Reducing Catheter-associated Urinary Tract Infections

HIMSS Enterprise Davies Award
Site Visit

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Introduction

- Why CAUTI
- VCU baseline (pre-intervention)
- IT collaboration
- Interventions
- Current projects
- Results
- Impact
- Lessons learned

Local Problem

Reducing Catheter-associated Urinary Tract Infections (CAUTI)

- **Why CAUTI**
- VCU baseline (pre-intervention)
- IT collaboration
- Interventions
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- Impact
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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

Why CAUTI?

Financial impact

- CDC national economic burden of $340 million annually
  - $1,000 is average cost associated with CAUTI
- 2018 study put national cost closer to $1.7 billion[1]
- AHRQ has additional cost for hospital-onset CAUTI at $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]

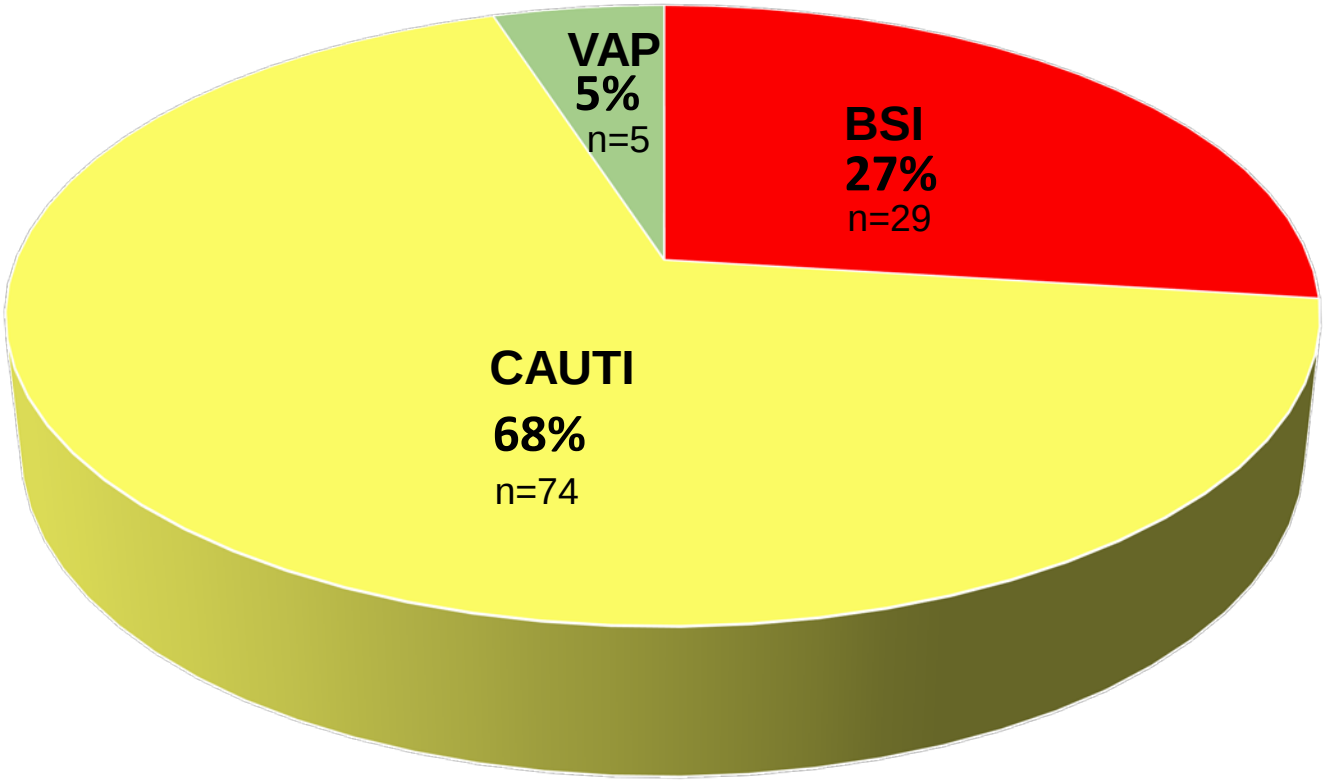
1. Hollenbeak, CS, Schilling, AL. The attributable cost of catheter-associated urinary tract infection in the United States: A systematic review. American Journal of Infection Control, 2018; 46(7);751-757.
2. https://www.ahrq.gov/professionals/quality-patient-safety/pfp/haccost2017-results.html
3. Gould 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

Design and Implementation

Reducing Catheter-associated Urinary Tract Infections

- Why CAUTI
- **VCU baseline (pre-intervention)**
- IT collaboration
- Interventions
- Current projects
- Results
- Impact
- Lessons learned

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

How Health IT Was Used

Reducing Catheter-associated Urinary Tract Infections

- Why CAUTI
- VCU baseline (pre-intervention)
- **IT collaboration**
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Collaboration with IT

- Department-based IT liaison
- Information and Documentation Technology Committee (IDTC)
- Enterprise analytics team

Reducing Catheter-associated Urinary Tract Infections

- Why CAUTI
- VCU baseline (pre-intervention)
- IT collaboration
- **Interventions**
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Timeline of Interventions for CAUTI Reduction

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 (in progress)
- Care Compass task to fire to remind nurses to remove urinary catheter at 72-hour mark (in progress)

