

2016 CLINICAL INFORMATICS SYMPOSIUM

- CONNECTING CARE THROUGH TECHNOLOGY -

Effects of Electronic Alerts on Urinary Catheter Days

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Conflict of Interest

None

LEARNING OBJECTIVES

Discuss the pressures to increase quality outcomes and decrease costs on healthcare organizations

Describe how technology can support the uptake of evidence into nursing practice

Review the history of alerts & reminders used to support reduction of CAUTI

Discuss the implementation approach of alerts by a large health system to increase uptake of EBP for timely removal of urinary catheters

Review before and after quality and financial metrics achieved as a part of this project



Healthcare Environment



ARRA

American Recovery and
Reinvestment Act of 2009

Medicare.gov/hospitalcompare/search.html

**THE
HITECH
ACT**



Clinician shortages

The IHI Triple Aim

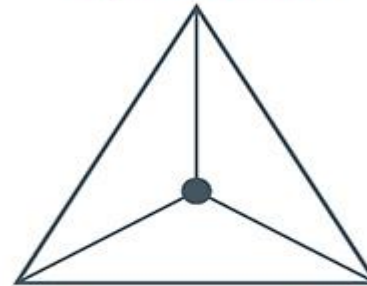
HCAHPS

Hospital Care Quality Information
from the Consumer Perspective

Hospital Acquired Conditions

SRG Repeal

Population Health



Experience of Care

Per Capita Cost



Andy Slavitt
@ASlavitt

Follow

In 2016, MU as it has existed-- with MACRA-- will now be effectively over and replaced with something better #JPM16

8:16 PM - 11 Jan 2016

99 37



Abstracted
Core
Measures

eQMs &
MIPs

Background

Reimbursement changes penalize organizations for hospital acquired infections (HAIs) (CMS, 2013)

Urinary tract infections account for 35-40% HAIs (Blodgett, 2009; Lo et al., 2014)

70-80% are attributed to urinary catheters (Blodgett, 2009; Lo et al., 2014)

Catheter associated urinary tract infections (CAUTIs) are the most common HAI (American Nurses Association, 2015)



Background

Healthcare Information Technology (HIT) is believed to support transformation through linkages between nursing care and patient outcomes

Barriers to implement evidence based guidelines (EBG) include lack of time, access to articles, research and guidelines (Solomons & Spross, 2011; Melnyk, 2012)

Electronic healthcare records can improve the quality of care by offering EBG to nurses

Alerts and reminders can help fill the gap between current practice and EBG



Problem

Clinical decision support interventions should target EBG during decision making (Greenes, 2014)

The use of alerts and reminders studied have been non-computerized

(Cornia, Amory, Fraser, Saint, & Lipsky, 2003; Topal et al., 2005; Apisarnthanarak et al., 2007; Loeb et al., 2008; Blodgett, 2009; Bernard, Hunter, & Moore, 2012; Palmer, Lee, Dutta-Linn, Wroe, & Hartmann, 2013; Meddings et al., 2014; Lo et al., 2014)

Relationship between catheter days and urinary tract infections is known
(Gould, C. V., Umscheid, C. A., Agarwal, R. K., Kuntz, G., & Pegues, D. A., 2010)

Informatics strategies need to be focused on cueing nurses (American Nurses Association [ANA], 2015)



Significance

Timely removal of catheter decreases CAUTI (Gould, C. V., Umscheid, C. A., Agarwal, R. K., Kuntz, G., & Pegues, D. A., 2010)

Addressing the gap between EBG and removal of urinary catheter is key
(Gould, et al., 2010)

Incorporation of HIT solutions, such as clinical decision support, is important
(American Nurses Association, 2015)

Evaluation of effectiveness of alerts in the informatics literature is incomplete (Topal et al., 2005; Cornia, Amory, Fraser, Saint, & Lipsky, 2003; Loeb et al., 2008; Apisarnthanarak et al., 2007)



Project Site specific example

BSWH-NTX has implemented several tactics to eliminate CAUTI incidence;

- Physician and Nursing leaders developed & approved an evidence based, nurse driven protocol (EBG) for timely removal of the urinary catheter
- Integration and hardwiring into the physician & nursing workflow has been a challenge
 - Physician documentation indicating reason
 - Nursing assessment identifying catheter necessity
 - Inconsistent use of Catheter Management Protocol
- Monitoring for utilization of the protocol and providing feedback loop has become labor intensive

What does the Literature say?

