

Integrating Evidence-Based Practice and Process Improvement Models to Decrease Catheter-Associated Urinary Tract Infection

Flagstaff Medical Center

Flagstaff, AZ

Evidence-Based Practice Department



Objectives

- * Define how evidence-based practice, lean six sigma, and the IHI PDSA cycles integrate to achieve sustained practice and process change
- * Define original CAUTI practices instituted at Flagstaff Medical Center
- * Cite best evidence in evidence-based CAUTI prevention
- * Discuss how clinical educators from ED, OR, ICU and Medical-Surgical/Telemetry areas successfully implemented CAUTI prevention practice changes
- * Disseminate CAUTI reduction and urinary catheter maintenance practice change data

Our Hospitals: Flagstaff Medical Center and Verde Valley Medical Center





Flagstaff Medical Center
Northern Arizona Healthcare

“Making Lives Better”



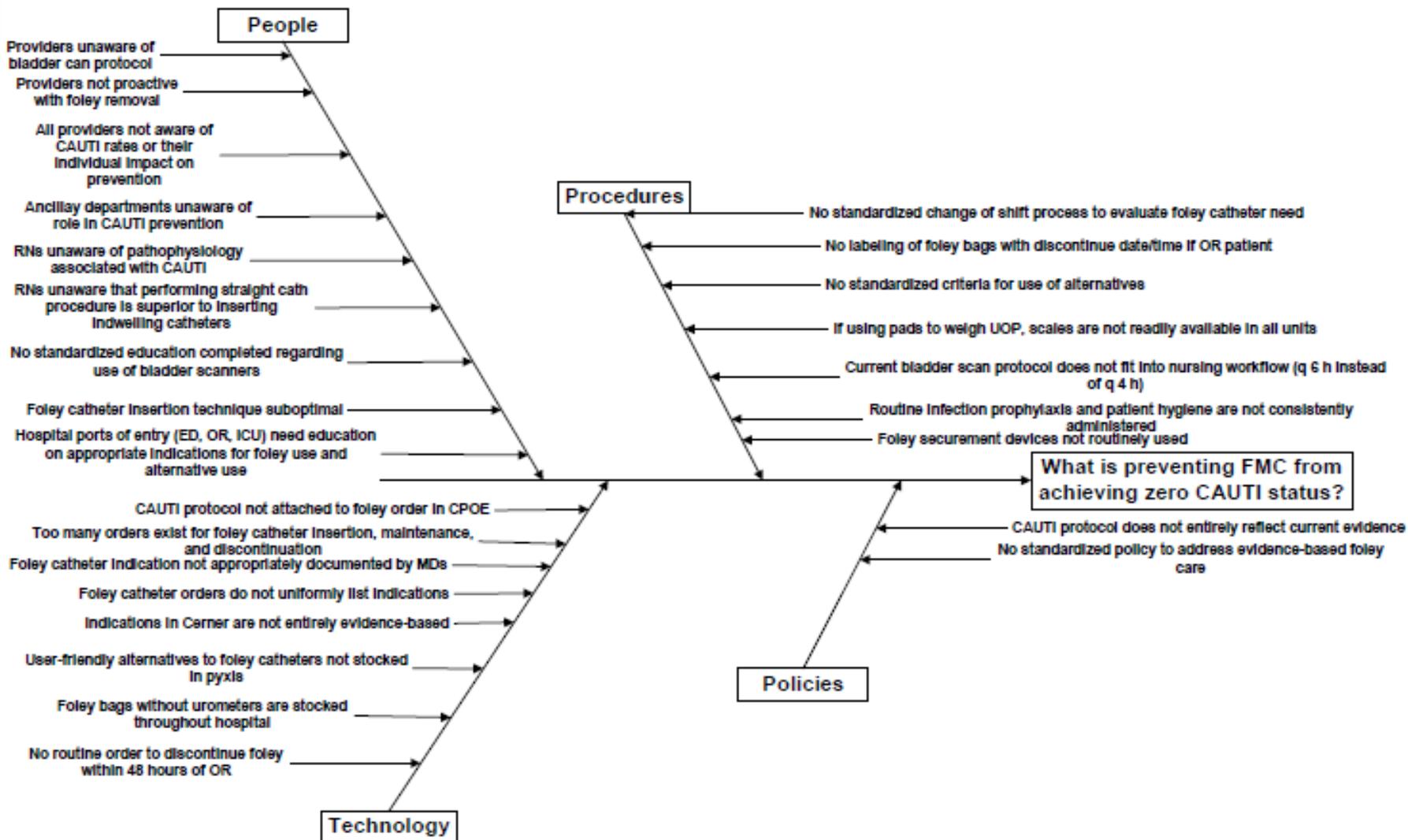
Northern Arizona Healthcare

Lean Six Sigma in Healthcare

- * Focus
 - * Eliminate defects, waste, and variation
 - * DMAIC Mnemonic
 - * D = Define
 - * M = Measure
 - * A = Analyze
 - * I = Improve
 - * C = Control
 - * Process-focused improvement strategy



Cause and Effect: CAUTI



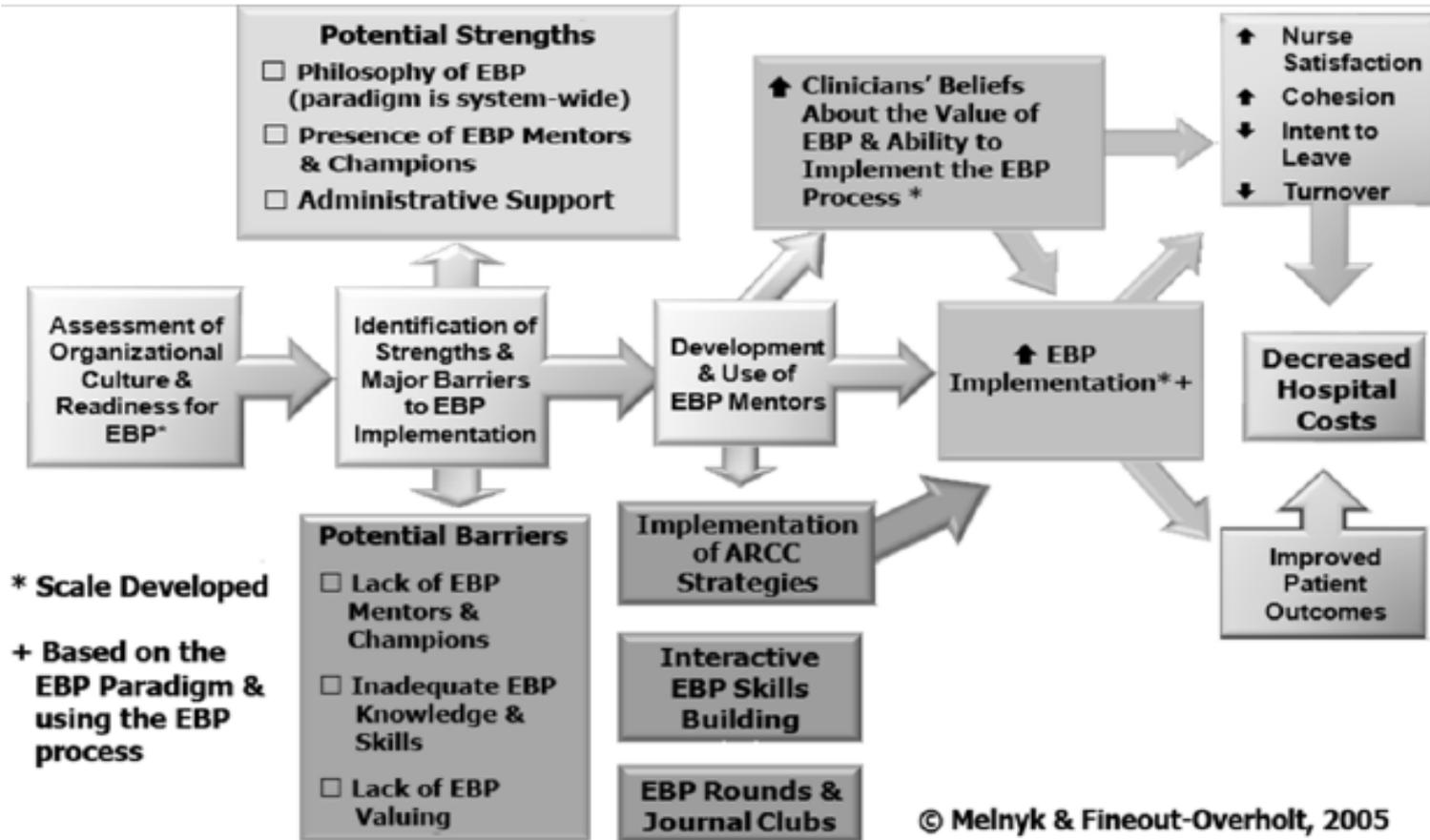
Advancing Research & Clinical Practice Through Close Collaboration EBP Model (ARCC)

- * Defines evidence-based practice using a holistic approach to change
 - * EBP is a **problem-solving** approach to clinical practice that integrates the conscientious use of **best evidence** in combination with a **clinician's expertise** as well as **patient preferences and values** to make decisions about the type of care that is provided. **Resources** must be considered in the decision-making process as well.

Melnyk, B. M. & Fineout-Overholt, E. (2nd ed.). (2011).

Step 0: Cultivate a Spirit of Inquiry

Melnik & Fineout-Overholt's Advancing Research & Clinical Practice through Close Collaboration (ARCC) Model



Organizational Culture: Lean Six Sigma and EBP

- * Lean Six Sigma
 - * Introductory Lean classes
 - * Critical mass of both Lean Six Sigma Green Belts and Black Belts
 - * Lean Six Sigma process improvement tools widely used throughout facility
- * EBP
 - * Small group of educators and one Clinical Nurse Specialist trained in EBP principles
 - * EBP tools used among educator/CNS group and in limited interactions with certain disciplines



Integrating LSS, EBP, and PDSA Cycles

- * Step 0 = Cultivate a spirit of inquiry
- * D = Define
 - * Step 1 = Clinical Question (PICOT)
- * M = Measure  PDSA Cycle
 - * Step 2 = Search for best evidence
- * A = Analyze  PDSA Cycle
 - * Step 3 = Evaluate the evidence
 - * Step 4 = Determine best fit
- * I = Improve  PDSA Cycle
- * C = Control  PDSA Cycle
 - * Step 5 = Outcomes evaluation
- * Step 6 = Dissemination plan

DO SYSTEM-BASED INTERVENTIONS AFFECT CATHETER-ASSOCIATED URINARY TRACT INFECTION?

AJCC

By Margo A. Halm, RN, PhD, ACNS-BC and Nancy O'Connor, RN, BSN, MSBA, CIC

Table 2
American Association of Critical-Care Nurses evidence-leveling system^a

Level	Description
A	Meta-analysis of multiple controlled studies or metanalysis of qualitative studies with results that consistently support a specific action, intervention, or treatment
B	Well-designed controlled studies, both randomized and nonrandomized, with results that consistently support a specific action, intervention, or treatment
C	Qualitative studies, descriptive or correlational studies, integrative reviews, systematic reviews, or randomized controlled trials with inconsistent results
D	Peer-reviewed professional organizational standards, with clinical studies to support recommendations
E	Theory-based evidence from expert opinion or multiple case reports
M	Manufacturer's recommendation only

^a From Armola et al,²⁷ with permission.

Table 1
Matrix of evidence ($P < .05$)

Reference	Intervention and results	Evidence level
Educational		
Yoon et al ²²	Hospitalwide education: catheter tagging Catheter insertion date tagging increased from 46.2% (baseline) to 84.6% (after education)	C
Daily Checklist or Reminder System		
Meddings et al ²⁰	Catheter reminders or stop orders (N = 14 studies) Catheter days declined 2.61 days per patient in intervention group (mean duration decreased 37%) Pooled standardized mean difference for duration of catheterization was -1.11 days overall, including significant decrease when stop orders were used (but not reminders) Catheter-associated urinary tract infection (CAUTI) rate (per 1000 catheter days) decreased by 52% with either intervention	A
Fuchs et al ²³	Daily checklist for catheter initiation/continuation Catheter days declined from 402 (baseline) to 380 (after intervention)	C
Elpern et al ²⁴	Nurse-driven daily evaluation of catheter indication Catheter days (mean) declined from 311.7 to 238.6 days per month Inappropriate catheter use = 32% (common reasons included incontinence, skin integrity concerns, obesity, diuresis, perceived discomfort, patient's request for comfort) CAUTI rate (mean) decreased from 4.7 to 0 per month during 6-month intervention period	C
Fakih et al ⁷	Daily review of catheter indication Catheter days declined from 203 (before intervention) to 162 per 1000 patient days (after intervention) Unnecessary catheters decreased from 102 (before intervention) to 64 catheter days per 1000 patient days (during intervention) but increased to 91 catheter days after the intervention Inappropriate catheter use decreased from 50.4% (at baseline) to 39.6% (during the intervention) and 48.7% (after the intervention)	B
Apisarnthanarak et al ²⁵	Multidisciplinary daily review of catheter indication Catheter days declined from a mean of 11 (SD, 2.5) to a mean of 3.0 (SD, 0.7) days Inappropriate catheter use decreased from 20.4% to 11% CAUTI rates decreased from 21.5 to 5.2 per 1000 catheter days Antibiotic costs decreased 63%, from \$3739 (SD, \$1422) to \$1378 (SD, \$651) Hospitalization costs decreased 58%, from \$366 (SD, \$62) to \$154 (SD, \$34)	C
Multifaceted		
Knoll et al ¹	Multifaceted education with system redesign/rewards/feedback Catheter prevalence decreased from 15.2% to 9.3% (intervention phase I), 13.6% (phase II) and 12% (phase III) Nonordered catheters decreased from 17% to 5.1%, and nonindicated catheters decreased from 15% to 5.1%	C
Oman et al ²⁶	Multifaceted education, charge nurse catheter rounds, product review/standardization Catheter days declined on surgical unit from 3.01 (phase 1) to 2.2 (phase 3) CAUTI rates maintained at 0 per 1000 catheter days from baseline to after the intervention (pulmonary unit) Length of stay (mean) decreased from 7.39 to 7.21 and 6.72 days in 3 phases (pulmonary unit) Product removal of silver alloy catheters had annual cost savings of \$52 000; no adverse effect on CAUTI rates	C

Equipment Change and Standardization

- Old kit

- Silicon catheter
- Sterile gloves
- Cotton balls
- Tweezers
- Betadine packet
- Lubricating jelly
- May or may not have urometer
- No securement device

- Multiple kits in use and not standardized

- * New kit

- * Silicon catheter
- * Sterile gloves
- * Hand gel for provider
- * Castile wipes
- * Betadine swabs
- * Lubricating jelly
- * Urometer standard
- * Securement device standard

- * Kit standardized throughout hospital

All RNs watched educational video and took quiz on appropriate catheter insertion and use of new kit

Audit Planning

- * Standardized audits addressing:
 - * Use of new kits
 - * Common catheter mishaps
 - * Appropriate clinical indications
- * Additional education addressing specific problems in each clinical area
- * Continuous feedback regarding results
- * Involvement of clinical staff

Table 5
Catheter do's and don'ts^a

Do	Don't
Use aseptic technique to insert catheter	Clean periurethral area with antiseptics
Secure catheter to prevent movement and traction	Let drainage bag touch floor
Perform routine meatal cleansing	Disconnect drainage system
Always keep drainage bag below level of bladder	Routinely irrigate bladder
Maintain free urine flow by keeping catheter and tubing free of kinks	Routinely change catheters or drainage bags
Empty bag regularly by using a separate clean container	Clamp tubing during transport
Disinfect port before and after urine sampling	Clamp catheter before removal
Replace catheter and system if a break in aseptic technique, disconnection, or leakage occurs	
Consider closed continuous irrigation if obstruction is anticipated	
Consider alternatives (external catheters or intermittent catheterization)	
Use bladder ultrasound to evaluate urinary retention	

^a Based on information from Gould et al,¹¹ Fink et al,²⁸ and Blodgett.²⁹

Halm, M. A. & O'Connor, N. (2014).