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

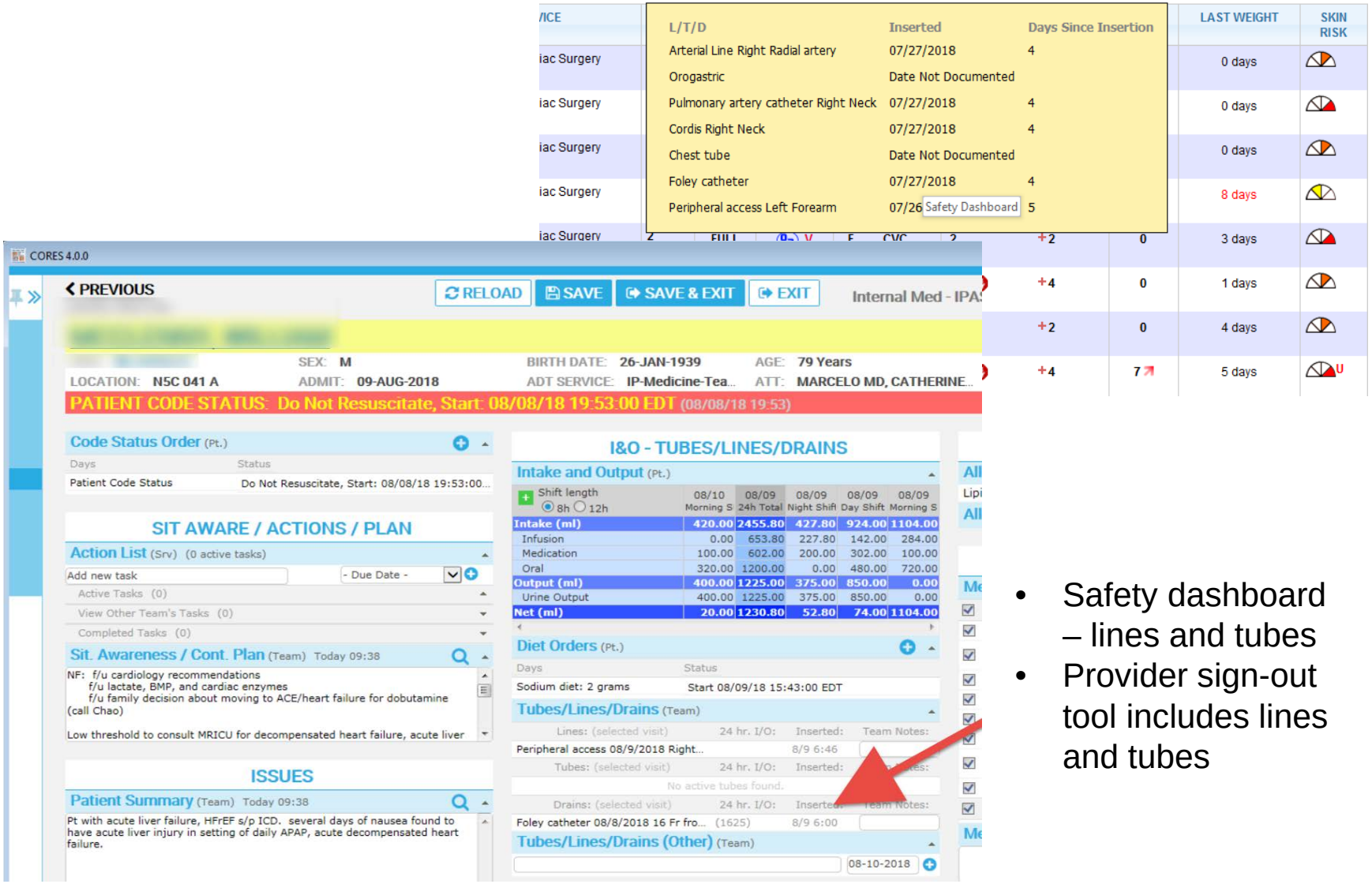
2016

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

Clinician Awareness



- Safety dashboard – lines and tubes
- Provider sign-out tool includes lines and tubes

2013

2014

2015

2016

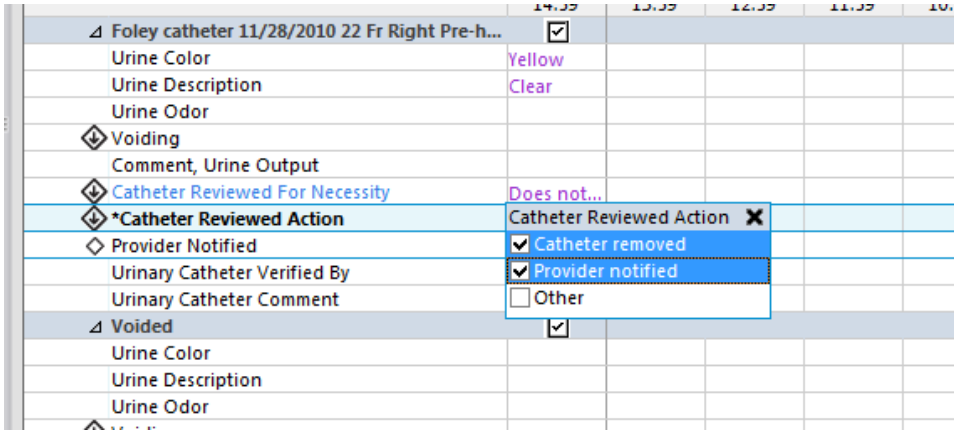
2017

2018

Daily Assessment of Need – Nursing Documentation

2013 – Policy development for indwelling urinary catheters (UC)

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



2013

2014

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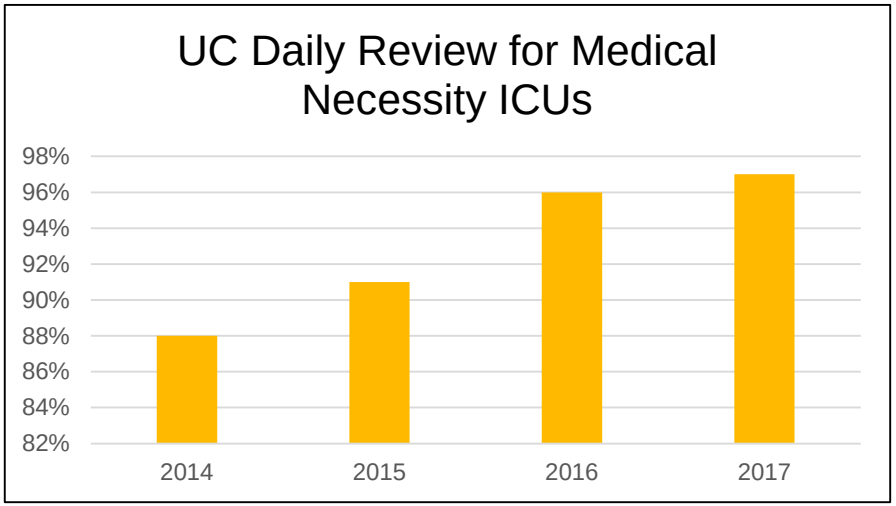
Daily Review for Necessity