Incidence of CAUTI and association of urinary catheter days

12-16% of adult acute care patients will have a urinary catheter during their hospitalization (Lo et al., 2014)

Risk of CAUTI is directly linked to the length of time the urinary catheter is in place (Cornia et al., 2003; Topal et al., 2005; Apisarnthanarak et al., 2007)

20-50% of catheters do not meet appropriate indications for use (Saint et al., 2000; Topal et al., 2005; Apisarnthanarak et al., 2007; Gould, Umscheid, Agarwal, Kuntz, & Pegues, 2010)

36% of physicians are unaware their patient has a urinary catheter (Saint et al., 2000)



Literature Review (cont.)

Strategies to prompt removal of unnecessary urinary catheters

Forming and initiating reminders to physicians is common (Cornia et al., 2003; Topal et al., 2005; Apisarnthanarak et al., 2007; Loeb et al., 2008; Blodgett, 2009; Palmer, Lee, Dutta-Linn, Wroe, & Hartmann, 2013; Meddings et al., 2014; and Lo et al., 2014)

Implementation of reminders is effective in decreasing catheter days

- Most reminders are face to face, paper based or electronic orders to physicians and require staff resources (Cornia et al., 2003; Huang et al., 2004; Crouzet et al., 2007; Apisarnthanarak et al., 2007; Loeb et al., 2008; Elpern et al., 2009; Fakhri et al., 2012; Welden, 2013)

Implementation of nurse driven protocol after physician documents catheter necessity criteria has been successful (Cornia et al., 2003; Topal, 2005; Apisarnthanarak et al., 2007; Fakhri, Rey, Pena, Szpunar, & Saravolatz, 2012; Roser et al., 2012; Adams, Bucior, Day, & Rimmer, 2012)

Promoting Action on Research Implementation in Health Services (PARIHS)

Evidence-nurse driven protocol for timely removal

Context- leadership approval and support of nurse driven protocol

PARIHS Framework
Outcome:
Decreased urinary catheter days

Facilitation-use of electronic alerts to enable the EBP protocol to be used for decision making



Project Site Metric

By 2/1/15, implement content changes in the EHR to support Catheter Management Protocol and reduce overall urinary catheter days by 10%;

- Include physician indication reason on urinary catheter order
- Alert message to nurses based on catheter necessity documentation
- Present EBG to support the nurses decision making about catheter removal
- Compare pre and post alert implementation catheter days

Project Site Metric

By 8/10/15, reduce overall NTX CAUTI incidence rate by 10%;

- Compare pre and post implementation CAUTI incidence rate

Project Site Metrics

By 8/1/15, calculate potential cost avoidance based on overall decrease of NTX CAUTI incidence rate by 10%;

- Compare pre and post alert implementation CAUTI incidence rates
- Calculate and compare the rate of change between two time periods
- Calculate decreased rate and calculate cost avoidance based on \$2,160 per avoided CAUTI
- Calculate the cost savings based on elimination of manual tracking

Capture catheter indication

Order:

Requested By: Template Name:

Messages:

Conditional Order: ☐ Max # of activations:

Start Date:

Foley Present on Admission: ☐

Insert/Maintain Task:

Foley Necessity: ☒

☐ Neurogenic/Urinary Retention ☐ Close Monitoring of Urine Output in Critically Ill Patient

☐ Urological Surgery ☐ Stage III or IV Sacral/Perineal Pressure Ulcer

☐ Non-Urological Procedure/Surgery Less Than 24 Hours Ago ☐ Prolonged Immobilization Due to Unstable Orthopedic Event

