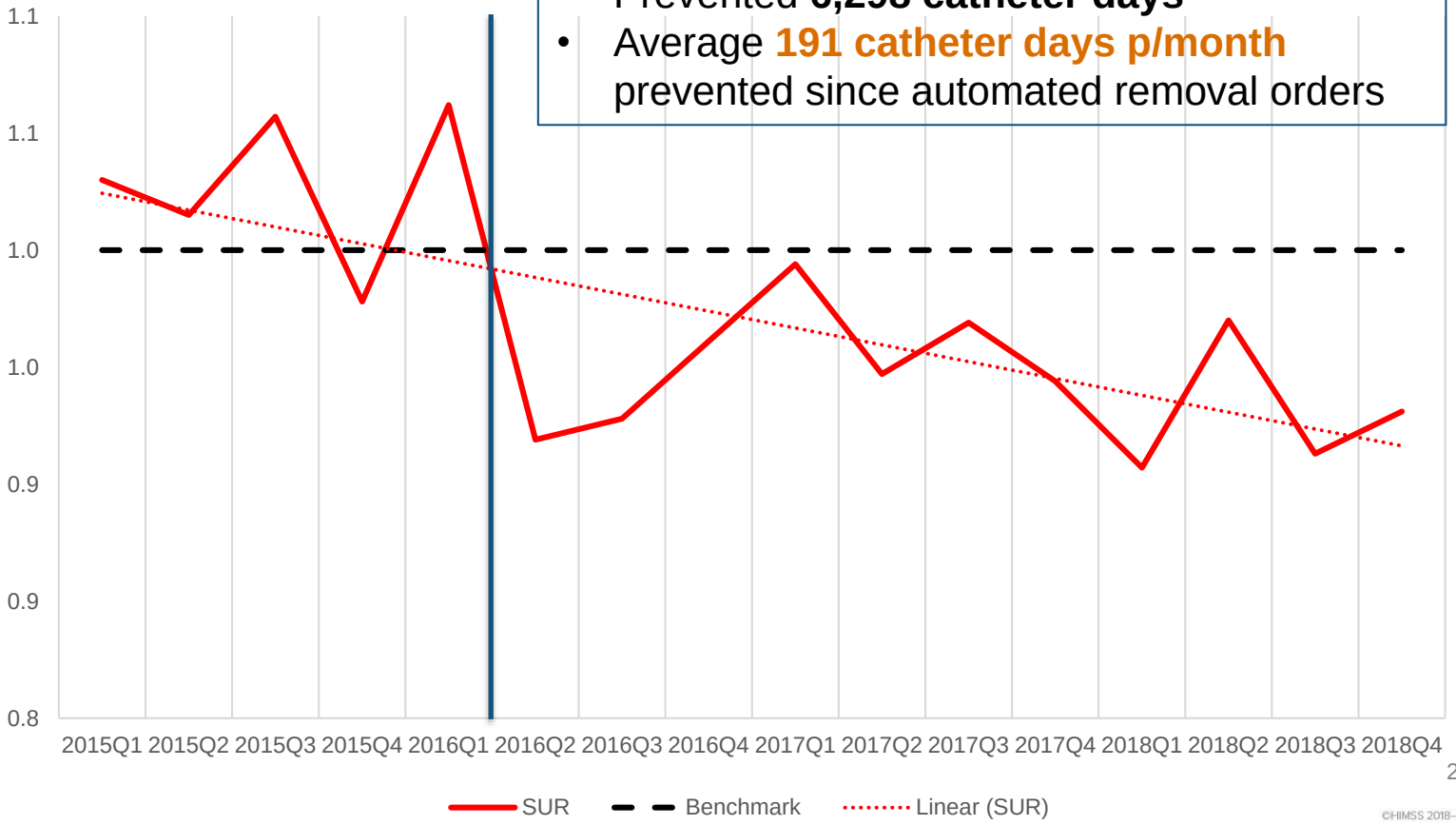
UC Standardized Utilization Ratio (SUR)
2015 - 2018

- Prevented **6,298 catheter days**
- Average **191 catheter days p/month** prevented since automated removal orders