FMC CAUTI Audit Tool

Urinary Catheter Audit Tool

Auditor:	Unit:	Unit Census:	Date/Time:	/													
Patient Sticker and Primary RN Name on Sticker	Cath System (See Below)	Seal intact? (Y/N)	Cath secured? (Y/N/NA)	Securement type? (See Below)	Urometer overflowing? (Y/N)	Tubing looped/ kinked? (Y/N)	Green clip used? (Y/N)	Tubing/bag below bladder? (Y/N)	Bag/ Meter Touching Floor? (Y/N)	Patient sitting up in chair? (Y/N)	Separate graduate for each patient? (Y/N/NA)	Sticker insert date? (Y/N)	Sticker insert time? (Y/N)	Sticker insert initials? (Y/N)	Evidence-based reason? (See Below)	RN Reason? (Free Text)	
	B			SL													
	3W			T													
	O			S													
				O													



CAUTI Prevention and Urinary Catheter Care Results

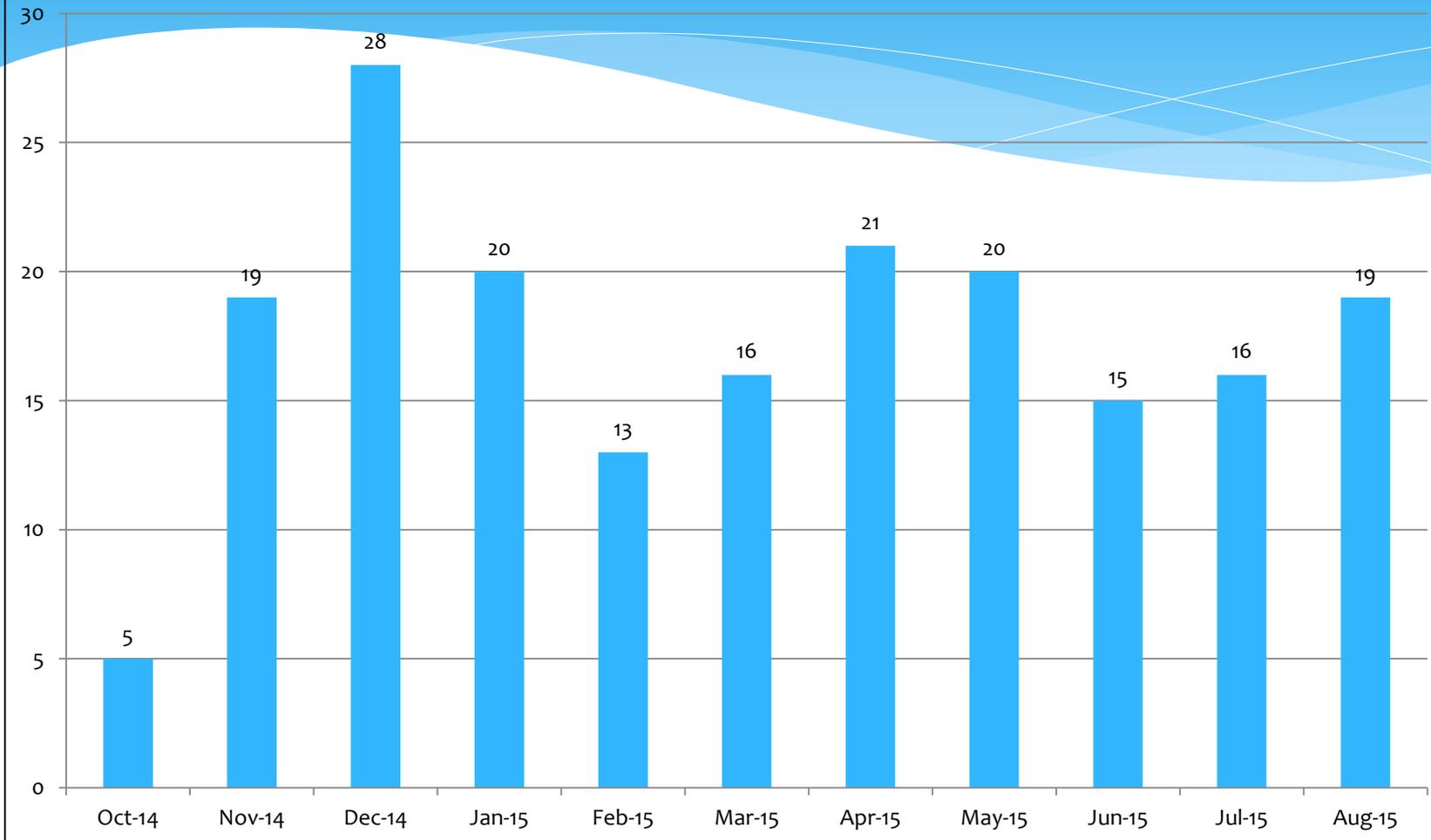


CAUTI Criteria Changes 1-2015

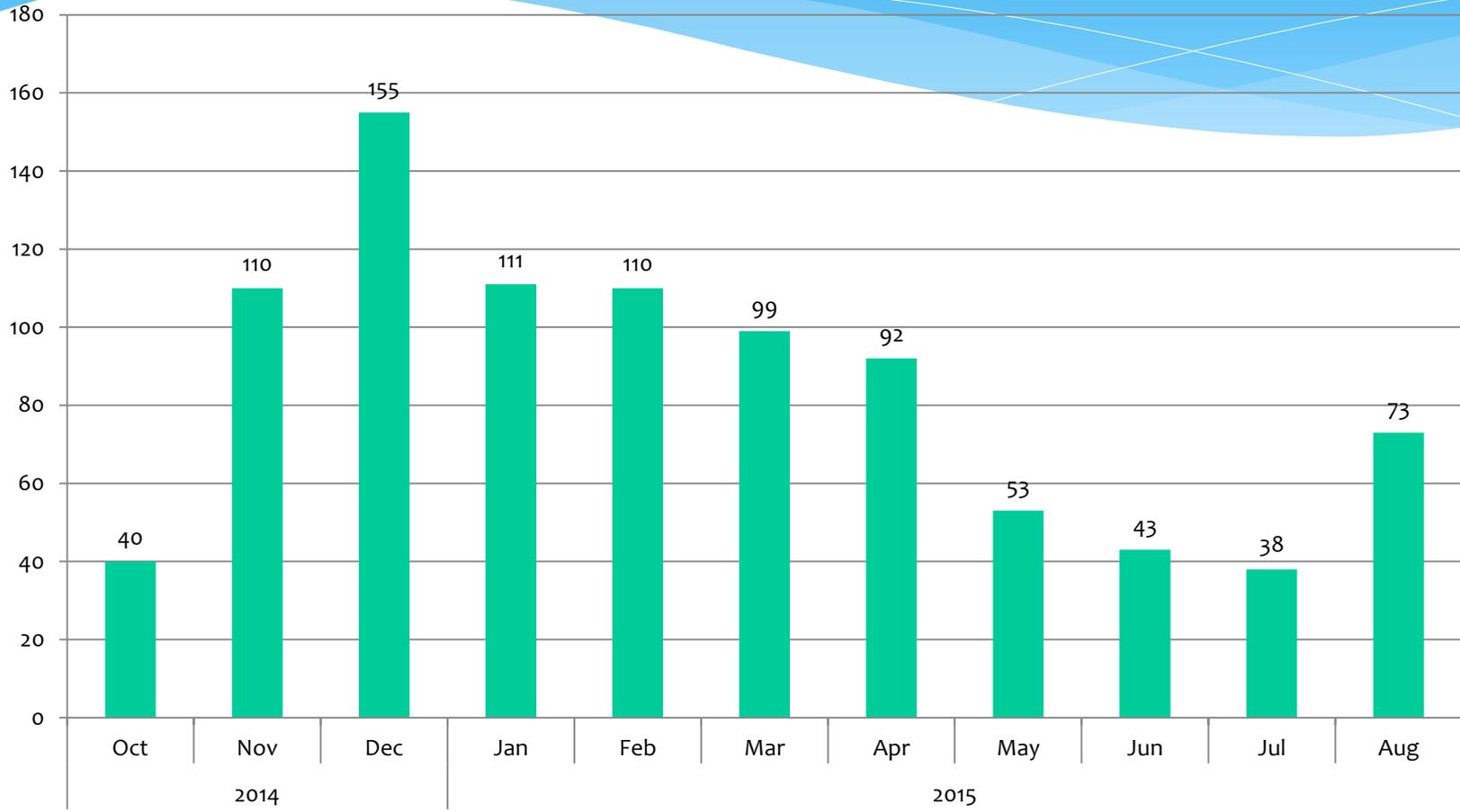
- * 100,000 CFU/ml will be the threshold for reporting
- * Non-bacteria will no longer be eligible pathogens for symptomatic/asymptomatic bacteremic UTI.
- * Urinalysis will not be used for any NHSN criteria.



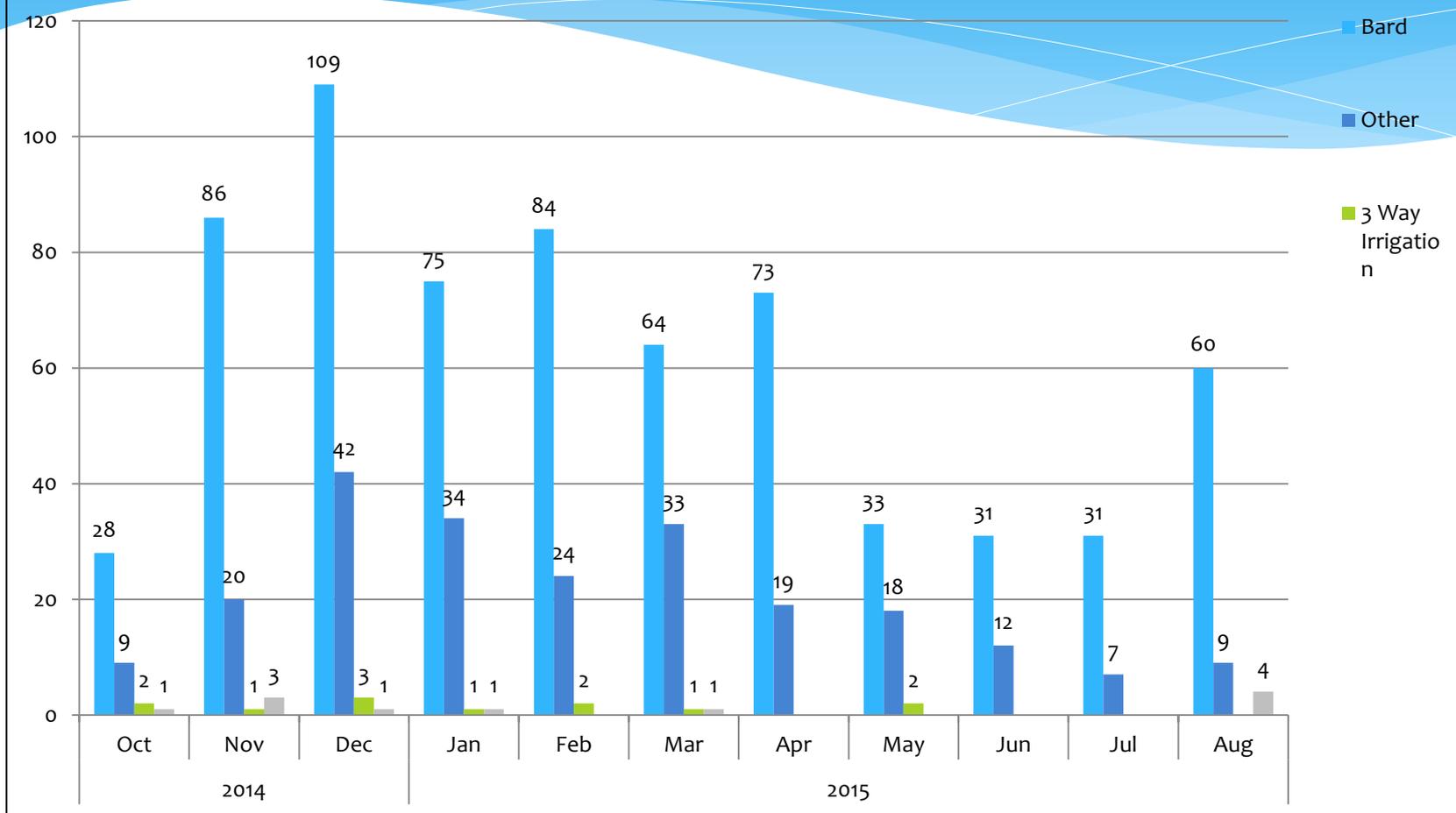
FMC Foley Audits: Number of audit days (n=192)