☐ Surgical/Trauma in Perineal Area ☐ Urinary Tract Obstruction

☐ Palliative Care ☐ Instillation of Medication

☐ Other ☐ ICU Patient on Vasopressors, Inotropes, Diuretics, or Paralytics

Other Specify:

Remove:

Special Task:

Special Task Instructions:

Use same necessity reason on Insert Tubes SN, but per your assessment thereafter

Be clear about how the provider wants to manage removal

Communicate clearly to care team

☐ **Foley Catheter.** ; Insert\Maintain: Now to Gravity; Remove: Per Urethral Catheter Management Policy
Foley Necessity: Neurogenic/Urinary Retention

Reason displays on last line

Nursing assessment determines on-going necessity

03 Lines/Tubes/Drains FS, From 12/22/2014 to 12/23/2014

12/23/2014

Genitourinary

Indwelling Catheter (foley) [Continuous]

Foley Catheter Necessity (CHECK ALL BOXES THAT APPLY)

Perineal Care Performed

Insertion Site Assessment

Drainage Method

Device Securement

Device Assessment

Clamp Status

Urine Characteristics

Patient Tolerance

Patient Discharged with Device in Place

Insert Date: 21-Dec-2014 Site: #3 indwelling urethral catheter, 16 Fr. double lumen

[[Continuous]]

Foley Catheter Necessity (CHECK ALL BOXES THAT APPLY)

Filter To: []

- ☐ neurogenic/urinary retention
- ☐ palliative care
- ☐ instillation of medication
- ☐ urologic surgery
- ☐ non-urologic procedure/surgery less than 24 hours ago
- ☐ surgical/trauma indications in perineal area
- ☐ close monitoring of urine output in critically ill patient
- ☐ prolonged immobilization due to unstable orthopedic e
- ☐ stage III or IV sacral/perineal pressure ulcer
- ☐ ICU patient on vasopressor, inotrope, diuretic, or paralyt
- ☐ urinary tract obstruction
- ☐ patient/family refused removal
- ☐ no criteria met

OK Cancel

Nursing documentation enables EBG to prompt decision making

CAUTI Documentation Alert

Post Op Day: 2
Foley Day: 2

Insert Order: Now to Gravity
Remove Order: Prior to Removal, Call Physician When Patient No Longer Meets Criteria for Foley

RN, patient DOES NOT meet criteria to continue foley catheter.

Please NOTIFY physician TODAY for foley removal/management instructions.

OK

Instruction based on removal order, day count, and necessity.

Message options based on conditions.

RN, patient MEETS criteria to continue foley catheter.

Please continue to assess daily for foley catheter necessity and CONTACT physician WHEN patient no longer meets criteria.

RN, patient MEETS criteria to continue foley catheter.

Please continue to assess daily for foley catheter necessity and facilitate catheter removal when patient no longer meets criteria.

RN, patient DOES NOT meet criteria to continue foley catheter.

Please remove foley catheter TODAY.

RN, LEAVE foley catheter in place, EDUCATE patient/family on CAUTI, and CONTINUE to assess patient/family willingness to remove foley catheter.

ALERT physician of circumstance.

The Catheter Management Policy is available as reference guide

Structured Notes Entry - CAUTI, SCTWO - Insert Tubes/Drains SN

CREATE Preview

Sections

Document Info

Insert Tubes/Drains

Insert Tubes/Drains

Reference Materials

Show Reference Data

Copy Forward Refer to Note Preview

Show Reference Data

Adult - Foley Catheter Algorithm and Guidelines click here for educational support

Adult_Foley Catheter Algorithm and Guidelines 3_2014.pdf - Adobe ...