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



2013

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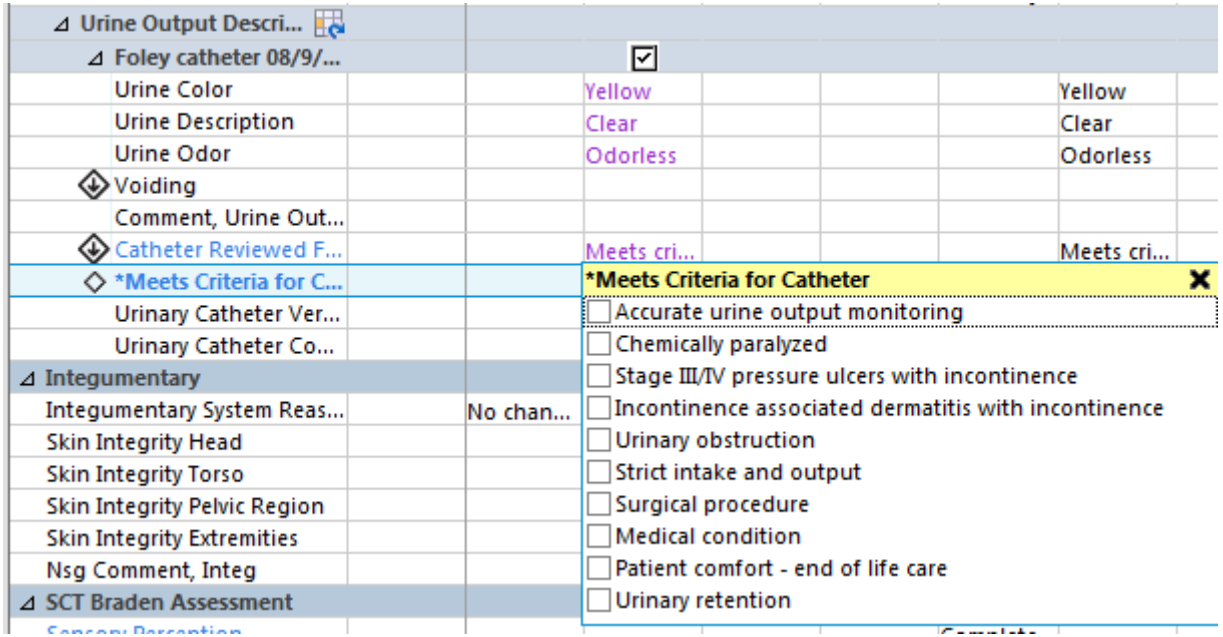
iView Urinary Catheter Documentation

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



2013

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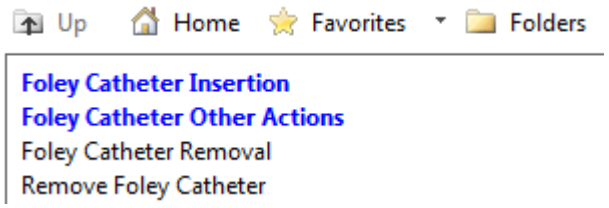
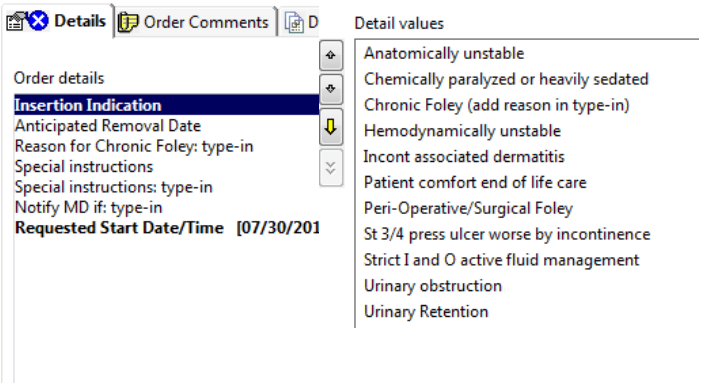
Provider Order Entry

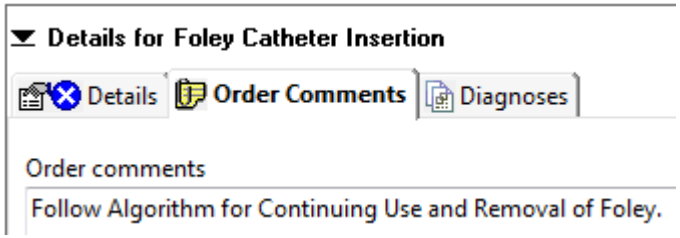
Provider must enter order for insertion



With an approved indication



Detail statement maintains independent RN removal, per policy



VCUHealth

2013

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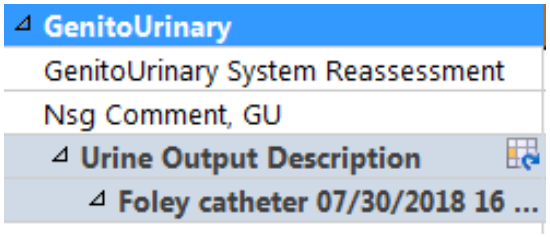
Automated Removal Order

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



2013

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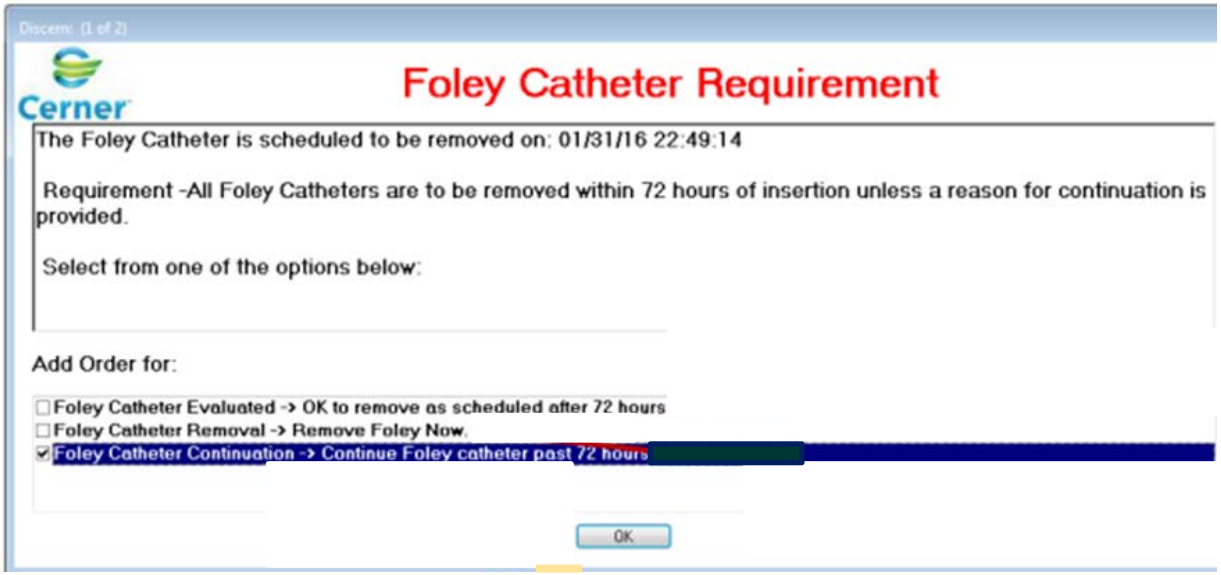
Provider Alerts

