

# Experimenting with New Systems of Care to Improve Patient Safety

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# Disclosures

- None



# Objectives

- Appreciate the need for new models of care to achieve sustainable improvements in infection prevention and antimicrobial stewardship
- List examples of changes that could be made in your organization to promote safer healthcare
- Identify strategies to address barriers to implementation of organizational changes





# Common reasons that Quality Improvement initiatives fail

- Failure to match solution to the problem
  - Layers added to existing system of care
  - Looking for “buy-in”
  - Increased workload of staff
  - Lack of iterative refinement
- 



# Building sustainability into the system design

- Co-creation with key stakeholders
- Targeted change
- Leverages hierarchy of effectiveness
- Promotes working smarter, not harder



# Let's get to some examples...





# Treatment of asymptomatic bacteriuria





# Treatment of asymptomatic bacteriuria

- Among most common reasons for unnecessary antimicrobial use – across primary care, acute care and long-term care
- No benefit - 6 randomized controlled trials
- Significant harms
  - Antimicrobial resistance
  - *C. difficile* infection - 8-fold risk in long-term care

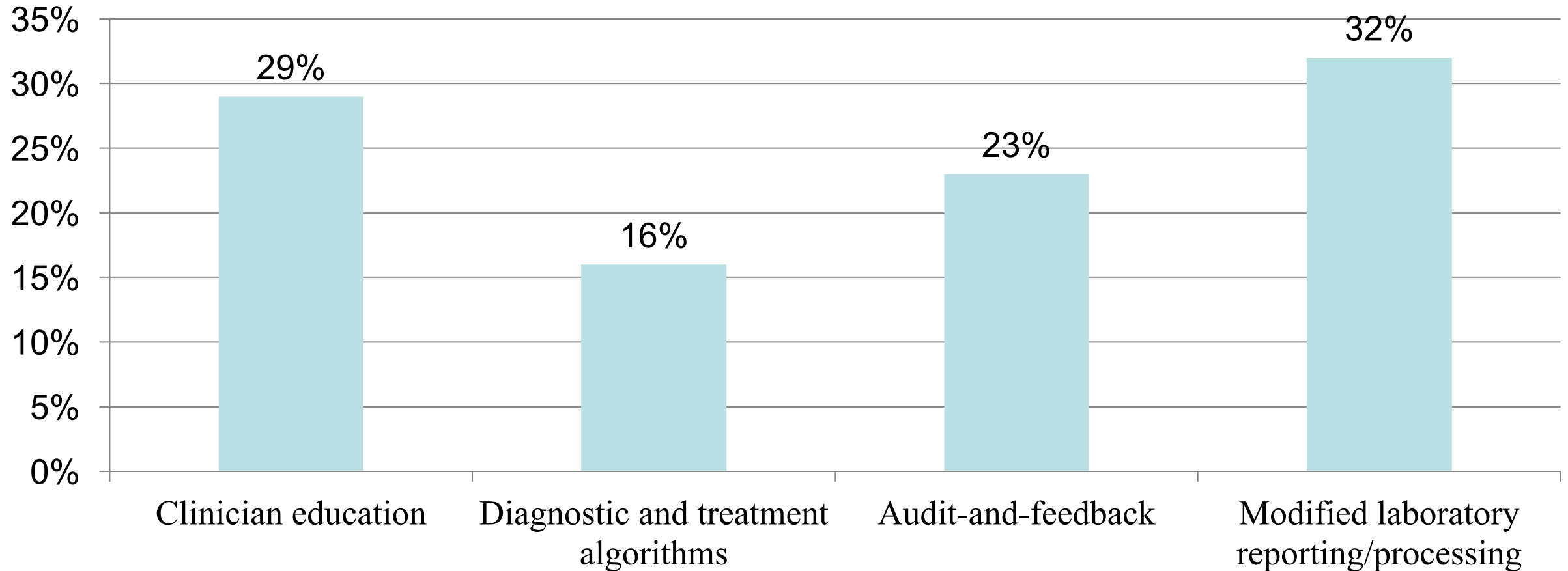


# Which best describes your hospital's current approach to reducing treatment of asymptomatic bacteriuria?

1. Clinician education
2. Diagnostic and treatment algorithms
3. Audit-and-feedback
4. Modified laboratory reporting/processing



## Which best describes your hospital's current approach to reducing treatment of asymptomatic bacteriuria?



# Challenging the “Culture of Culturing”

- Treatment of ASB is actually a urine culture problem
- Educational interventions have had limited impact and struggled with sustainability