File Edit View Window Help

1 / 3 45.8% Tools Sign Comment

Prevention of Catheter Associated Urinary Tract Infections (CAUTI)

Foley Catheter Necessity

Nurse Managed Removal per BHCS Urethral Catheter Management Policy:

Policy guides nursing to independent management, maintenance, and removal of foley catheter based on identified criteria; this does not require interaction/orders from the

12/22/2014 to 12/23/2014

CHECK ALL BOXES THAT APPLY)

Perineal Care Performed
Insertion Site Assessment
Drainage Method
Device Securement
Device Assessment
Clamp Status
Urine Characteristics
Patient Tolerance
Discharged with Device in Place
er, 16 Fr. double lumen

Add Multiple Time Columns
Add Single Time Column
Auto Enter
Auto Enter Cell Selection
Auto Enter Header Selection
Delete Cell Data
Enter Comment
Enter Held
Enter Note
Enter WDL
Highlight On
Remove WDL
Show Detail
Show History
Show Reference Data
Show Related Data

Evaluation-Retrospective Design

Quantitative, non-experimental, before and after comparative design

A retrospective data set from the electronic health record was used

Large data set representing the total population

Consecutive sample of all unique, EHR records with an urinary catheter order

Electronic data query contained records 3 months before and 3 months after implementation of alerts

Nov	Dec	Jan	Feb	March	April	May
Before	Before	Before	Not used	After	After	After



Evaluation approach

Consecutive sample of the total population of discharge unique patient records

Total sample population contain 13,774 unique patient records

Before comparison group to contain 6,838 unique patient records

After comparison group to contain 6,935 unique patient records

Data set query meeting the inclusion and exclusion criteria was cleaned and scrubbed prior to data analysis



Data Analysis Findings

Demographic Characteristic Statistics - Categorical Variables

	Before group		After group		Whole group	
Characteristic	n	%	n	%	n	%
Gender						
Male	2664	38.9	2593	37.4	5257	38.2
Female	4177	61.1	4345	62.6	8522	61.8
Race						
White	5523	80.7	5296	76.3	10,819	78.5
Non-white	1318	19.3	1642	23.7	2960	21.5
Age						
18-34	1153	16.9	1299	18.7	2452	17.8
35-120	5688	83.1	5639	81.3	11,327	82.2
Type of Unit						
Med-Surg	6020	88	5983	86.2	12,003	87.1
ICU	821	12	955	13.8	1776	12.9
Antibiotics	1571	23	1572	22.7	3138	22.8
No Antibiotic	5270	77	5366	77.3	10,636	77.2

Data Analysis Findings

Independent samples t-test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
					Sig. (2-tailed)		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
				t					Lower Upper
Catheter Days	Equal variances not assumed			2.959	.003		.186	.063	.063 .310

Test Statistics ^a	
	Catheter Days
Mann-Whitney U	22840192.000
Wilcoxon W	46897708.000
Z	-3.868
Asymp. Sig. (2-tailed)	.000
a. Grouping Variable: Alerts	

Mean Catheter Days

Descriptive Statistics						
	N	Range	Minimum	Maximum	Mean	Std. Deviation
Catheter Days	13,774	39	0	39	2.96	3.695
Before Group	6,838	39	0	39	3.06	3.790
After Group	6,936	39	0	39	2.87	3.597