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



2013

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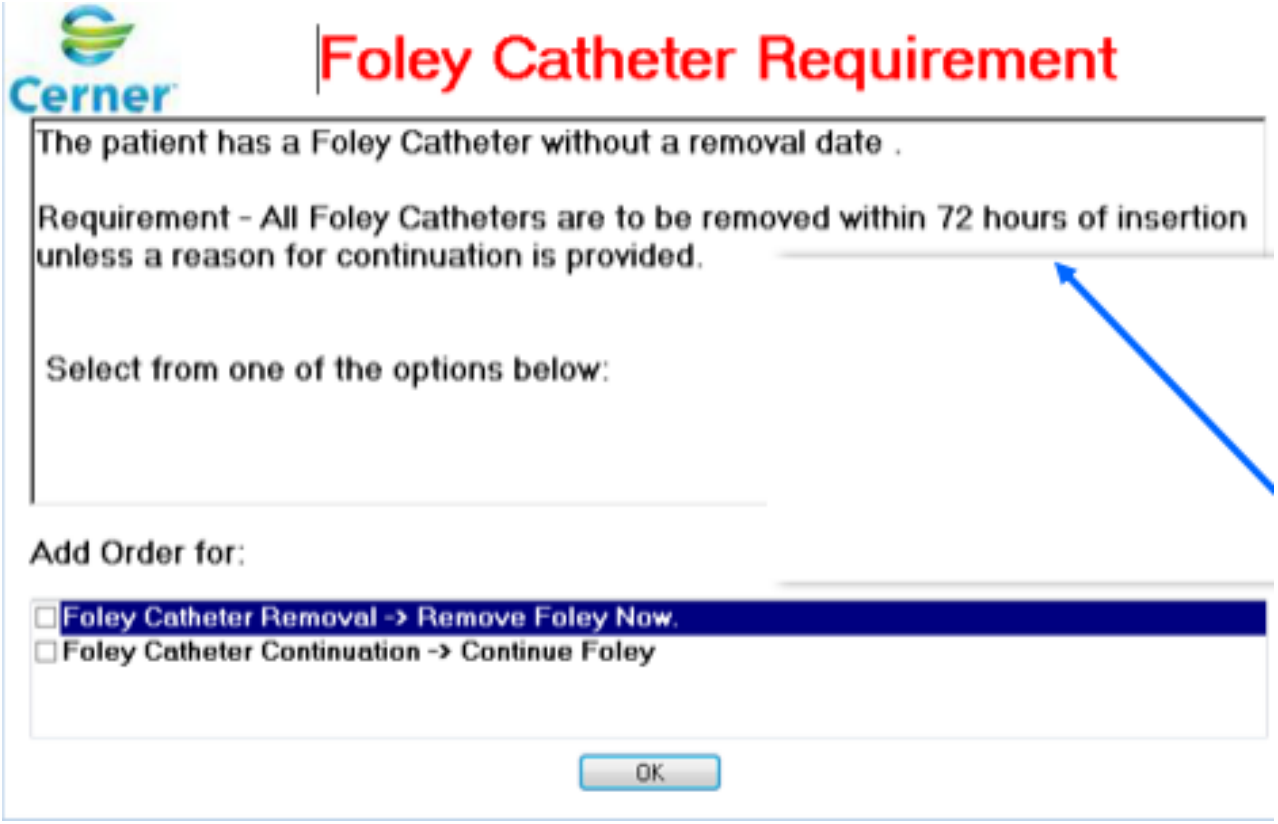
Provider Continuation Order



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

2013

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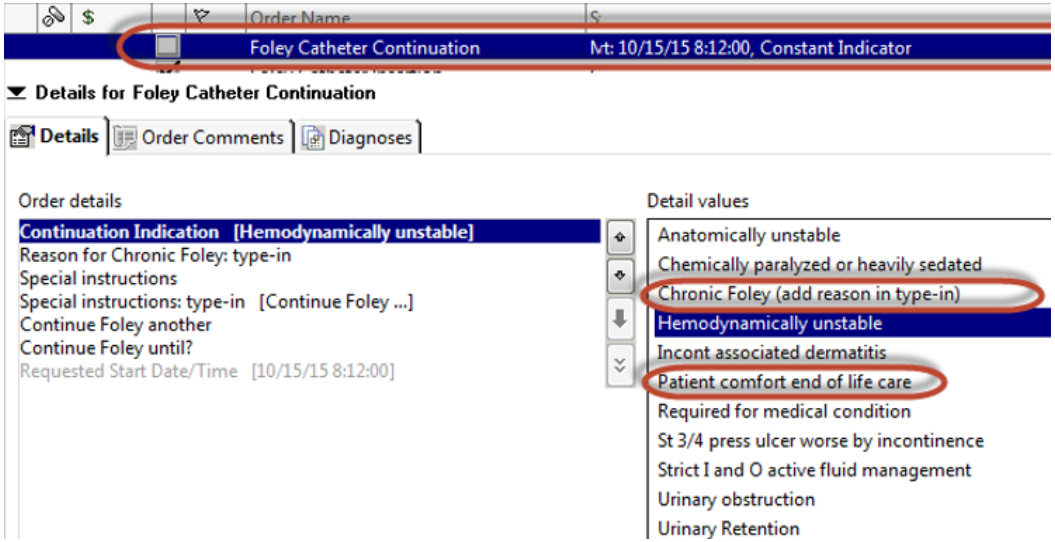
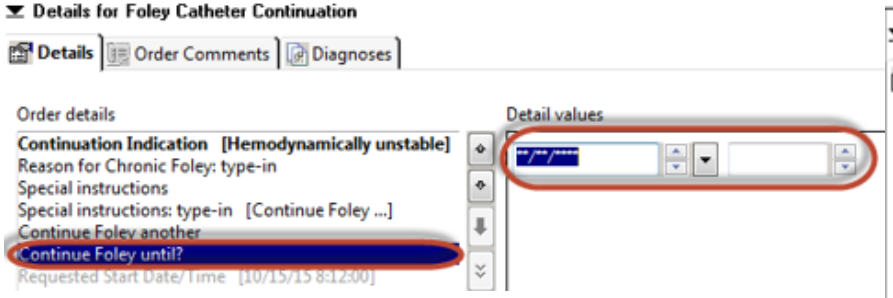
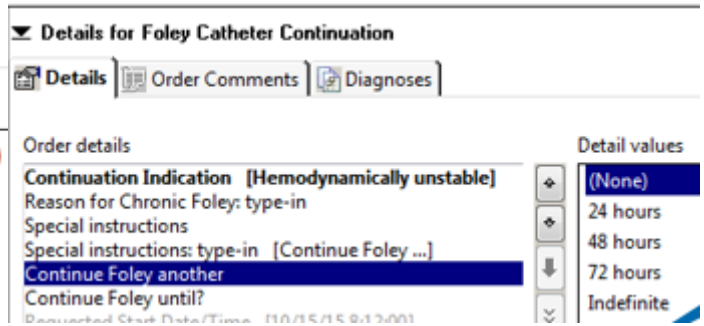
2018