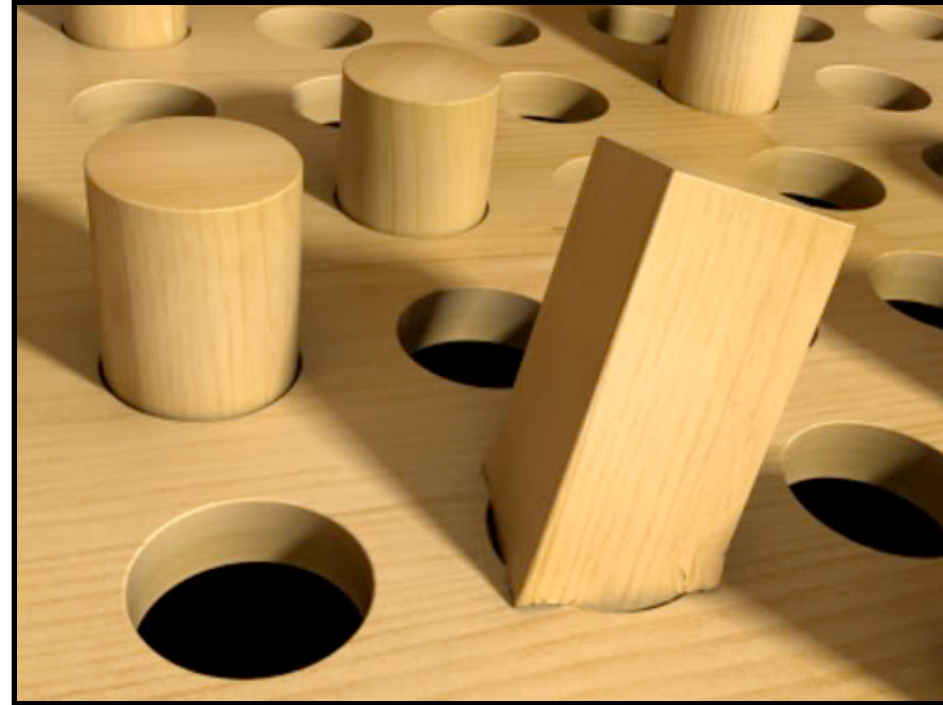
# Urine cultures in the ED: the same old strategies

- Raising awareness
- Staff education/training
- Diagnostic algorithms
- Pop-up messages