Mean Catheter Days by Unit of Care

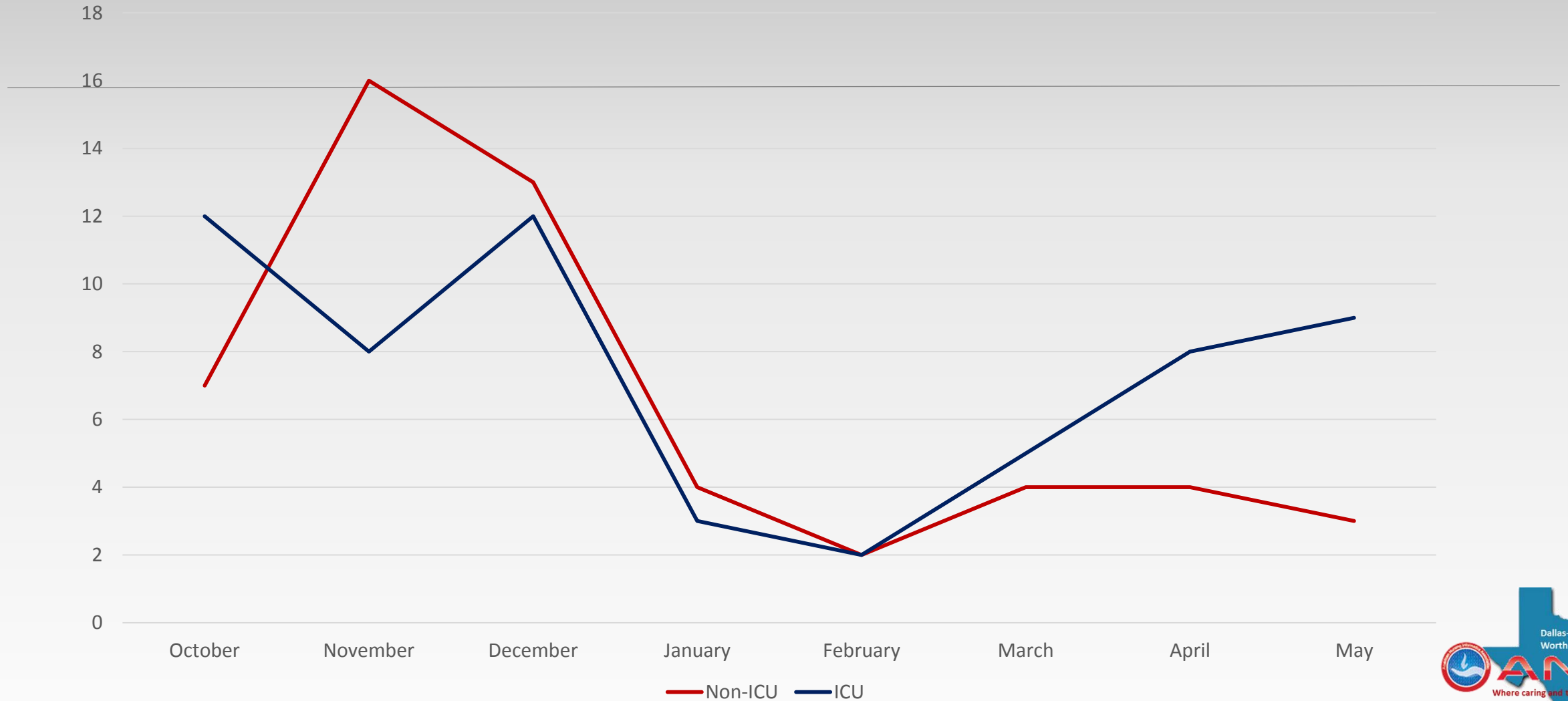
<u>Before group</u>			<u>After group</u>			<u>Total group</u>		
<i>n</i>	M/S	ICU	<i>n</i>	M/S	ICU	<i>n</i>	M/S	ICU
6838	3.01	3.55	6936	2.81	3.36	13744	2.89	3.45