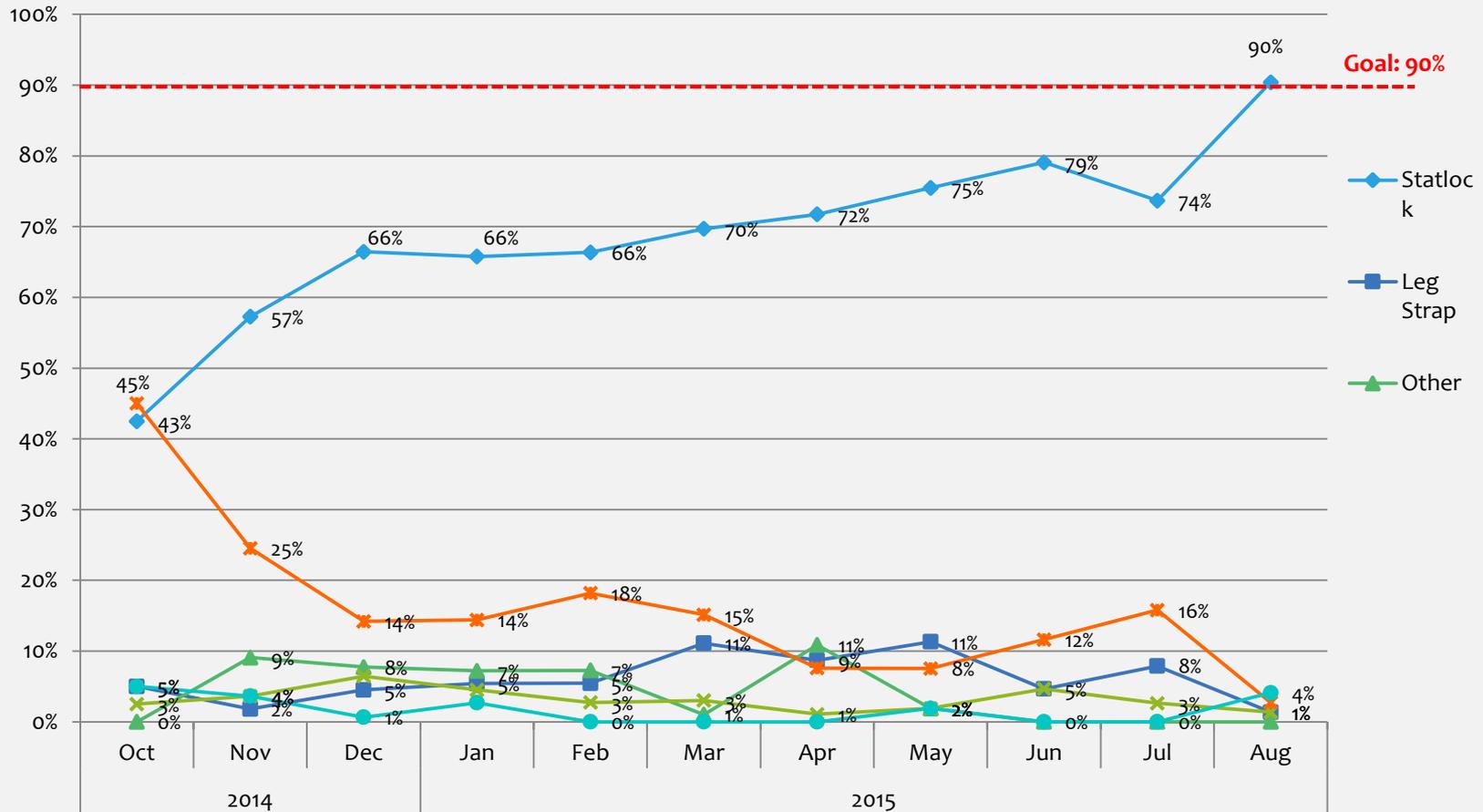
FMC Foley Audits: Number of catheters audited per month – Adult patients only (n=924)



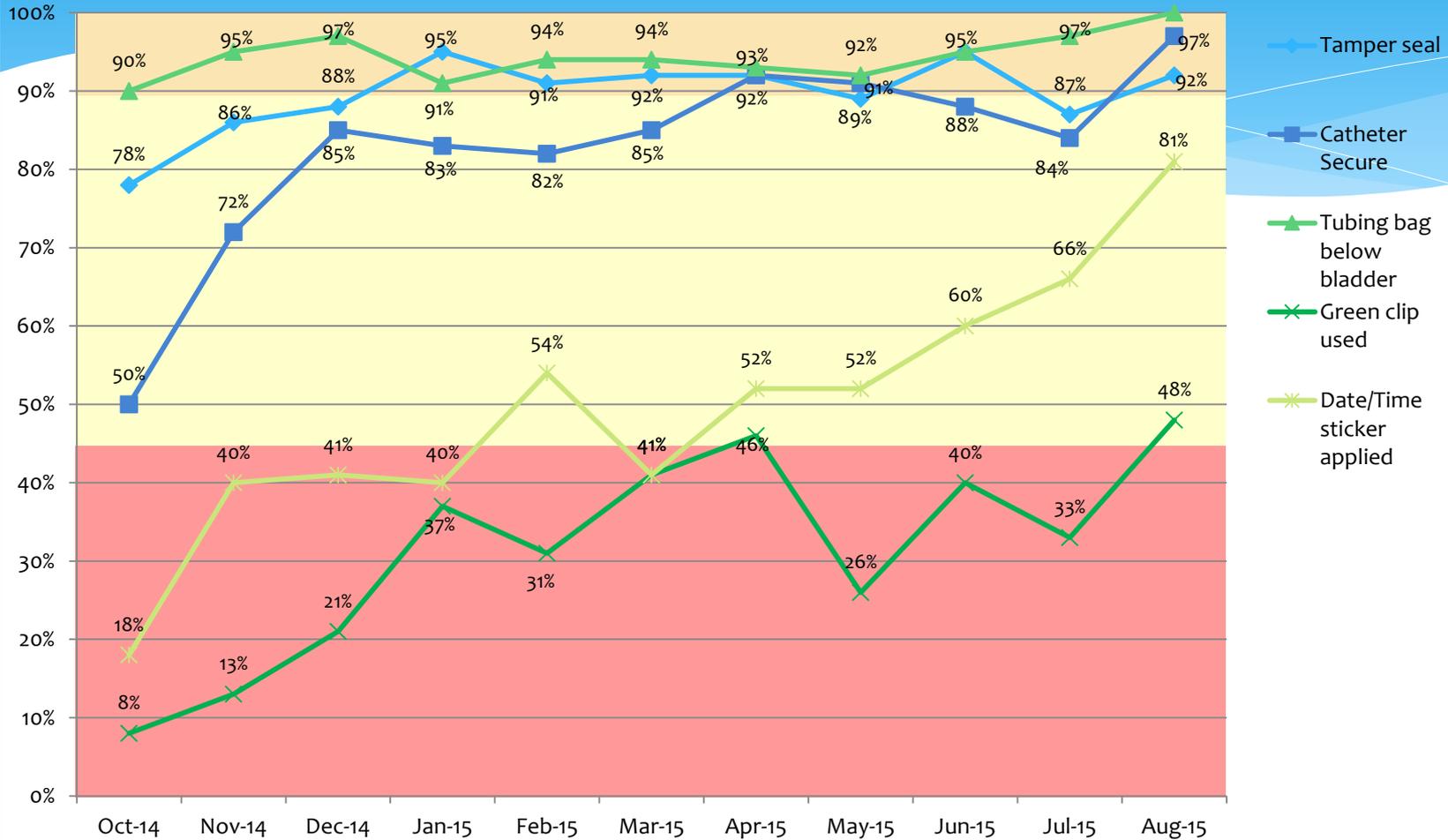
FMC Foley Audits: Catheter type per month- Adult patients (n=924)



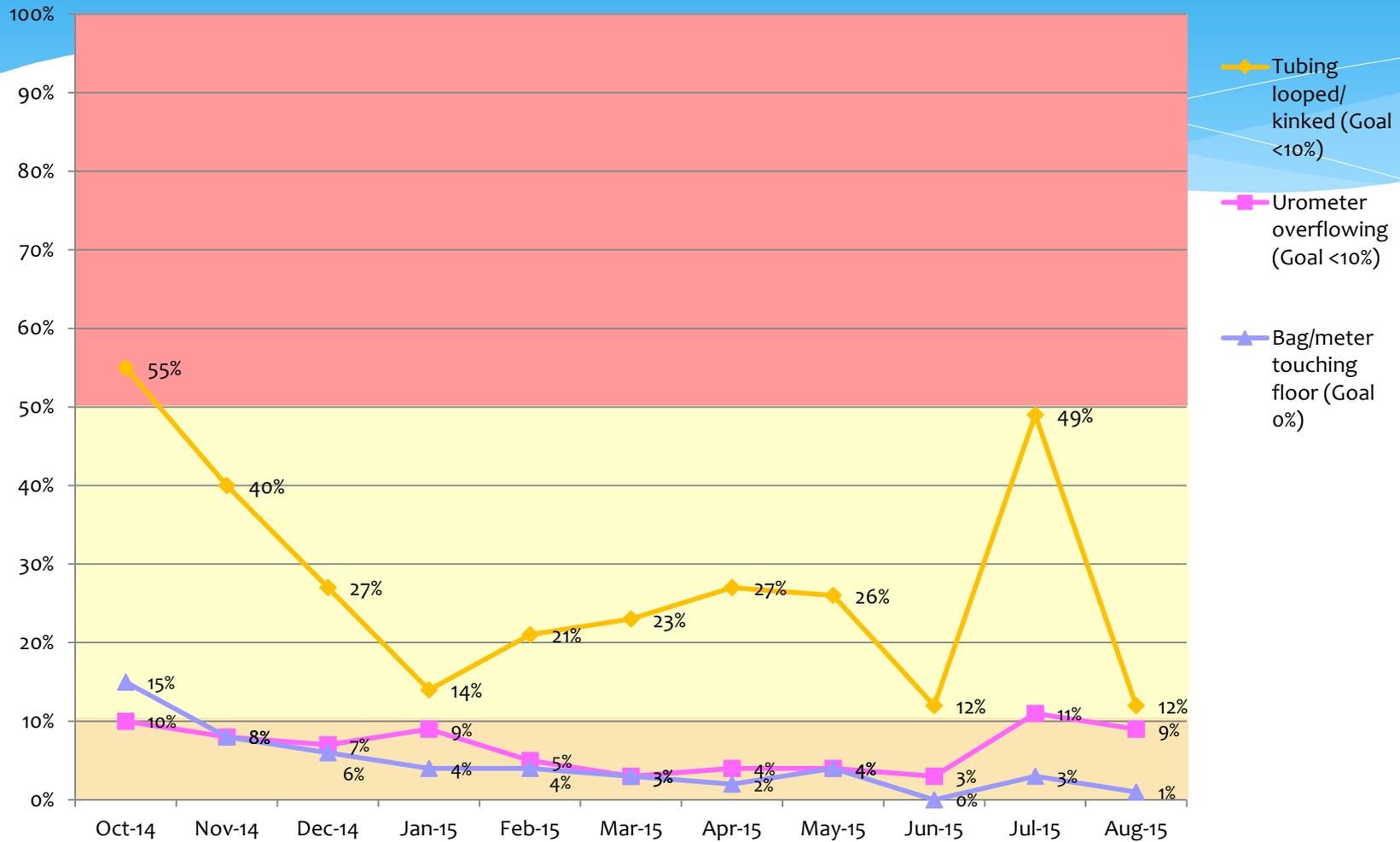
FMC Foley Audits: Catheter securement per month- Adult patients (n=924)



FMC Foley use Indicators: All units, Adult patients (n=924)