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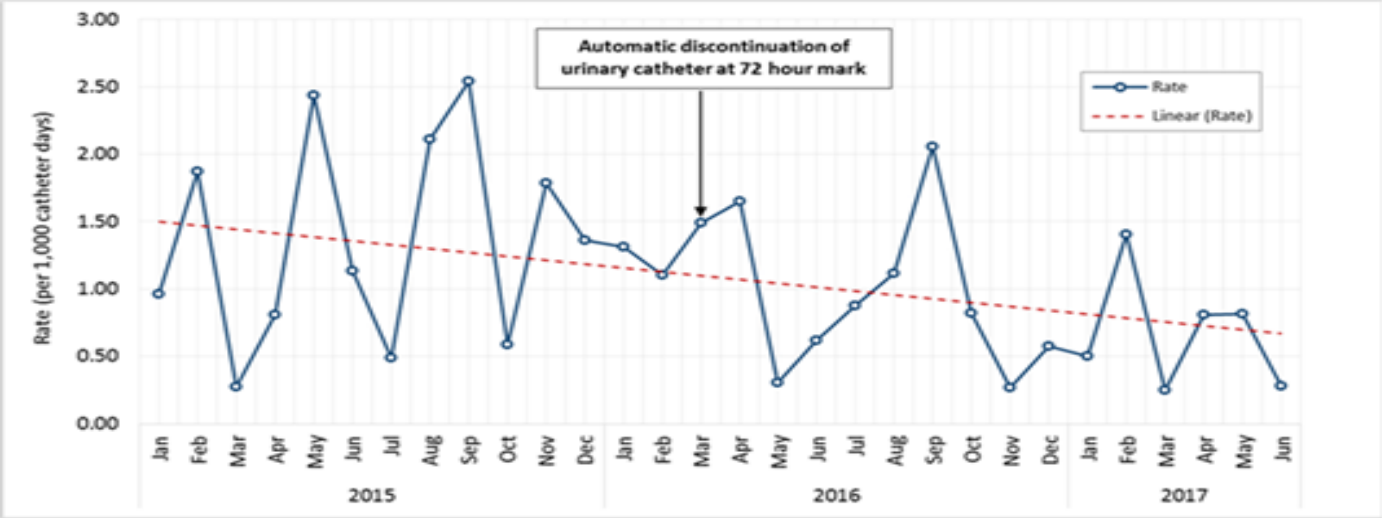
Automated 72-hour Removal Orders



CAUTI Rates Pre- & Post-implementation of EMR-generated Automatic Discontinuation			
	CAUTI Rate*	Standardized Infection Ratio	P-Value**
Pre-implementation	1.34	0.77	0.0083
Post-implementation	0.81	0.47	

Table 1: Mean CAUTI rates and standardized infection ratios for pre- (15 months) and post (15 months)-implementation
*Rates per 1,000 catheter days
**Two-proportion Z-test comparing CAUTI rate means

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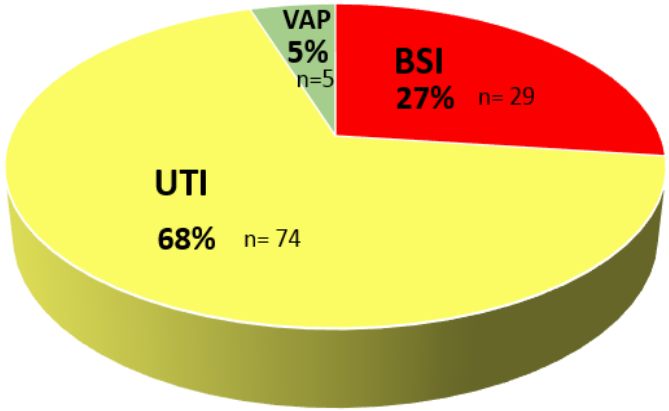
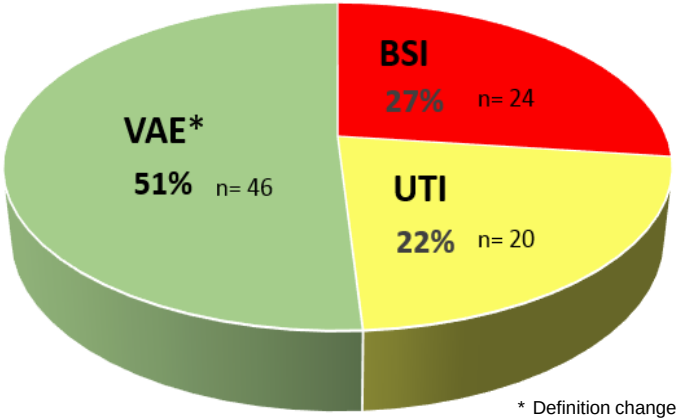
CAUTI Results – Adult ICUs

67% reduction in CAUTI rate

2012



2018



* Definition change for VAE

2012

- 74 CAUTIs
- 68% (74/108) device-associated HAI due to CAUTI
- CAUTI rate = 3.1 per 1,000 device days

2018 * updated

- 20 CAUTIs
- 22% (20/90) device-associated HAI due to CAUTI
- CAUTI rate = 1.0 per 1,000 device days