Note. Confidence interval at 95%

Median Catheter Days

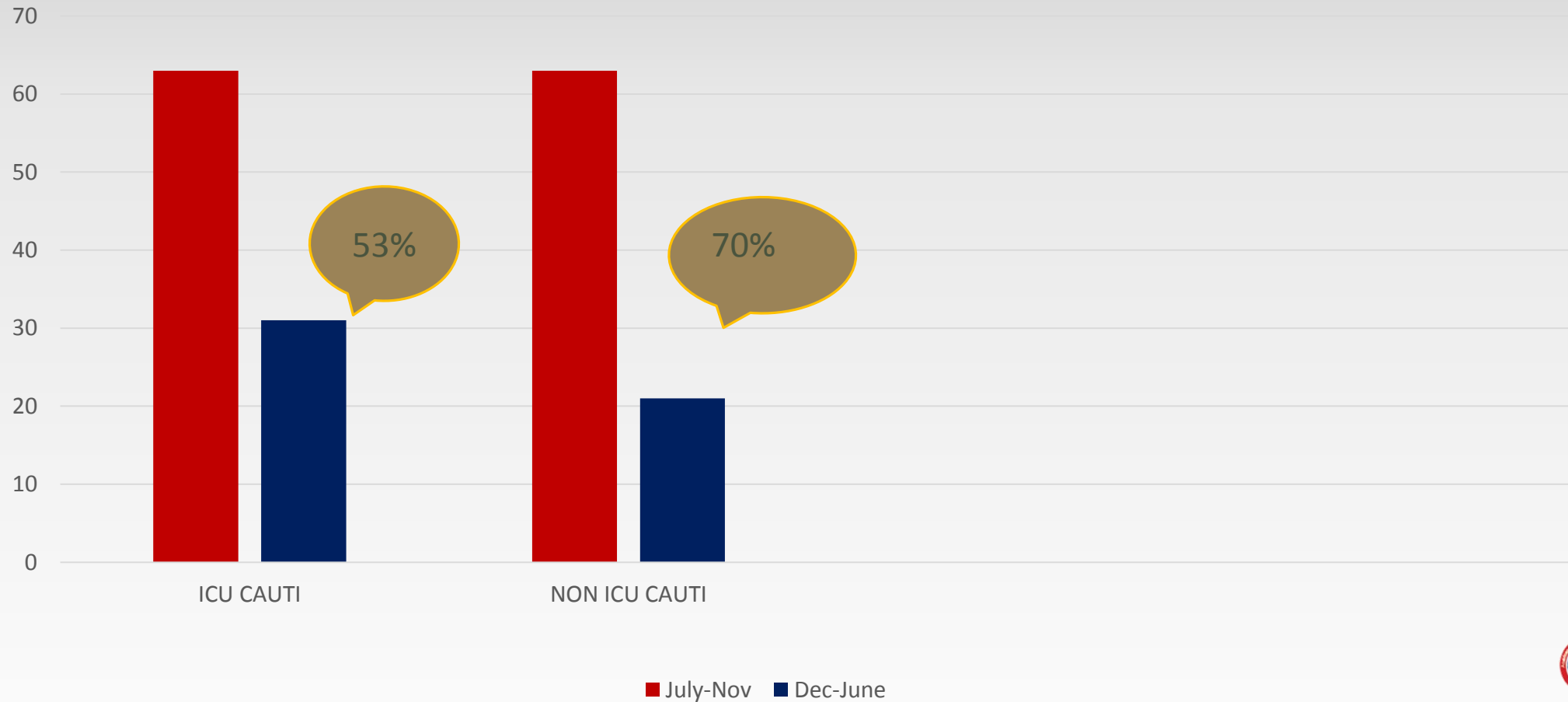
Variable	Before group		After group	
	n	Md	n	Md
Age				
18-34 years	1152	1.00	1299	1.00
35-120 years	5688	2.00	5639	2.00
Race				
White	5523	2.00	5296	2.00
Non-White	1318	2.00	1642	2.00
Gender				
Male	2664	2.00	2593	2.00
Female	4177	2.00	4345	2.00
Unit of Care				
Med-Surg	6020	2.00	5983	2.00
ICU	821	2.00	955	2.00
Antibiotics				
No	5270	2.00	5366	1.00
Yes	1571	4.00	1572	3.00

CAUTI Incidence



Potential Cost Avoidance

12 months of CAUTI Incidence



Calculating Cost Avoidance

- 53% rate of change equates to 32 avoided CAUTI in ICU patients
- 70% rate of change equates to 42 avoided CAUTI in non-ICU patients
- Total of 74 avoided CAUTI at \$2,160 per case = cost avoidance of \$159,840
- Decrease in manual tracking of foley days in 181 units x 2.5 hrs. per week = 23,530 hrs. per year = \$941,200

\$1,101,040

Importance to Nursing Informatics

Introduction of electronic alerts was significant in decreasing catheter days

Strong research links decrease in catheter days to decrease incidence of CAUTI (Cornia et al., 2003; Topal et al., 2005; Apisarnthanarak et al., 2007)

Introduction of electronic alerts presented EBP at the time of decision making to cue nurses (American Nurses Association, 2015)

The use of the PARIHS framework can organize and help evaluate implementation science projects

Implementation of alerts and calculation by EHR decreases administrative burden

Big data can be used to evaluate quality improvement projects



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QUESTIONS & DISCUSSION

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