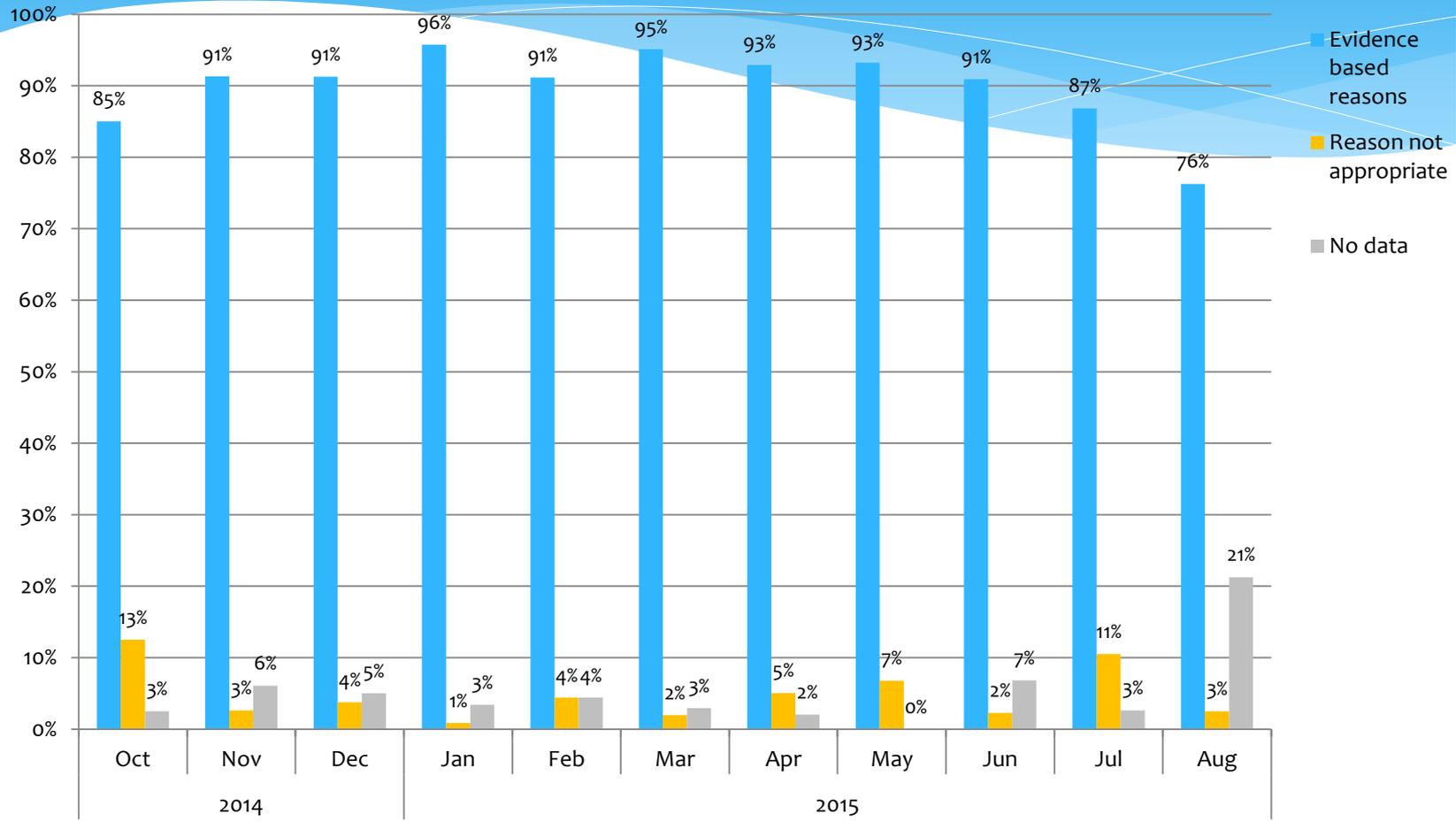


FMC Foley use Indicators: All units, Adult patients (n=924)

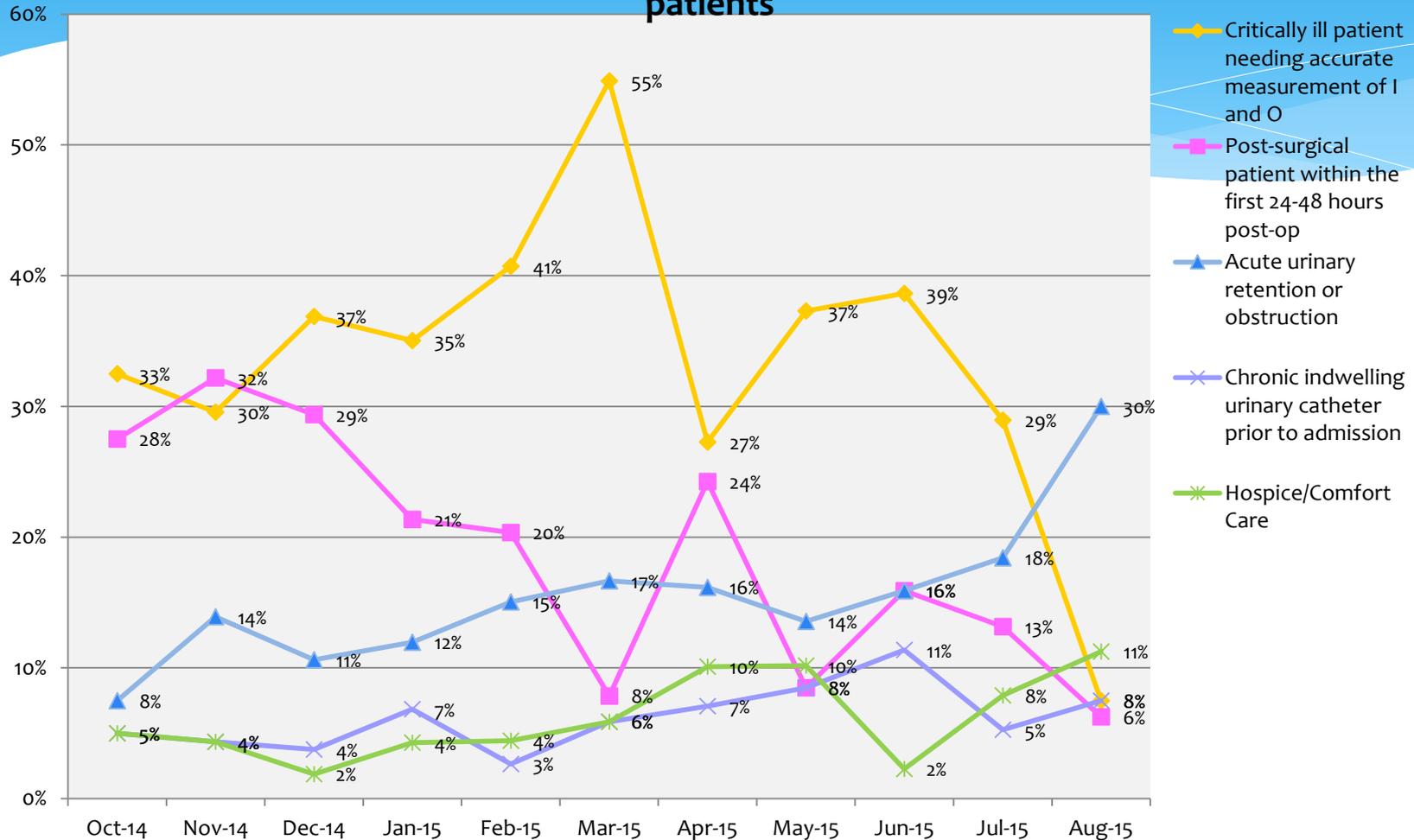


FMC Foley Audits: Reasons for use, All units - Adult patients (n=967)

*Please note that some cases have more than one reason listed



FMC Foley Audits: Top 5 Evidence Based reasons, All units - Adult patients



Emergency Department Role in CAUTI Prevention

- Quality measures begin when the patient enters the hospital/health care system
- Emergency Department is a hospital front door
 - A major point of entry into the hospital/healthcare system
- Patient outcomes are affected by the quality of our care
 - Trauma
 - S-T elevation myocardial infarction
 - Stroke
 - **CAUTI**

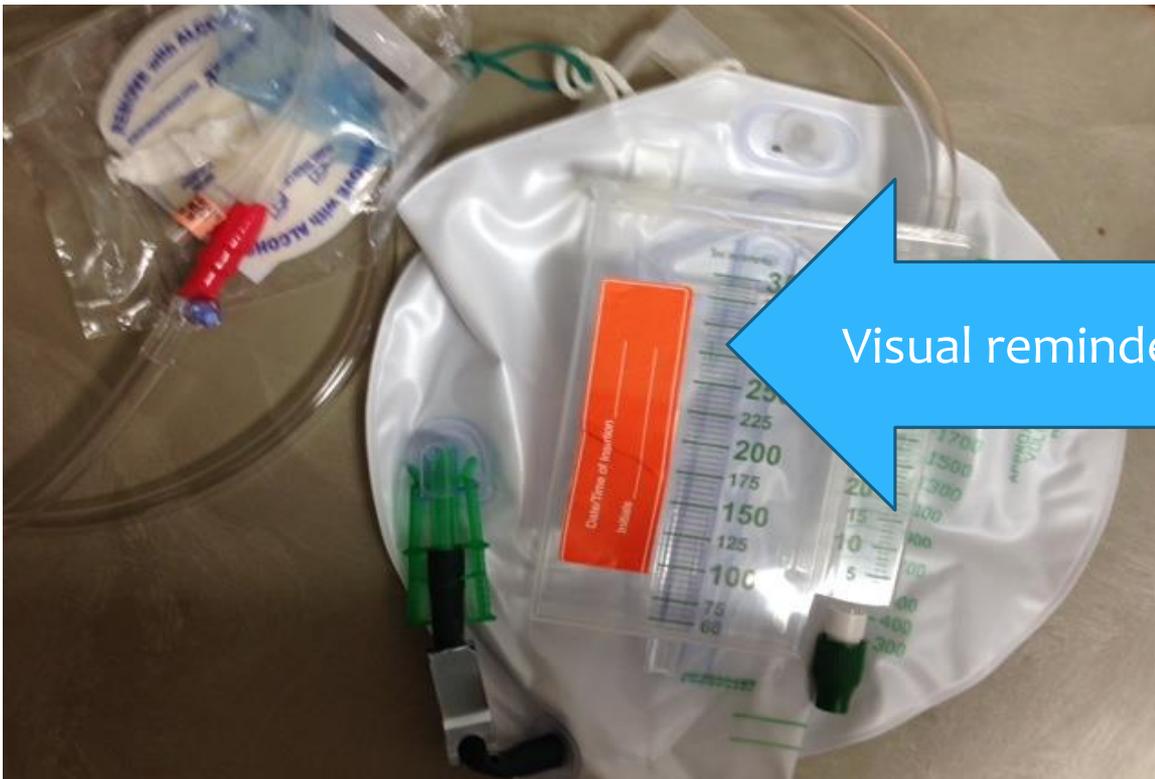


Indwelling Urinary Catheter Kit Trial in Emergency Department

- **Conducted trial of new indwelling urinary catheter kit**
- ED inserts “lots of catheters”
 - High use of supplies
- Kit contained extra supplies recommended for prevention of CAUTI
 - Wipes for gross patient contamination
 - RN alcohol gel
 - Securement device
 - Big orange insertion date/time sticker for inpatient RN’s
 - Prevented time wasted scrolling thru chart for insertion date/time
 - Sheet clip



Sticker for Date/Time Insertion



Visual reminder for inpatient nurses!

Product Representative Educational Support

- Product Representative clinical educator provided several educational sessions to ED Staff
 - Shift meeting at 0700 and 1900 hrs.
- ED Clinical Educator and ED RN Champion educated remainder of staff
- 100 % of staff educated with checkoff list

Facility Educational Support

- Education regarding how to use new kit with demonstration
- Education regarding new guidelines to reduce CAUTI's
- New hospital policy written establishing new guidelines to reduce CAUTI's
 - **Result -- Overall reduction in IUC placement in the ED**
- Video and post test created for larger inpatient staff education

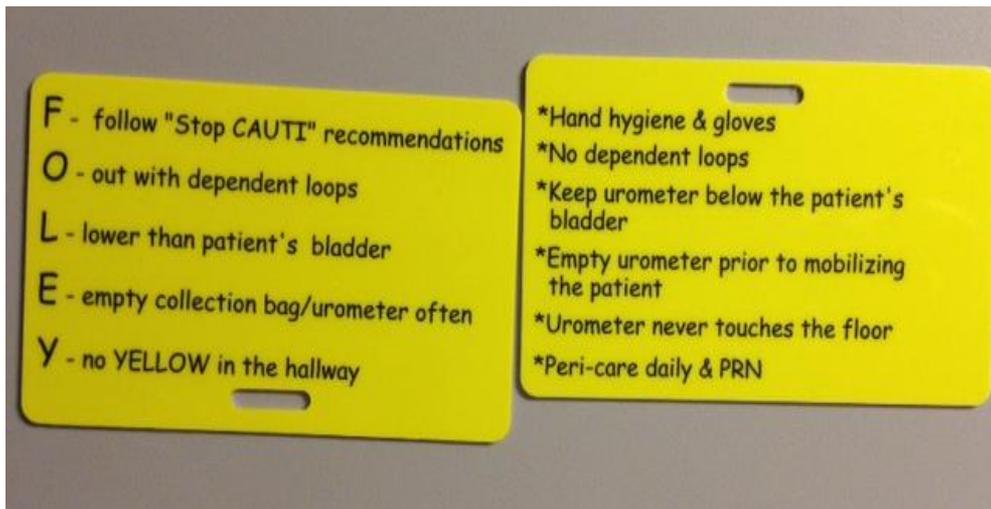


Involvement of ED and Patient Care Technicians

- Previously considered RN only practice
- Education for ED Techs to empty urometers and document urinary output
- Management of drainage system to prevent dependent loops
- Keep urometers below bladder level
- Urometer never touches floor



Technician Training Program and Badge Card for Every RN and Technician



- ED & Patient Care Technician Training Program Created
- Trained existing technicians
- Train all incoming nurses and technicians

Trial Outcomes – The Easy Part

- Staff feedback about indwelling urinary catheter kit overwhelmingly positive
 - Useful
 - Easy
 - Extra supplies helpful
- The ED recommended kit for use house-wide to:
 - Educators
 - Quality (Clinical Value Department)
 - Management
- Hospital-wide transition to this kit



Translation into Practice – The Hard Part

- Live educational audits of patients with indwelling urinary catheters
 - **Had nurses implemented what they learned?**
 - **Were nurses using all parts of kit?**
 - Collection bag lower than bladder level
 - Emptying collection bags/urometers prior to transport *anywhere* (no yellow in the hallways)
 - No dependent loops with use of sheet clip
 - Use of securement device
 - Peri-care daily and PRN
- On the spot education by Clinical Educators



Current State – *Maintaining* Evidence Based Best Practices

- Work in progress
- Some ED nurses still want to place IUC's for inappropriate indications
- Education for alternatives
 - Straight cath to empty bladder
 - Condom catheter for males
 - Risks of placement
- Reinforcement and repetition

Surgical Services.....

The accidental late adaptor or laggard if you prefer



Surgical Services Structure

- * Consists of Pre-Op, OR, PACU and ENDO
- * 11 ORs in Main
- * 4 ORs in Outpatient
- * Average of about 800 cases per month
- * High orthopedic volume



Work in a Specialty Area, OR

- * Challenging and Rewarding
- * This does not apply to me
- * A shifted focus
- * Money is a motivator
- * Supply Chain differences



My introduction to Surgical Services Educator

- Welcome... teach this new protocol to help prevent CAUTI's.
- P.S. we go live in 2 weeks
- Good luck!

The question I asked myself... how do I get a team of staff who will NEVER get charged with a CAUTI to adapt to a new practice?