Provider Continuation Order







2013

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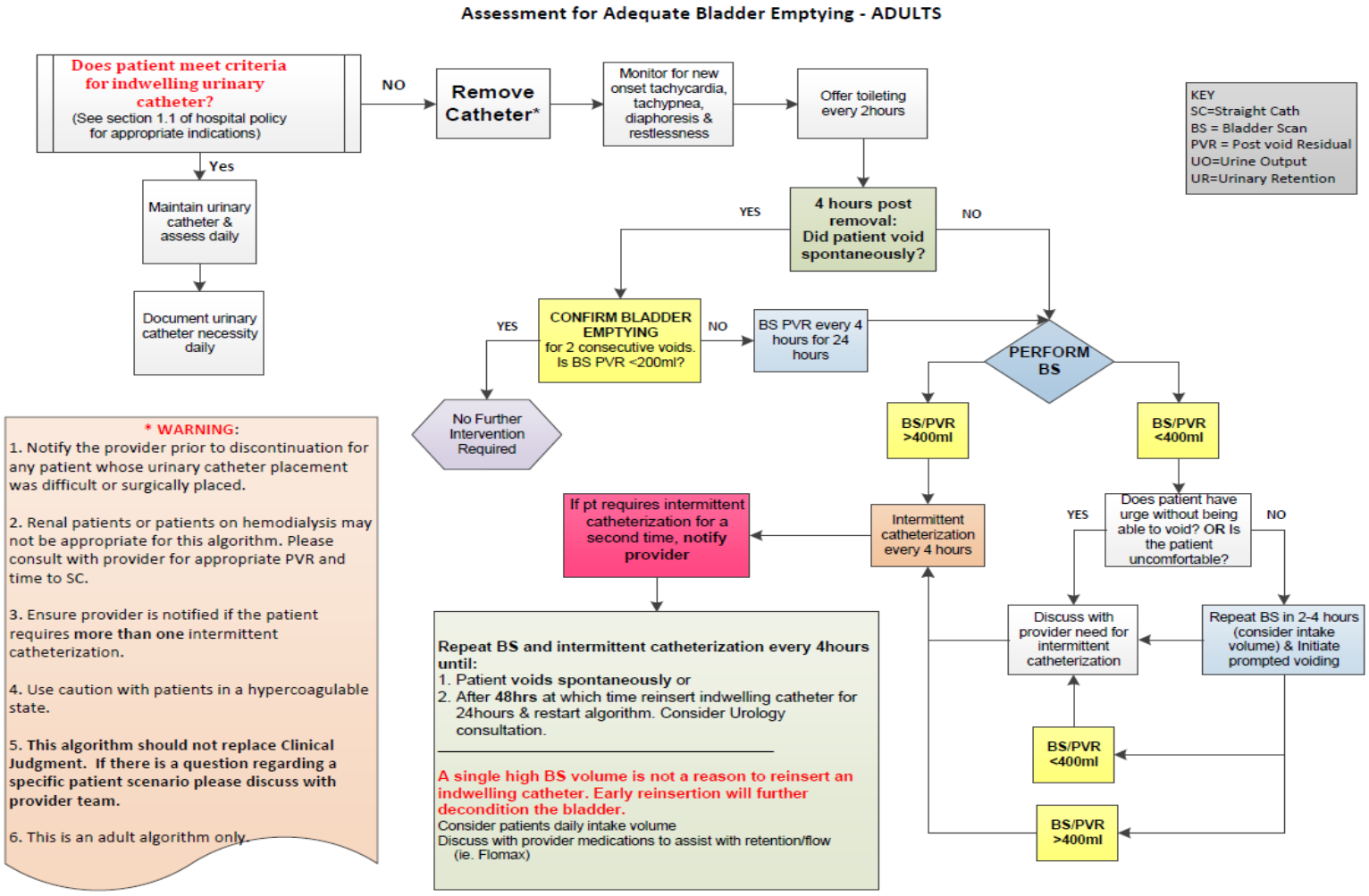
Updated Intermittent Catheterization Algorithm Embedded into iView



2013

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2017

2018

Urine Test Stewardship – Adult ICUs

- 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

2013

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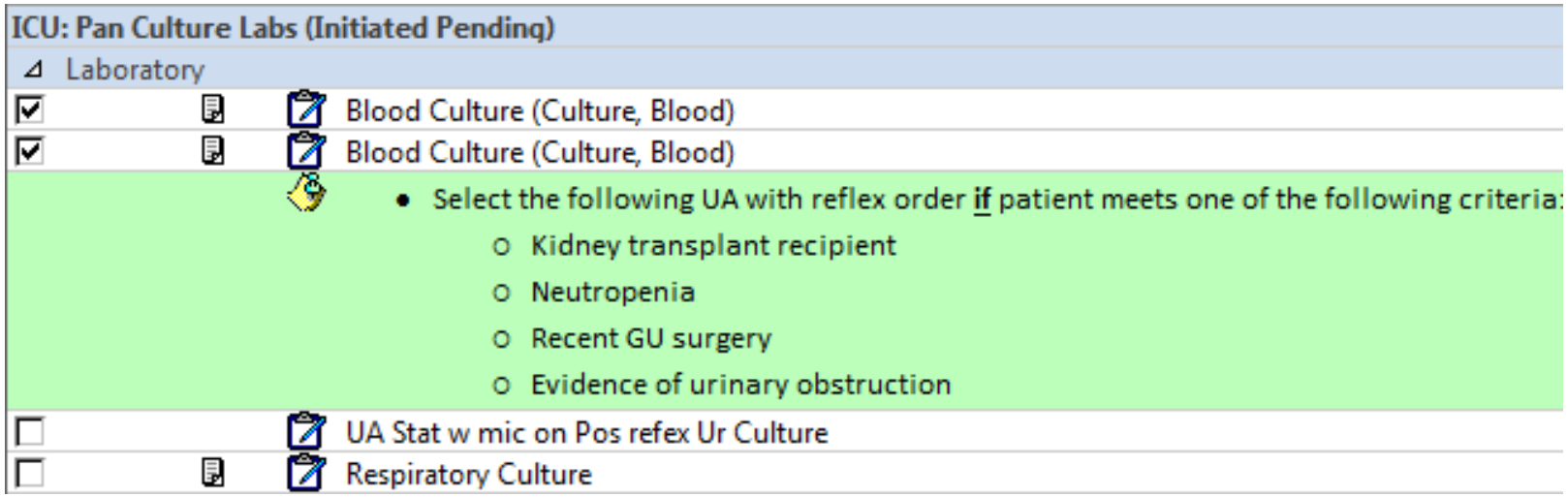
2018

Urine Test Stewardship – Adult ICUs

ICU pan culture order set



2013

2014

2015

2016

2017

2018

Dashboard for Adult ICU Urine Cultures

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

March 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						
May						
June						
July						
Aug						