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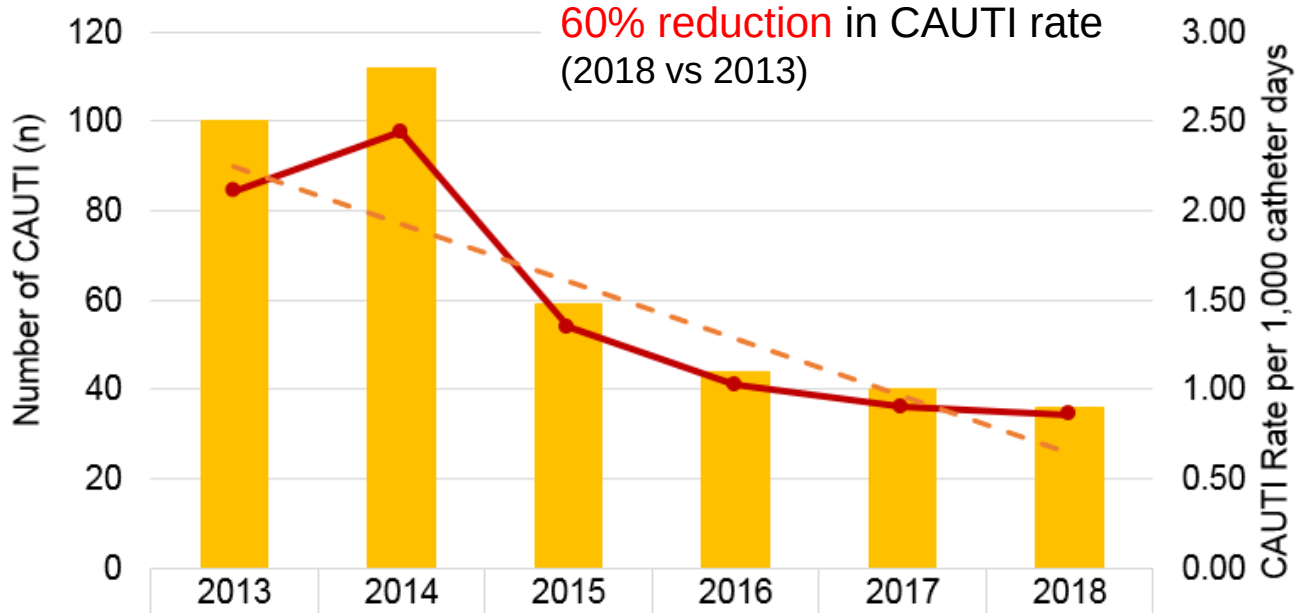
VCUHS CAUTI Rates
2013-2018



	2013	2014	2015	2016	2017	2018
CAUTI (n)	100	112	59	44	40	36
CAUTI Rate	2.11	2.44	1.34	1.02	0.90	0.86
	2013 – EMR RN documentation	2014 - Audits	2015 – Improved RN documentation	2016 – Provider Orders, Automatic removal order	2017 – UCX test stewardship	2018 – EMR decision support