The answer:

Persistence



Surgical Services Receptiveness to EBP

- * Receptiveness to EBP
 - * Mixed reviews
- * Tolerance to change
 - * New Kits were a pain point
- * Decreased Utilization

Audits

- * Audits as a teaching opportunity
 - * Immediate correction
 - * Positive staff interactions
 - * Time consuming
- * Audits as a data collection tool
 - * Had to slightly change this for the surgical services departments



The OR... things are a little different

- * Surgical beds are great for surgery, but not much else
 - * Where to hang the bag
 - * How to keep the tubing out of the way of surgery
- * Use of chosen catheter securement device in the OR is not ideal
 - * Goal became save the catheter securement device for PACU
- * EBP Reason – “The Audits are ever in our favor”

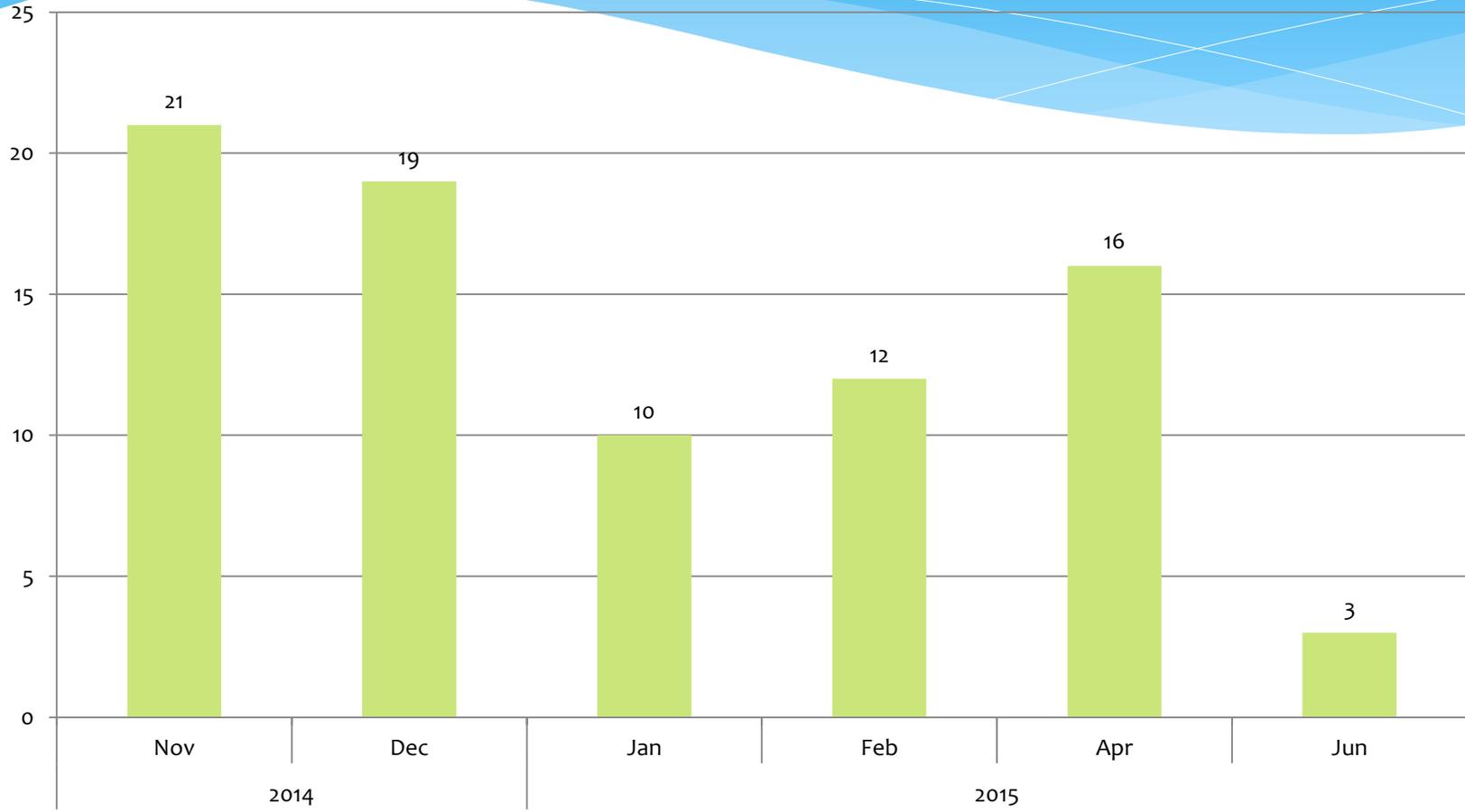


Things are going well, could we do better?

- * Audits showed improvement, however talking with the staff revealed other issues
- * Gap Analysis
 - * Skills Lab
 - * Making experienced staff demonstrate urinary catheter insertion



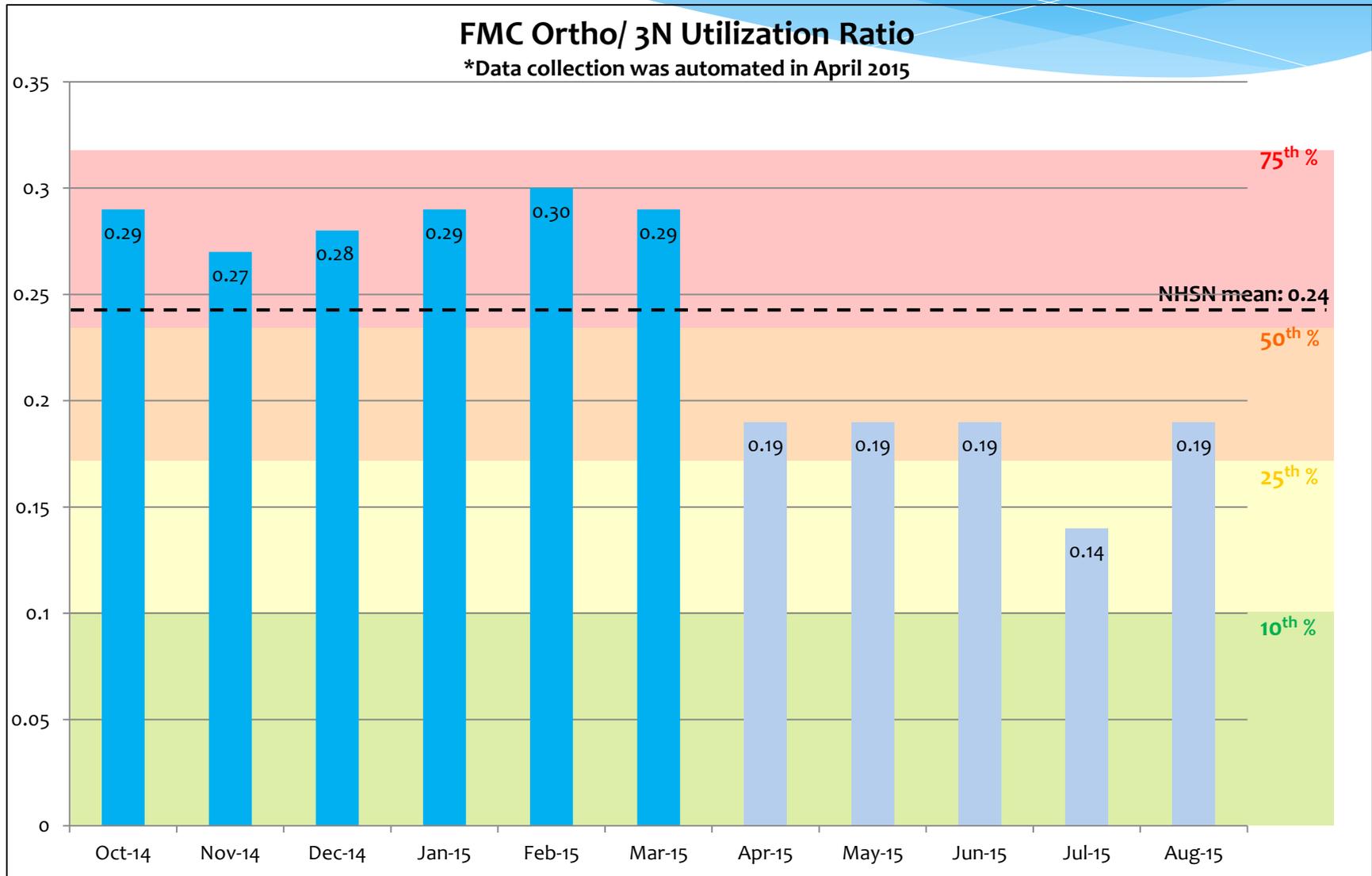
FMC Foley Audits: Number of catheters audited per month - Surgery and PACU, Adult patients (n=81)



FMC Urinary Catheter Focus Study

Urinary Catheter Utilization Benchmarks

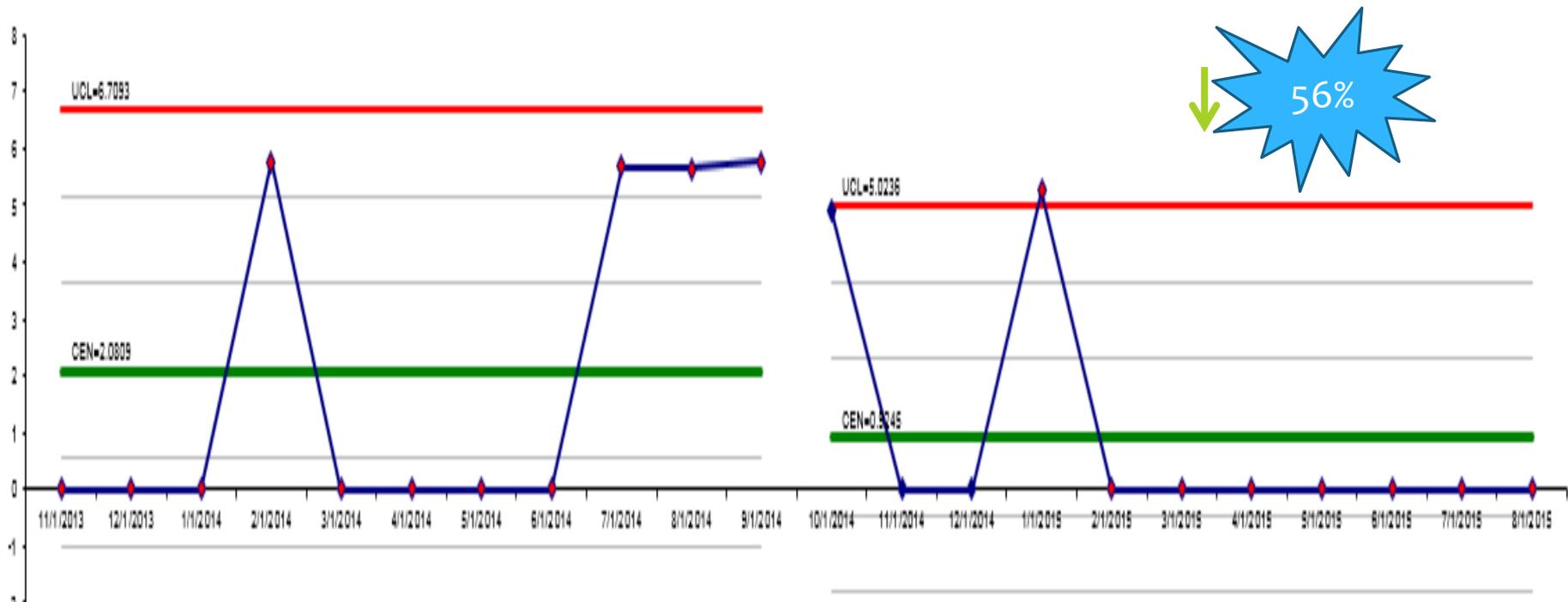
Oct2014 - Aug2015
Data source: IP- CVD



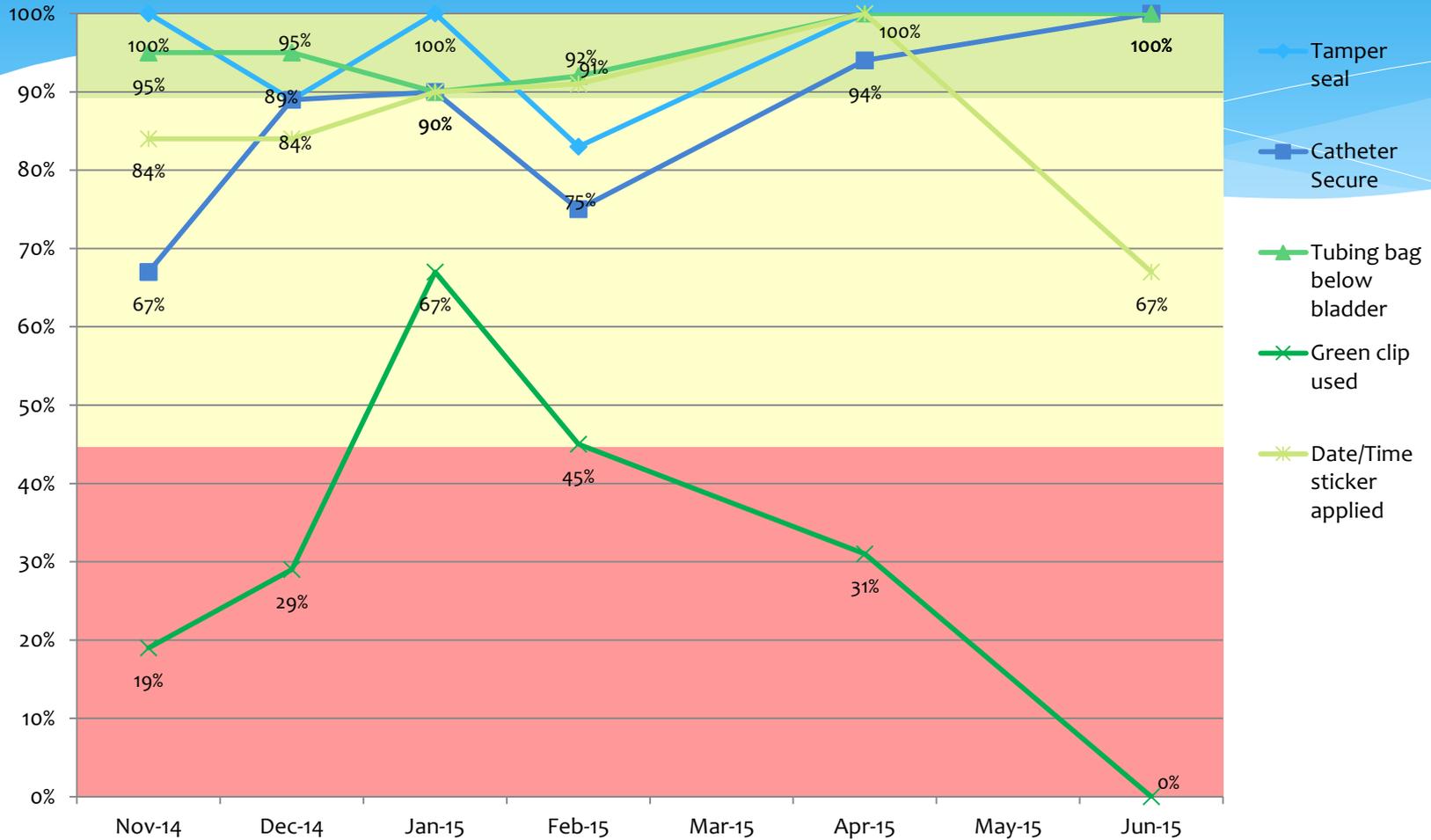
Benchmarks source: NHSN Report, Data summary for 2013, Device associated module. Posted online March 2015.