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

VCU Health

Reducing Catheter-associated Urinary Tract Infections

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2013

2014

2015

2016

2017

2018

Urine Test Stewardship - EMR decision support

- Urine culture (UA with reflex) should NOT routinely be ordered 48 hours AFTER admission, unless there is a valid indication

- **DO NOT ORDER culture**

- Pregnancy
- Fever in neutropenia
- Fever with kidney transplant
- Fever with known urinary obstruction/indwelling stent
- Fever with 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

2013

2014

2015

2016

2017

2018

Care Compass – Task for Removal

Value Derived

Reducing Catheter-associated Urinary Tract Infections

- Why CAUTI
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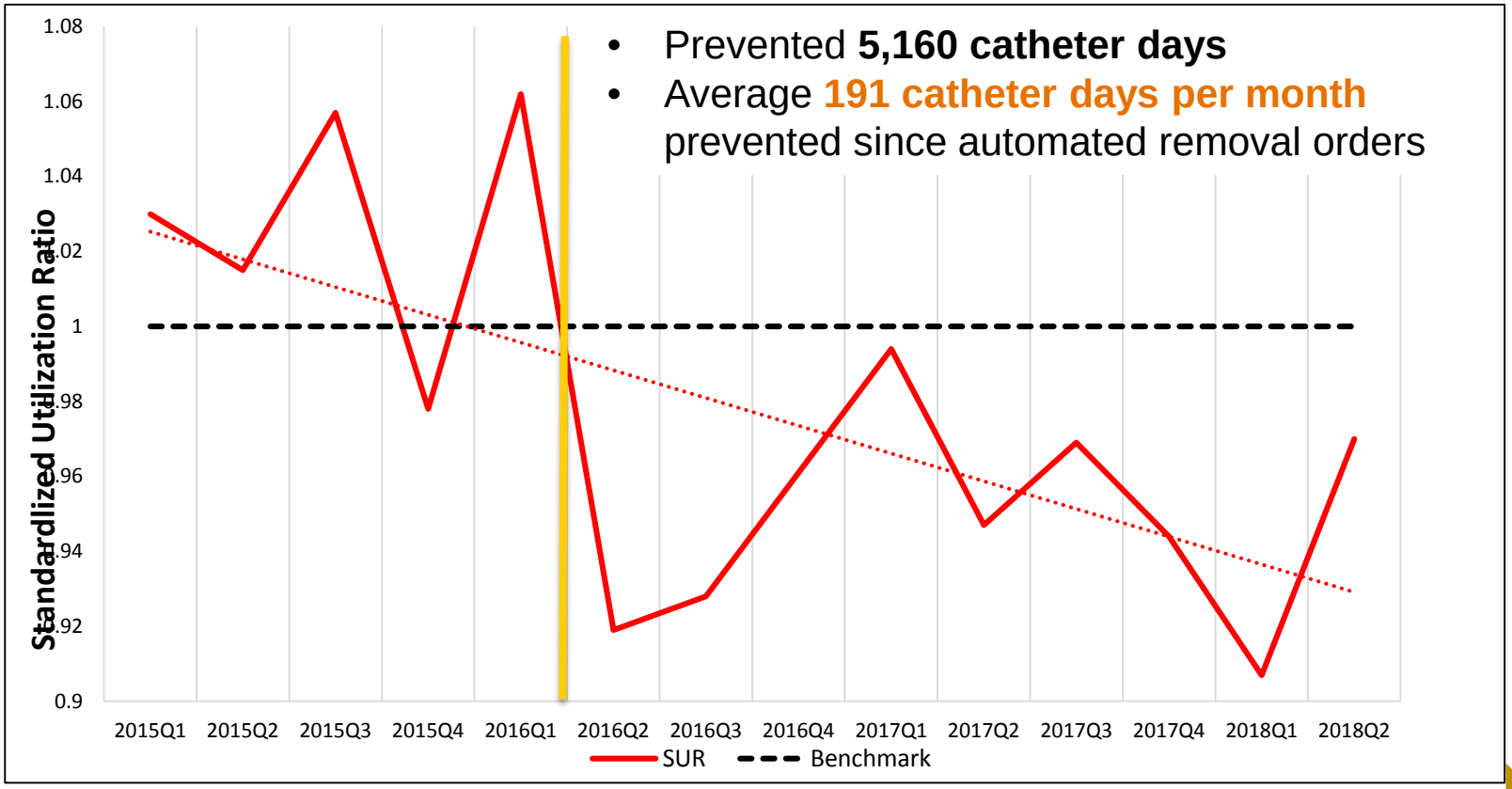
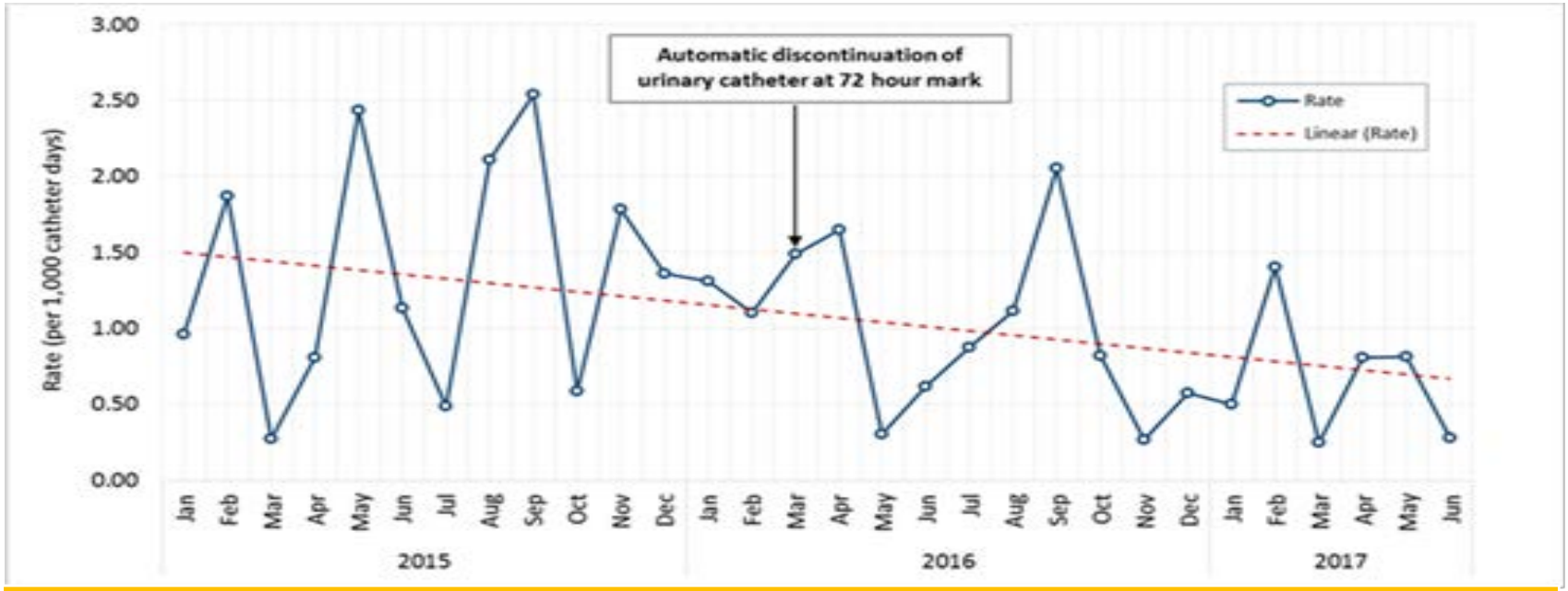
UC Standardized Utilization Ratio (SUR)