* updated

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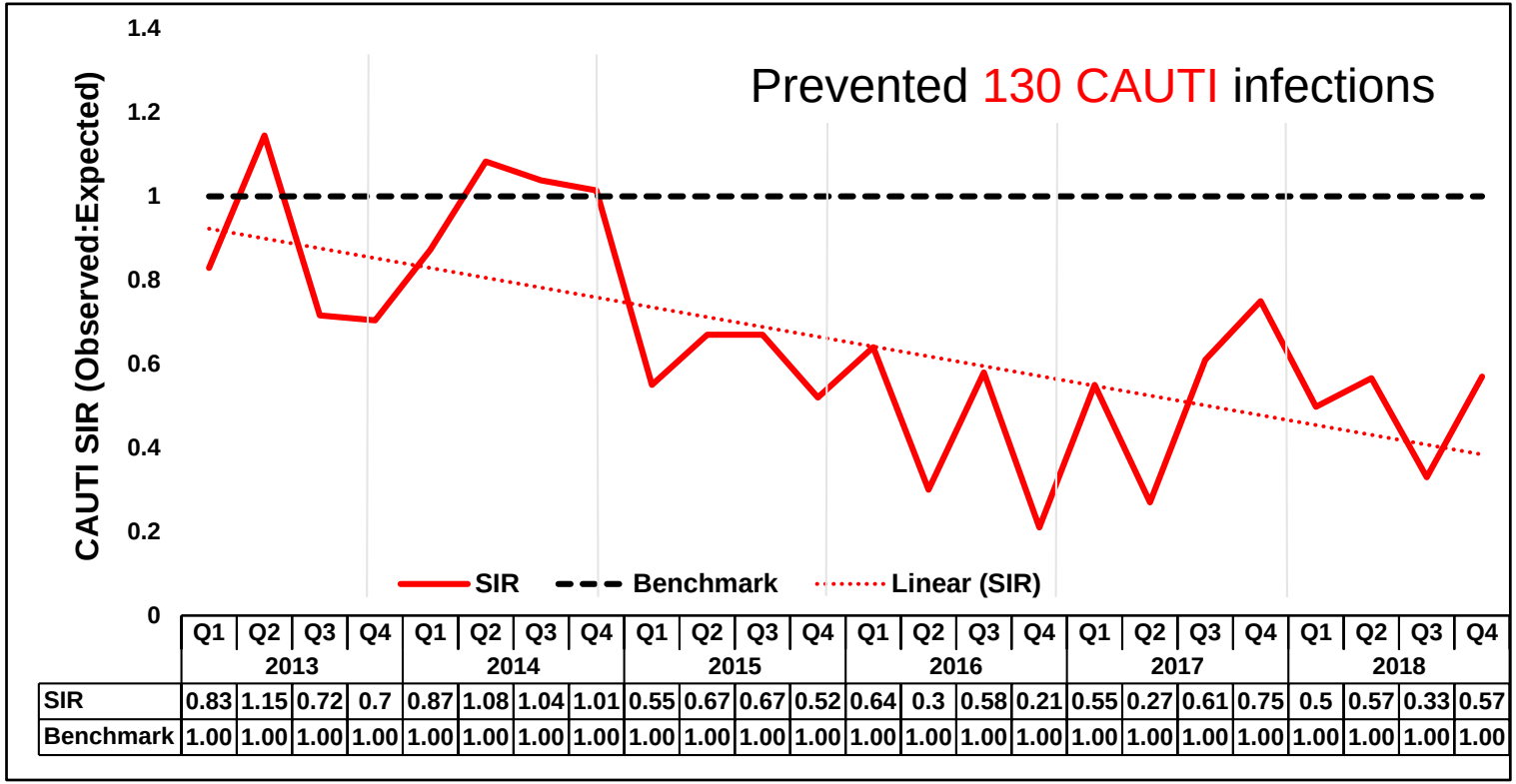
VCUHS CAUTI Standardized Infection Ratio (SIR) *2013 – 2018*



	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	2013				2014				2015				2016				2017				2018			
SIR	0.83	1.15	0.72	0.7	0.87	1.08	1.04	1.01	0.55	0.67	0.67	0.52	0.64	0.3	0.58	0.21	0.55	0.27	0.61	0.75	0.5	0.57	0.33	0.57
Benchmark	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

SIR =1 Observed and expected infections are equal
SIR >1 Observed infections exceed the number expected
SIR <1 Oberved infections are less than expected

*updated

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Urine Test Stewardship – Adult ICUs

- Analysis of ICU pan culture order change
- 3 months pre-/post-intervention testing fidelity
- Significant improvement in test fidelity (P-value 0.0074)
- Met 20% reduction goal last 4 months

2017 Baseline Urine Culture rates p/100 device days						
	CICU	CSICU	MRICU	NSICU	STICU	Average
2017 Baseline	23	10.4	21.4	23	17.8	19.6
2018 Goal	18.4	8.6	17.1	18.4	14.2	15.7
2018 Urine Culture rates p/100 device days						
January	25.7	11.8	15.1	29.7	15.4	19.5
February	27.3	15.4	17.8	24.1	14.6	19.8
March	24.2	8	18	28.4	17.5	19.2
April	31.8	7.5	14.9	23.5	12	17.9
May	25.3	11.1	16.5	18.2	12.8	16.8
June	22.1	10.2	16.8	14.9	15.9	16
July	33.8	8.9	14.5	19.2	13.5	18.0
August	23.6	9.5	16.7	17.6	13.6	16.2
September	22.2	11.2	11.8	16	14.8	15.2
October	20.9	7.8	12.6	13.1	11.2	13.1
November	23.2	4.0	11.6	14.6	12.7	13.2
December	20.6	6.5	12.4	17.0	13.5	14.0

* Updated

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Agenda

- Why CAUTI
- VCUHS baseline (pre-intervention)
- Interventions
- Results
- Impact
- Lessons learned

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Estimated Impact

- Top 10 Vizient performer for CAUTI
- 72% reduction in ICU CAUTI since 2012
- 62% reduction in non-ICU CAUTI since 2012

Since 2015

- Reduced catheter days: **6,298**
- CAUTIs prevented: **130**
  - Prevented **5 deaths**
- Cost savings estimate: **$130,000** - **$1.8 million**
- Reduction in number of beds used: **260–520**
  - Gained additional **43-87** hospital admissions

* Updated

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Agenda

- Why CAUTI
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Lessons Learned

- Have all stakeholders at table in beginning
- Start with automated removal orders
- Leveraging IT through EMR decision support impacts change
- Make decision support tools that make it easy to do the right thing

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Questions

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Please complete online session evaluation

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