Orthopedic Units

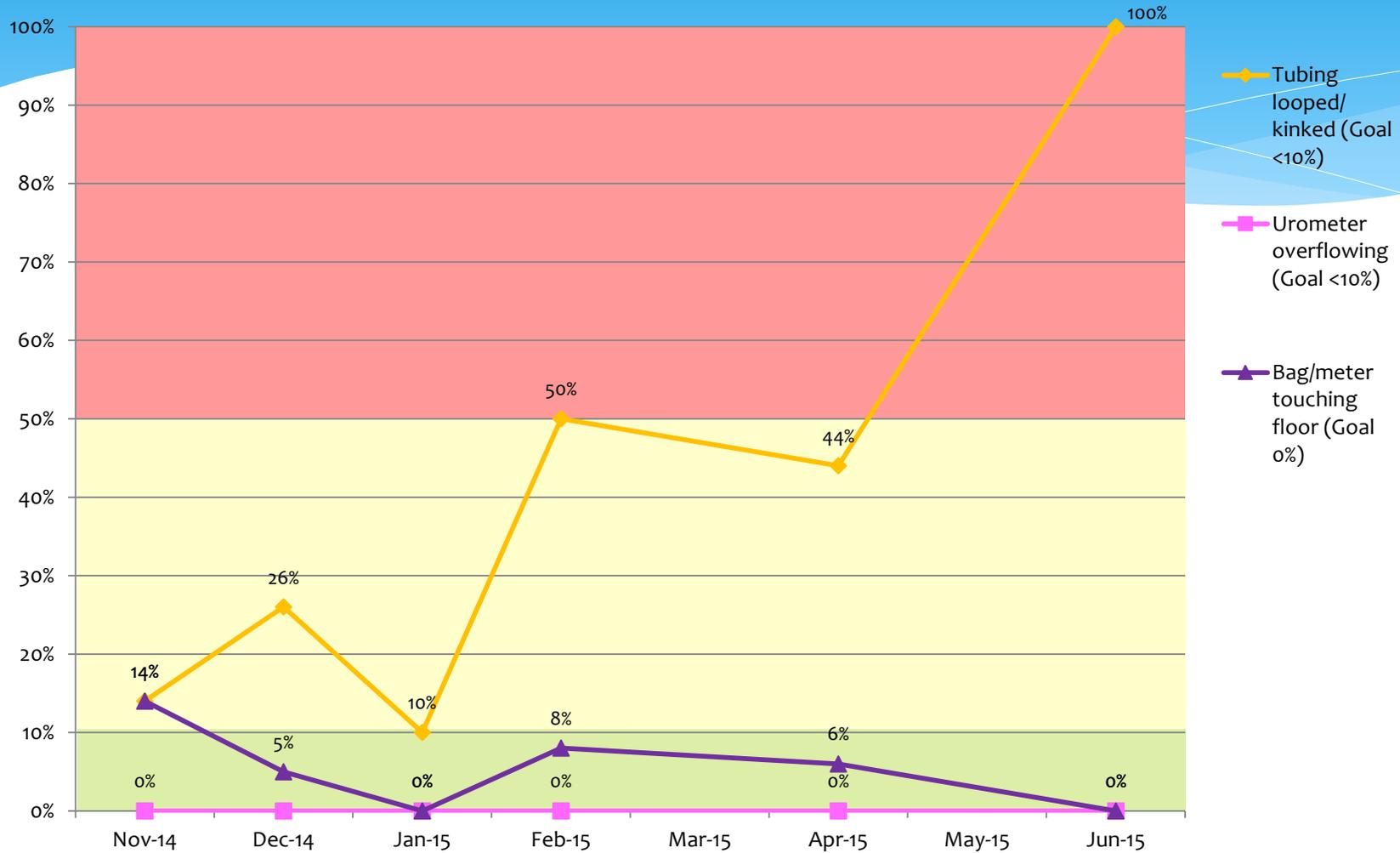
Ortho CAUTI Rate per 1,000 Device Days



FMC Foley use Indicators: Surgery and PACU, Adult patients (n=81)



FMC Foley use Indicators: Surgery and PACU, Adult patients (n=81)



Lessons Learned

Persistence Matters

Know your audience

Open honest communication

Smile while giving orders

Engage staff in the process



DETERMINATION

has to be admired even though you look like a muppet



Critical Care Cluster (CCC) Unit structure

Consists of 3 in-patient units:

- * ICU – 20 beds
- * CVICU – 11 beds
- * SDU – 22 beds

Semi-open Admission Structure



CCC Pre-Implementation Strengths & Weaknesses



STRENGTHS

- * Data driven – quality goals and statistics were visible
- * Receptive to standardization and protocols
- * Passionate

WEAKNESSES

- * Reliance on convenience of hourly output
- * Breaking the “we’ve always done it that way” philosophy with catheters
- * Lack of catheter product standardization and process for discontinuation

CCC Barriers for Culture Change

- * ICUs have highest prevalence of CAUTIs – Now what?
- * EDUCATION!!!
- * Re-focus critical thinking with evidence-based reasons for catheter indication
- * Standardize practices, give clear directives

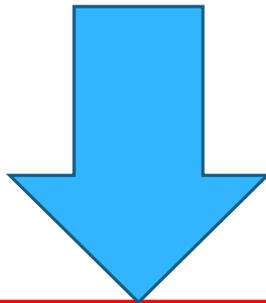


Audit Tool & EBP Visibility

Auditor:	Unit:	Unit Coor:	Date/Time:	#								
Patient Sticker and Primary RN Name on Sticker	Cath System used? [Y/N]	Cath secured? [Y/N]	Securement type? [Y/N]	Tabling looped/ kinked? [Y/N]	Green clip used?	Tabling/bag below bladder?	Bag/line secured?	Patient sitting up in chair? [Y/N]	Sticker insert date?	Sticker insert time?	Sticker insert evidence-based reason? (See Reason)	RN Reason? (Free Text)
	Y N	Y N	Y N	Y N								
	Y N	Y N	Y N	Y N								
	Y N	Y N	Y N	Y N								
	Y N	Y N	Y N	Y N								
	Y N	Y N	Y N	Y N								

Cath System: B = BARD (both arometer and temp probe); 3 W = 3 way irrigation; O = Other (other manufacturer) or Criticare
Securement Type: SI = Staked; T = Tape; S = Strap; O = Other
Evidence-Based Reason: CI = Critically ill patient needing accurate measurement of I & O; PS = Post-surgical patient within the first 24- 48 hours post-op; UR = Acute urinary retention/obstruction; UP = Urological procedure; IM = Required immobilization for trauma or surgery; CC = Hospice or comfort care; PU = Stage III or IV pressure ulcer; ID = Chronic indwelling catheter prior to admission; RN = Reason not appropriate

- * Instant indications for evidence-based reasons incorporated into the audit tool
- * Simple and Educational



Evidence-Based Reason = CI = Critically ill patient needing accurate measurement of I & O; PS = Post-surgical patient within the first 24- 48 hours post-op; UR = Acute urinary retention/obstruction; UP = Urological procedure; IM = Required immobilization for trauma or surgery; CC = Hospice or comfort care; PU = Stage III or IV pressure ulcer; ID = Chronic indwelling catheter prior to admission; RN = Reason not appropriate

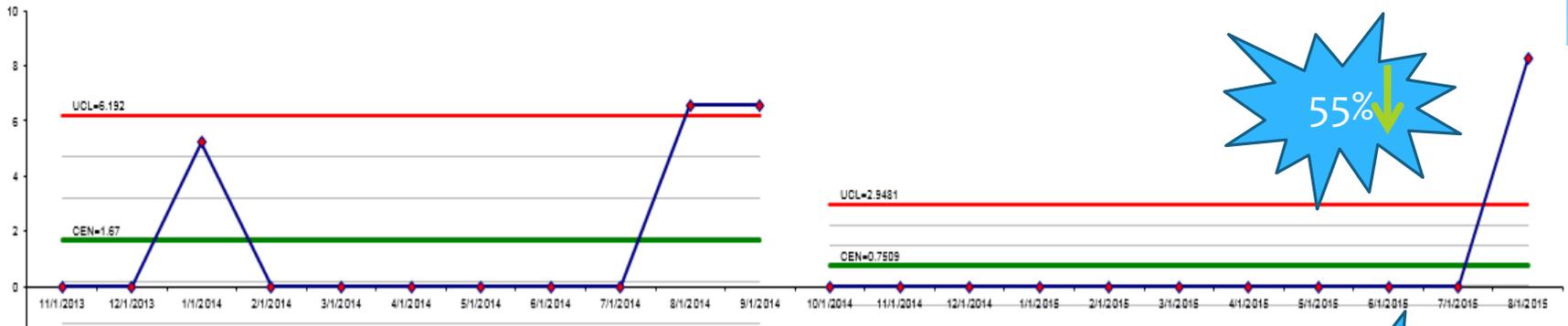
Critical Care Skills Labs

- * Skills Lab station based off of Audits
- * Content
 - * 30-45 min station
 - * New Kit overview
 - * Hands-on & Interactive
 - * Conversations about CAUTI prevention
- * Updates on improvement and performance in CCC
- * Observing metrics that need consistent attention

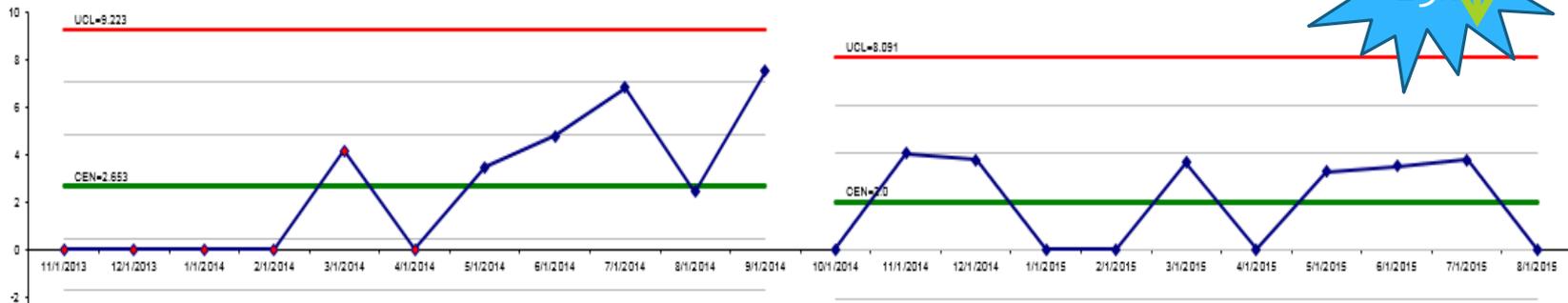


Critical Care and CVICU

CVICU CAUTI Rates Per 1,000 Device Days



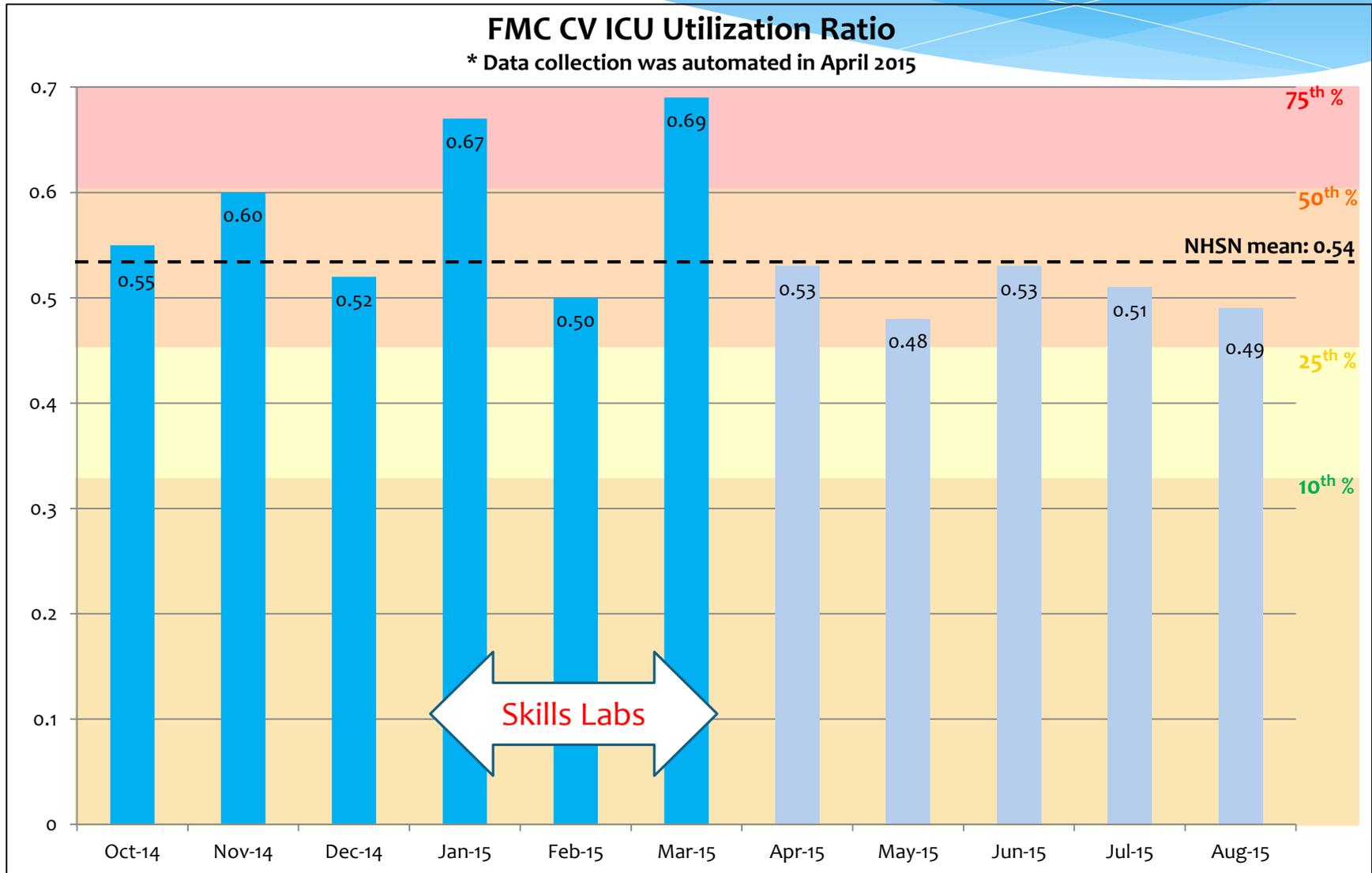
ICU N/S CAUTI Rates Per 1,000 Device Days