2015-present



2015 RN documentation	2016 provider orders & automatic removal	2017 UCX test stewardship	2018

Automatic 72-hour Removal Orders



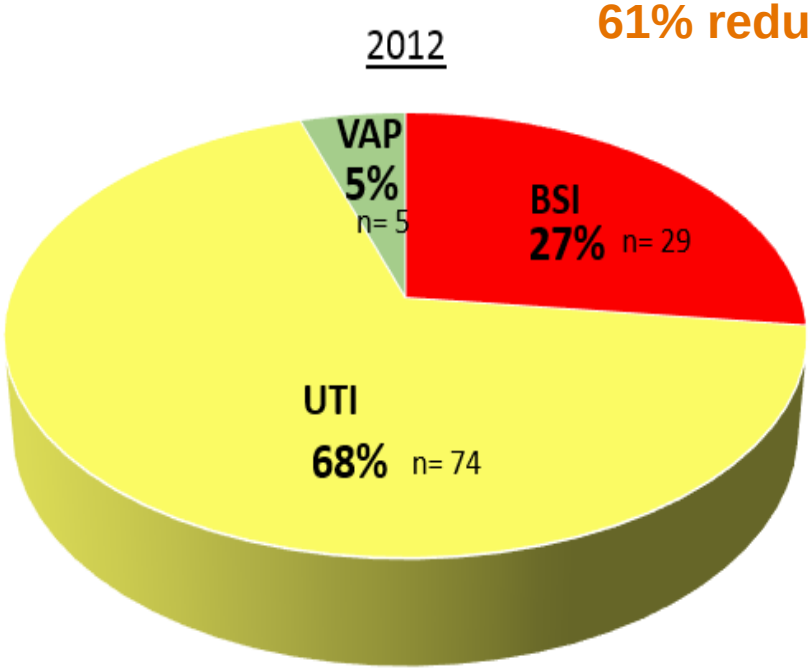
CAUTI Rates Pre- & Post-implementation of EMR-generated Automatic Discontinuation

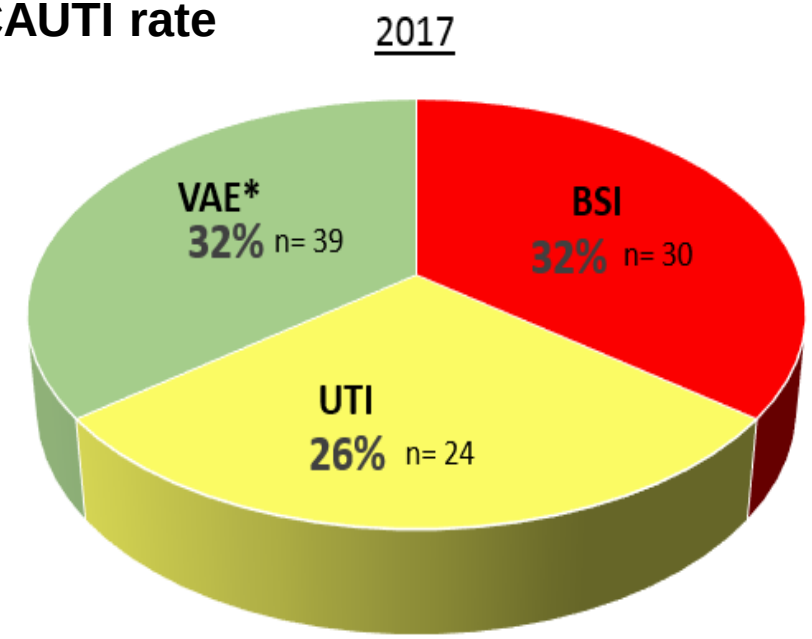
	CAUTI Rate*	Standardized Infection Ratio	P-Value**
Pre-implementation	1.34	0.77	0.0083
Post-implementation	0.81	0.47	