FMC Urinary Catheter Focus Study

Urinary Catheter Utilization Benchmarks

Oct2014 - Aug2015
Data source: IP-CVD

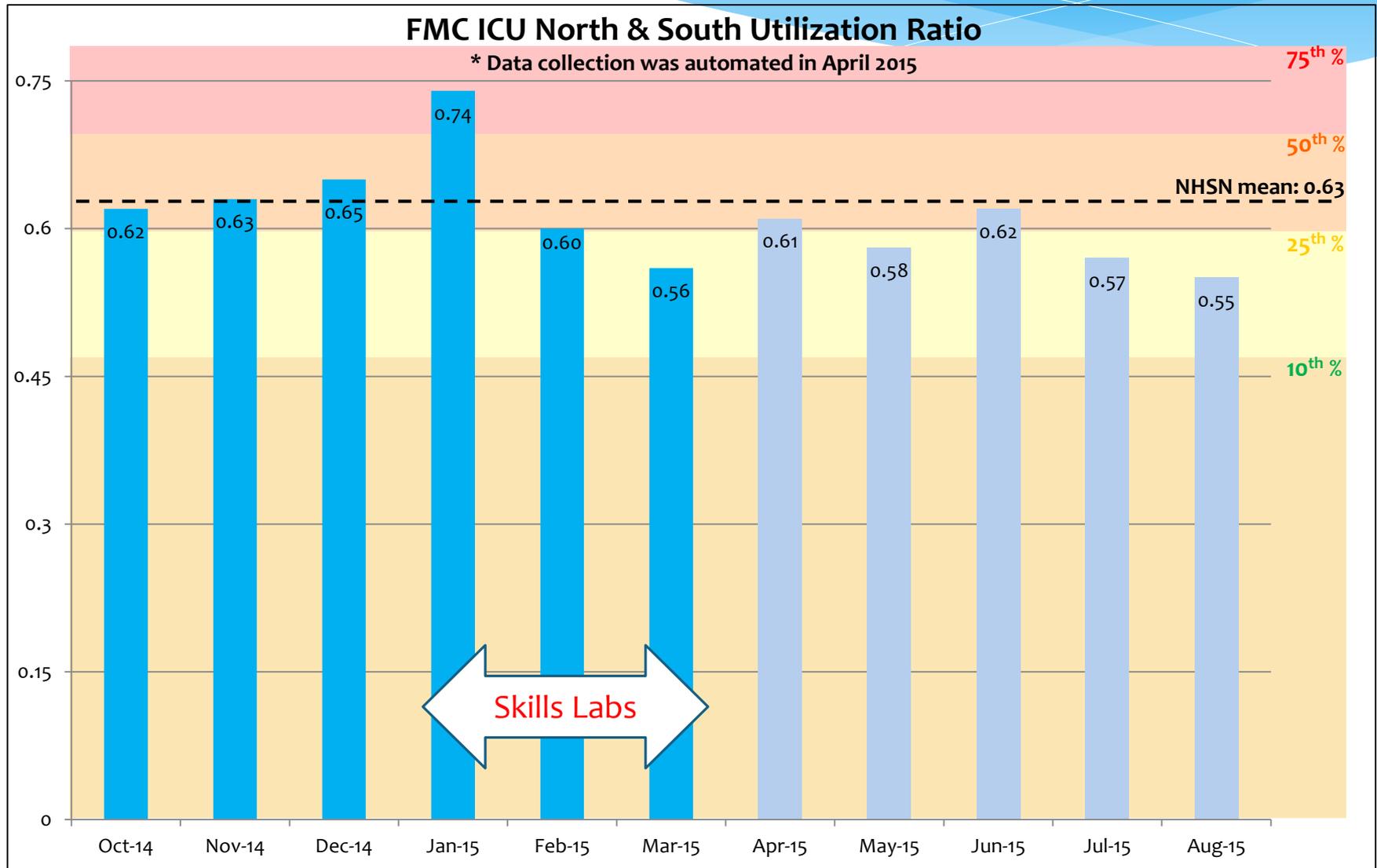


Benchmarks source: NHSN Report, Data summary for 2013, Device associated module. Posted online March 2015.

FMC Urinary Catheter Focus Study

Urinary Catheter Utilization Benchmarks

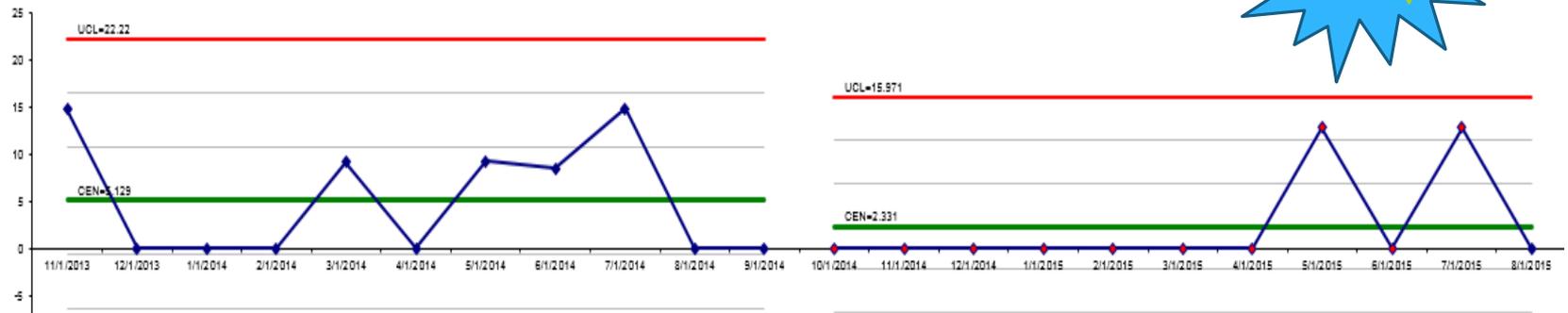
Oct2014 - Aug2015
Data source: IP-CVD



Benchmarks source: NHSN Report, Data summary for 2013, Device associated module. Posted online March 2015.

Stepdown Unit

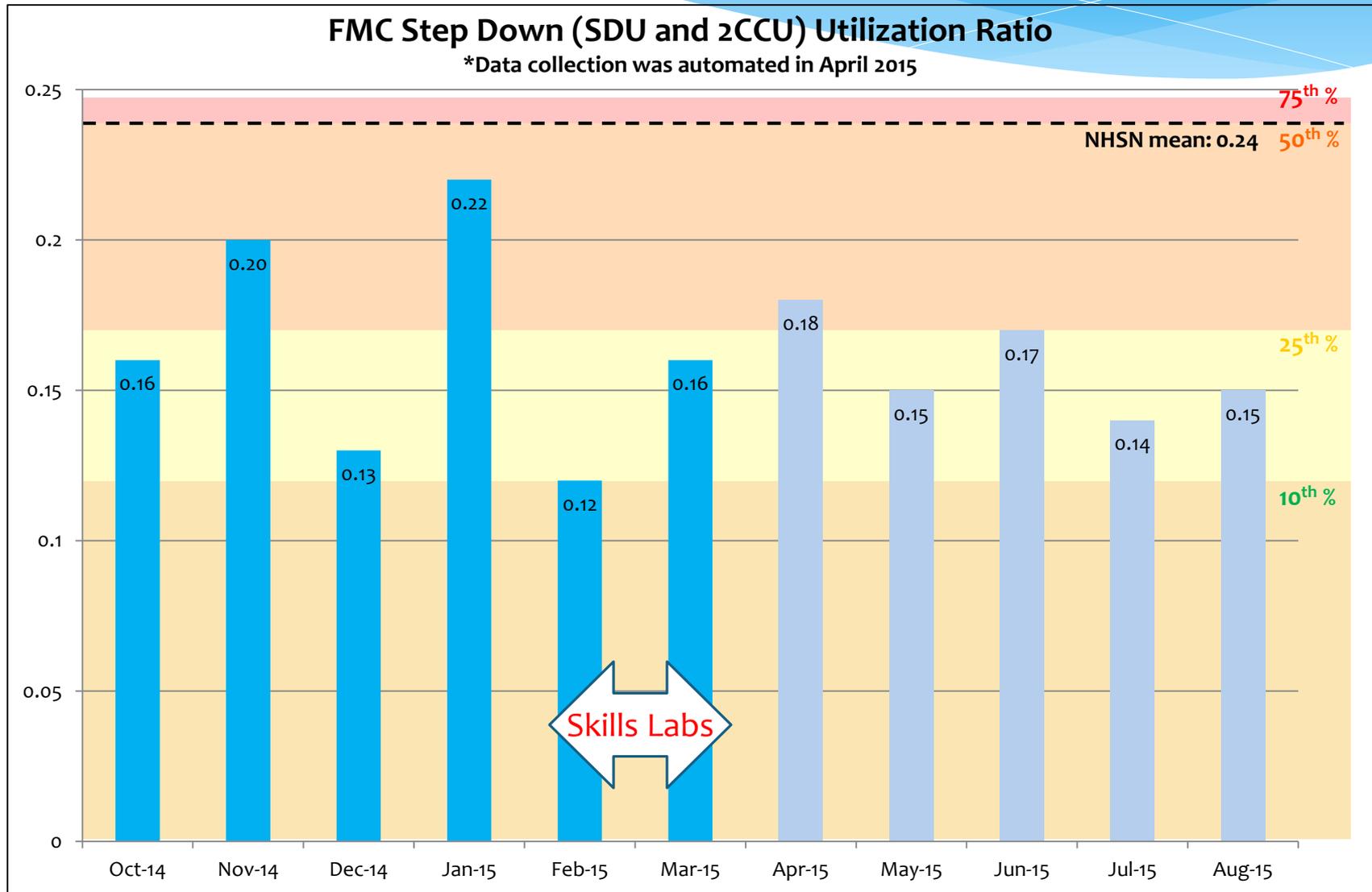
SDU CAUTI Rates Per 1,000 Device Days



FMC Urinary Catheter Focus Study

Urinary Catheter Utilization Benchmarks

Oct2014 - Aug2015
Data source: IP-CVD



Benchmarks source: NHSN Report, Data summary for 2013, Device associated module. Posted online March 2015.

Medical/Surgical/Telemetry (MST) Unit structure

5 Medical/Surgical/Telemetry Floors

- * 3 West
- * 3 South
- * Humphreys (N/S)
- * 2 East/Short Stay
- * 3 North

Registered Nurse/Patient Ratios

- * Days vs Night

MST Receptiveness to EBP

- * Desire to do what is best for the patient
- * Time is often a constraint
 - * RNs want the information but struggle with having the time for it

Pre-Implementation Strengths & Weaknesses

- * Historical view
 - * The other units
 - * 3N
- * The Good, Bad & the Ugly
 - * Good – facility support for protocols
 - * Bad – do not execute the protocols predictably
 - * Ugly – removing catheters at end of shift



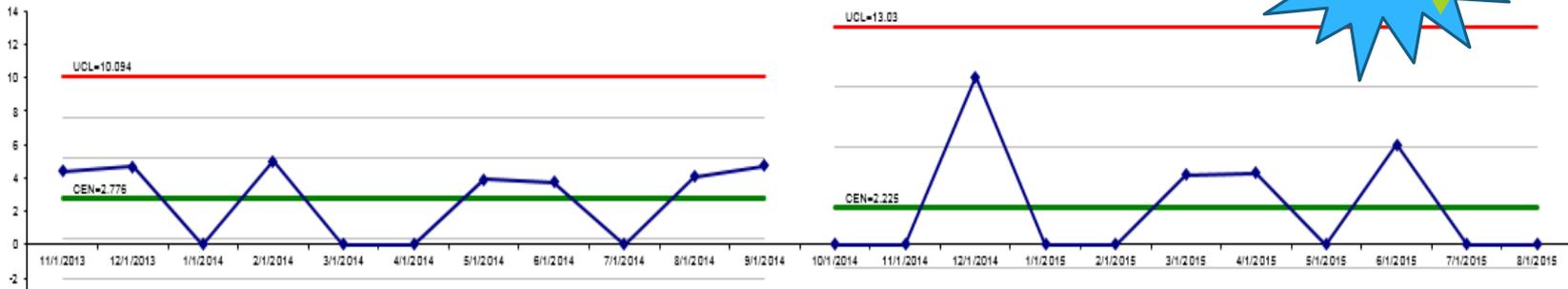
Education and Opportunities for Improvement (OFIs)

- * Management involvement
- * Peer Audits
- * Educators showing the staff the “so what factors”

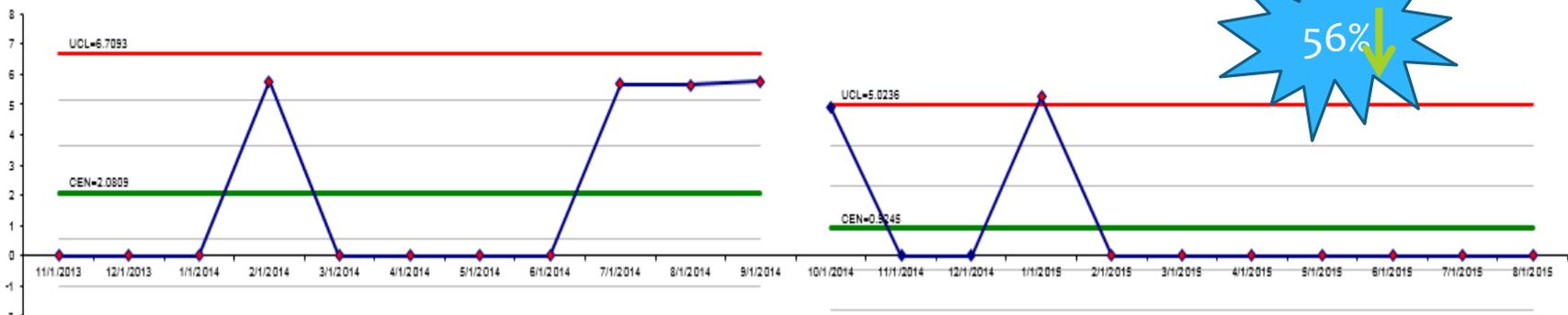
- * OFIs
 - * Peer to Peer accountability

Medical Surgical/Telemetry and Orthopedic Units

Med/Surg CAUTI Rate per 1,000 Device Days



Ortho CAUTI Rate per 1,000 Device Days



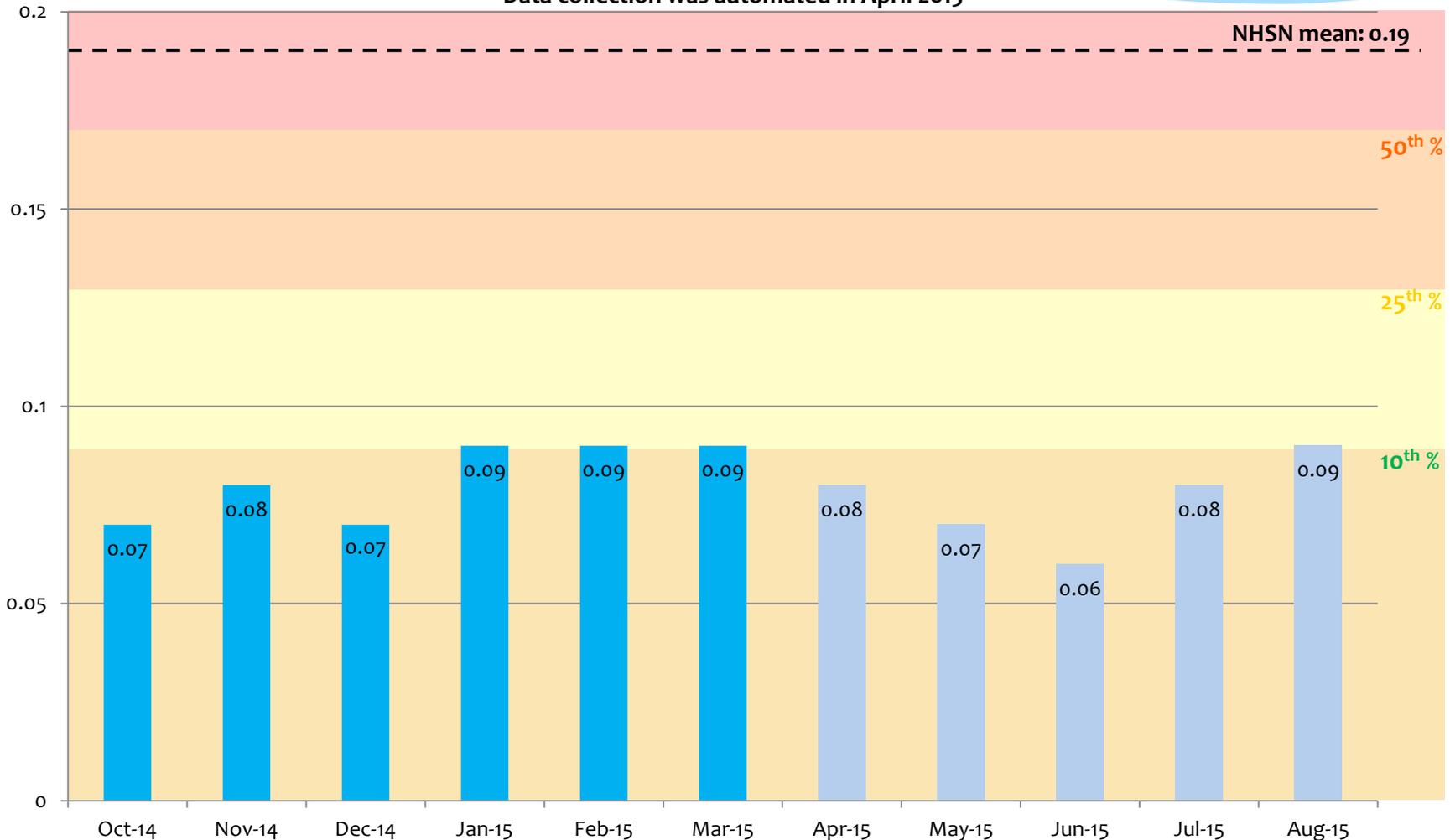
FMC Urinary Catheter Focus Study

Urinary Catheter Utilization Benchmarks

Oct2014 - Aug2015
Data source: IP-CVD

FMC Med-Surg Utilization Ratio (excludes 3N)

*Data collection was automated in April 2015

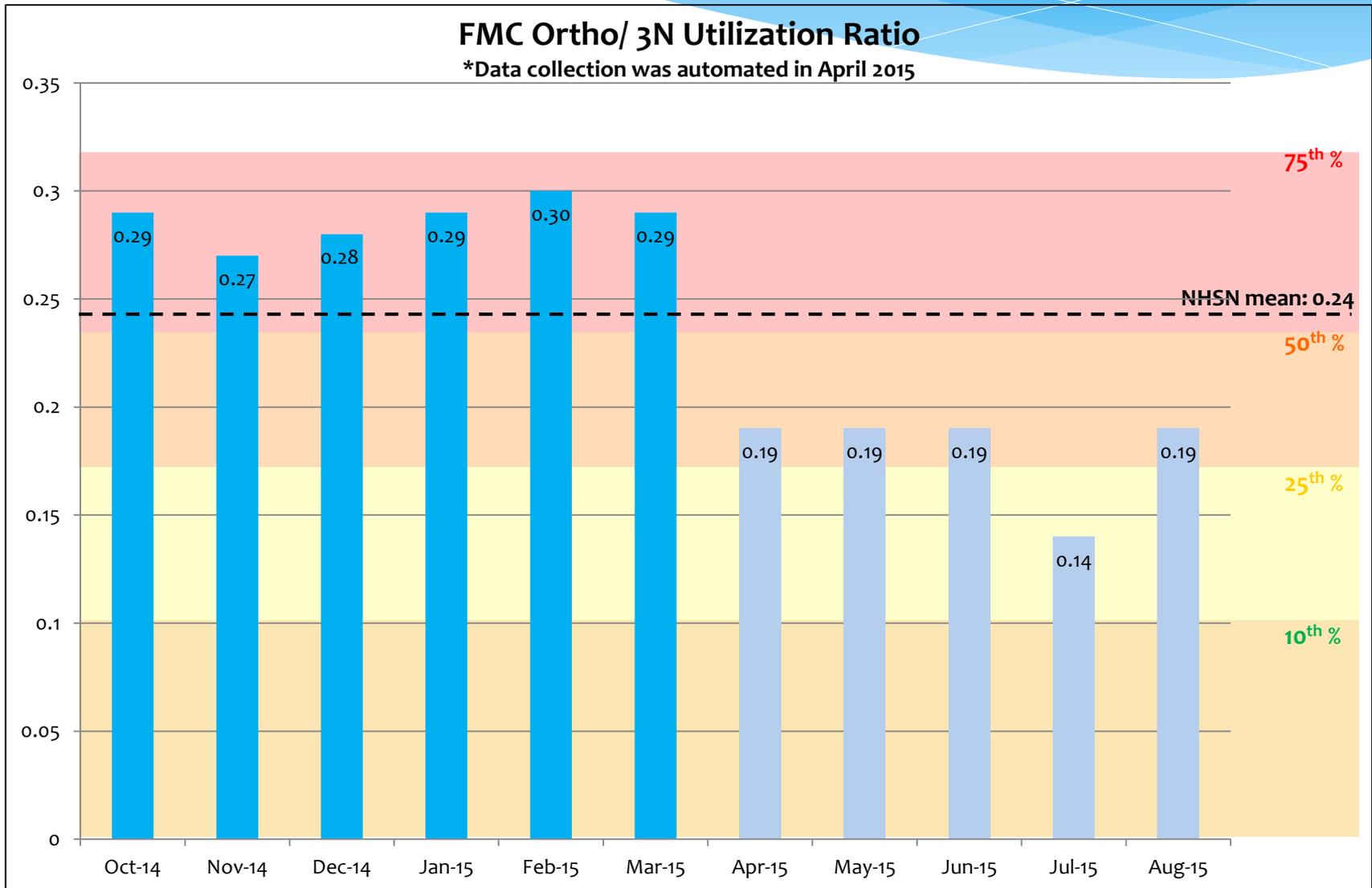


Benchmarks source: NHSN Report, Data summary for 2013, Device associated module. Posted online March 2015.

FMC Urinary Catheter Focus Study

Urinary Catheter Utilization Benchmarks

Oct2014 - Aug2015
Data source: IP- CVD



Benchmarks source: NHSN Report, Data summary for 2013, Device associated module. Posted online March 2015.

Lessons Learned Throughout the Journey

- * LSS and EBP tools are easily integrated to achieve practice and process improvement
- * Multiple PDSAs are implemented as part of practice and process change
- * Amazing interdepartmental teamwork is essential to move an organization forward
- * Highly skilled EBP mentors improve staff engagement and explain the “whys”
- * Clear expectations of staff and real-time education are key in promoting practice change



Overall Wins for the Facility

- * Minimized clutter of kits and products – streamlined!!
- * CAUTI Awareness & staff involvement
- * Clear resources for catheter practices (clinical educators)
- * Decrease in utilization ratio throughout the hospital



**DEMAND
EVIDENCE
AND
THINK
CRITICALLY**





References

- * Agency for Healthcare Research and Quality. (2014). *On the CUSP: stop CAUTI implementation guide*. Retrieved from <http://www.hret.org/quality/projects/stop-uti.shtml>
- * Association for Professionals in Infection Control and Epidemiology. (2014). *Guide to preventing catheter-associated urinary tract infections*. Retrieved from http://apic.org/Resource/_EliminationGuideForm/off6ae59-0a3a-4640-97b5-eee38b8bed5b/File/CAUTI_o6.pdf
- * Blanchard, J. (2011). Use of indwelling urinary catheters for perioperative patients. *AORN Journal*, 93(1), 165-171.
- * Elpern, E. H., Killeen, K., Ketchem, A., Wiley, A., Patel, G., & Lateef, O. (2009). Reducing use of indwelling urinary catheters and associated urinary tract infections. *American Journal of Critical Care*, 18. (6), 535-541. doi: 10.4037/ajcc2009938
- * Fakih, M. G., Krein, S. L., Edson, B., Watson, S. R., Battles, J. B., & Saint, S. (2014). Engaging health care workers to prevent catheter-associated urinary tract infection and avert patient harm. *American Journal of Infection Control*, 42, S223-S229. doi:10.1016/j.ajic.2014.03.355.
- * Fink, R., Gilmartin, J., Richard, A., Capezuti, R. Boltz, M. & Wald H. (2012). Indwelling urinary catheter management and catheter-associated urinary tract infection prevention practices in Nurses Improving Care for Healthsystem Elders hospitals. *American Journal of Infection Control*, 40, 715-720.



References

- * Gokula, M., Smolen, D., Gasper, P. M., Hensley, S. J., Benninghoff, M. C., & Smith, M. (2012). Designing a protocol to reduce catheter-associated urinary tract infections among hospitalized patients. *American Journal of Infection Control*, 40, 1002-1004. doi:10.1016/j.ajic.2011.12.013
- * Halm, M. A. & O'Connor, N. (2014). Do system-based interventions affect catheter-associated urinary tract infection? *American Journal of Critical Care*, 23(6), 505-509.
- * Meddings, J., Rogers, M.A., Krein, S., Fakhri, M., Olmsted, S. (2013). Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: an integrative review. *BMJ Quality and Safety*, 0, 1-13.
- * Meehan, A., & Beinlich, N. (2014). Peer-to-peer learning/teaching: An effective strategy for changing practice and preventing pressure ulcers in the surgical patient. *International Journal of Orthopedic and Trauma Nursing*, 18, 122-128. doi:10.1016.org/10.1016/j.ijotn.2013.12.004
- * Melnyk, B. M. & Fineout-Overholt, E. (2nd ed.). (2011). *Evidence-based practice in nursing and healthcare*. Philadelphia: Wolters Kluwer.
- * Oman, K. S., Makic, M., Fink, R., Schraeder, N., Hulett, T., Keech, T., & Wald, H. (2012). Nurse-directed interventions to reduce catheter-associated urinary tract infections. *American Journal of Infection Control*, 40, 548-553.