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

CAUTI Results – Adult ICUs

61% reduction in CAUTI rate





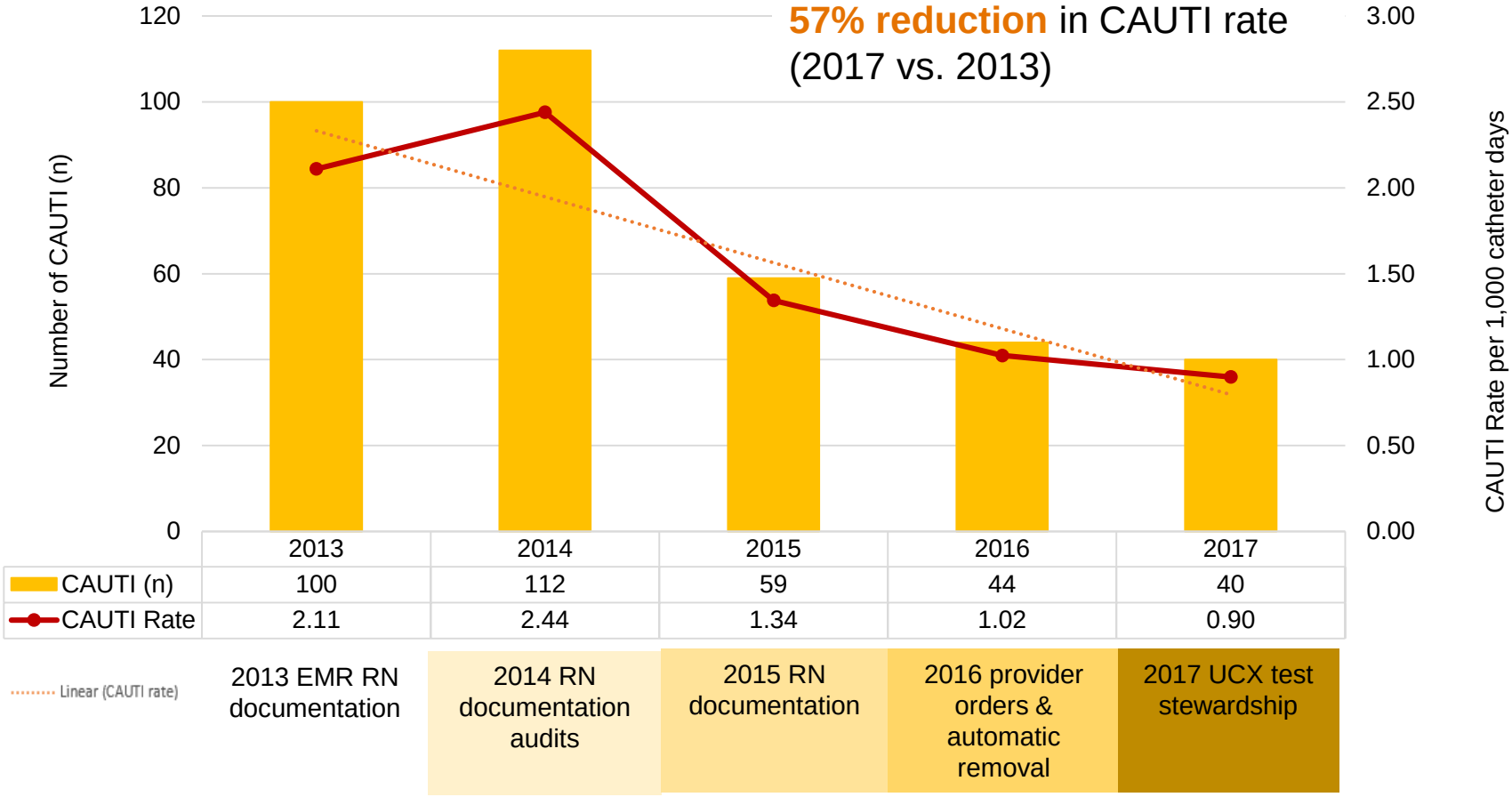
- 74 CAUTIs
- 68% (74/108) device-associated HAI due to CAUTI
- CAUTI rate=3.1 per 1,000 device days

- 24 CAUTIs
- 26% (24/93) device-associated HAI due to CAUTI
- CAUTI rate=1.2 per 1,000 device days

* Definition change for VAE

VCUHS CAUTI Rates

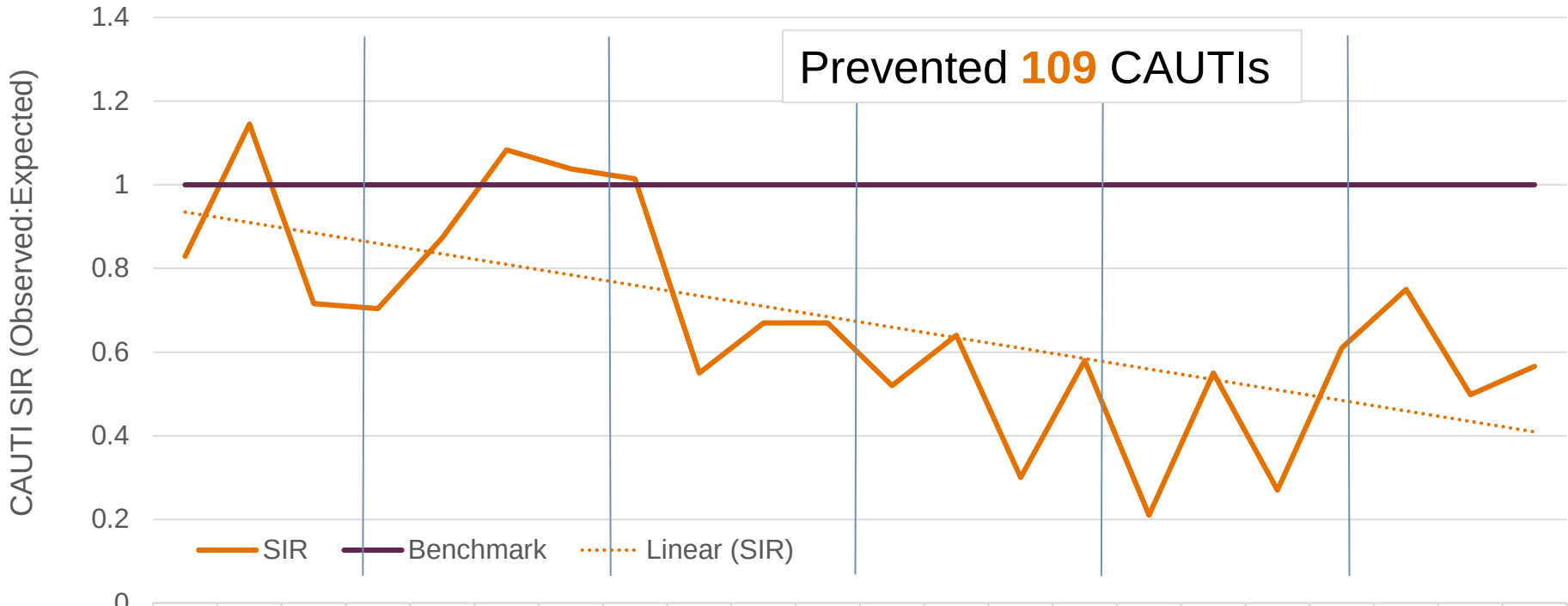
2013-2017



	2013	2014	2015	2016	2017
CAUTI (n)	100	112	59	44	40
CAUTI Rate	2.11	2.44	1.34	1.02	0.90
	2013 EMR RN documentation	2014 RN documentation audits	2015 RN documentation	2016 provider orders & automatic removal	2017 UCX test stewardship

VCUHS CAUTI Standardized Infection Ratio (SIR)

2013-2018 ytd



	Q1 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 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
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

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

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)
- 18% reduction in testing in June

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
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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!!!

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- Results
- **Impact**
- Lessons learned

Estimated Impact

- Currently a Top 10 Vizient performer for CAUTI
- 61% reduction in ICU CAUTI since 2012
- 50% reduction in non-ICU CAUTI since 2012

Since 2015

- Reduced catheter days: **5,160**
- CAUTIs prevented: **109**
  - Prevented **4 deaths**
- Cost savings estimate: **$10,900-$1.5 million**
- Reduction in number of beds used: **218**
  - Gained additional **36-72** hospital admissions

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Lessons Learned

- Have all stakeholders at table in beginning
- Start with automated removal orders
- Data drives quality improvement
- Feedback and support essential
- Leveraging IT through EMR decision support impacts change
- Make it easy to do right thing
- Make decision support tools that help end user

Questions?