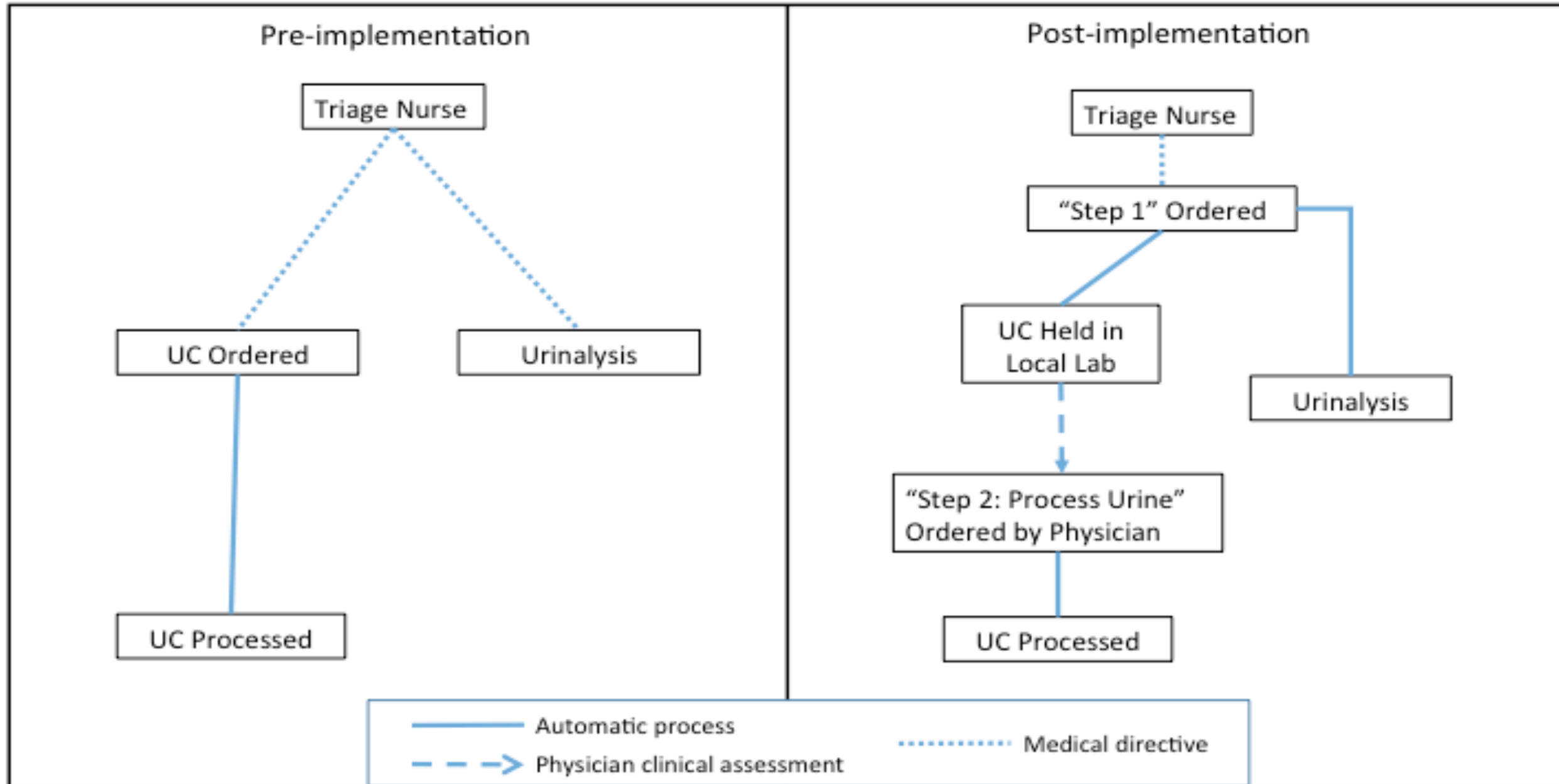


# Matching the solution to the problem

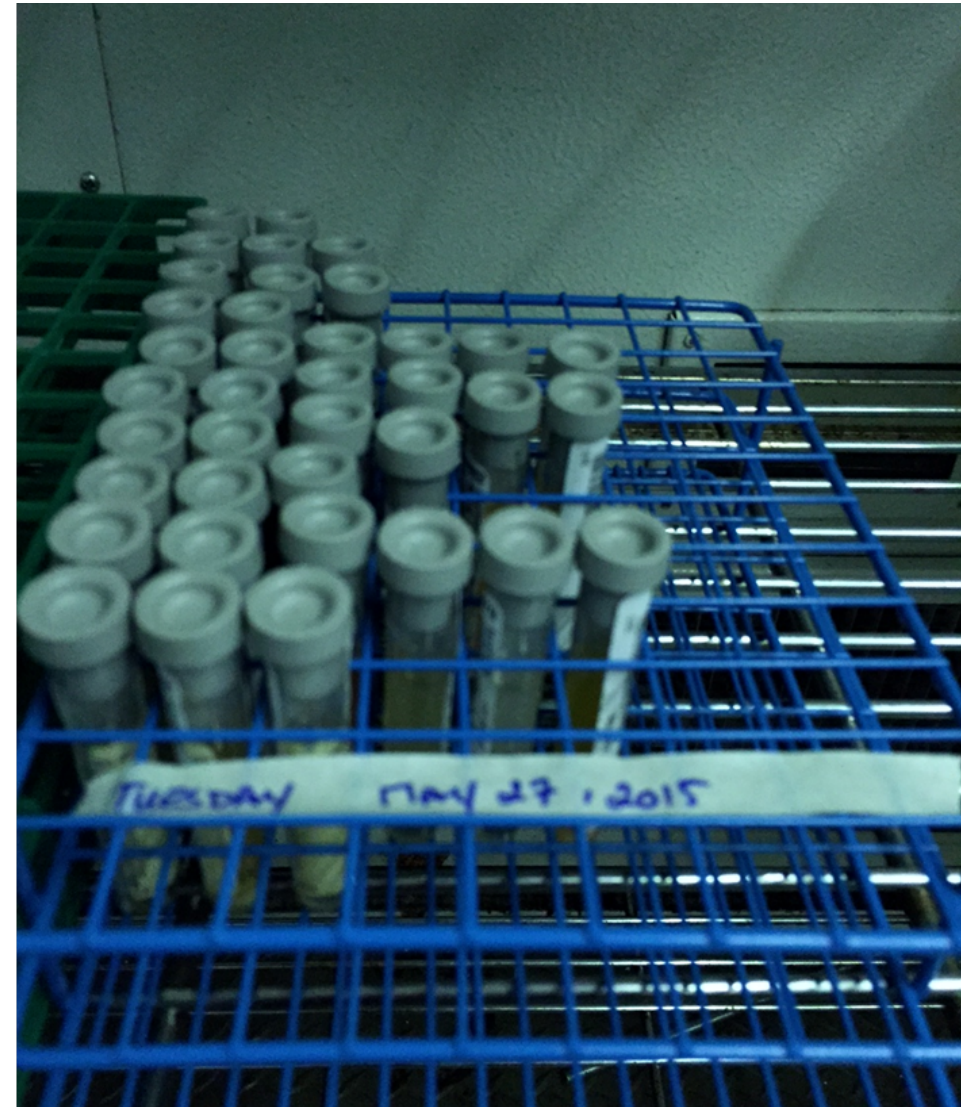
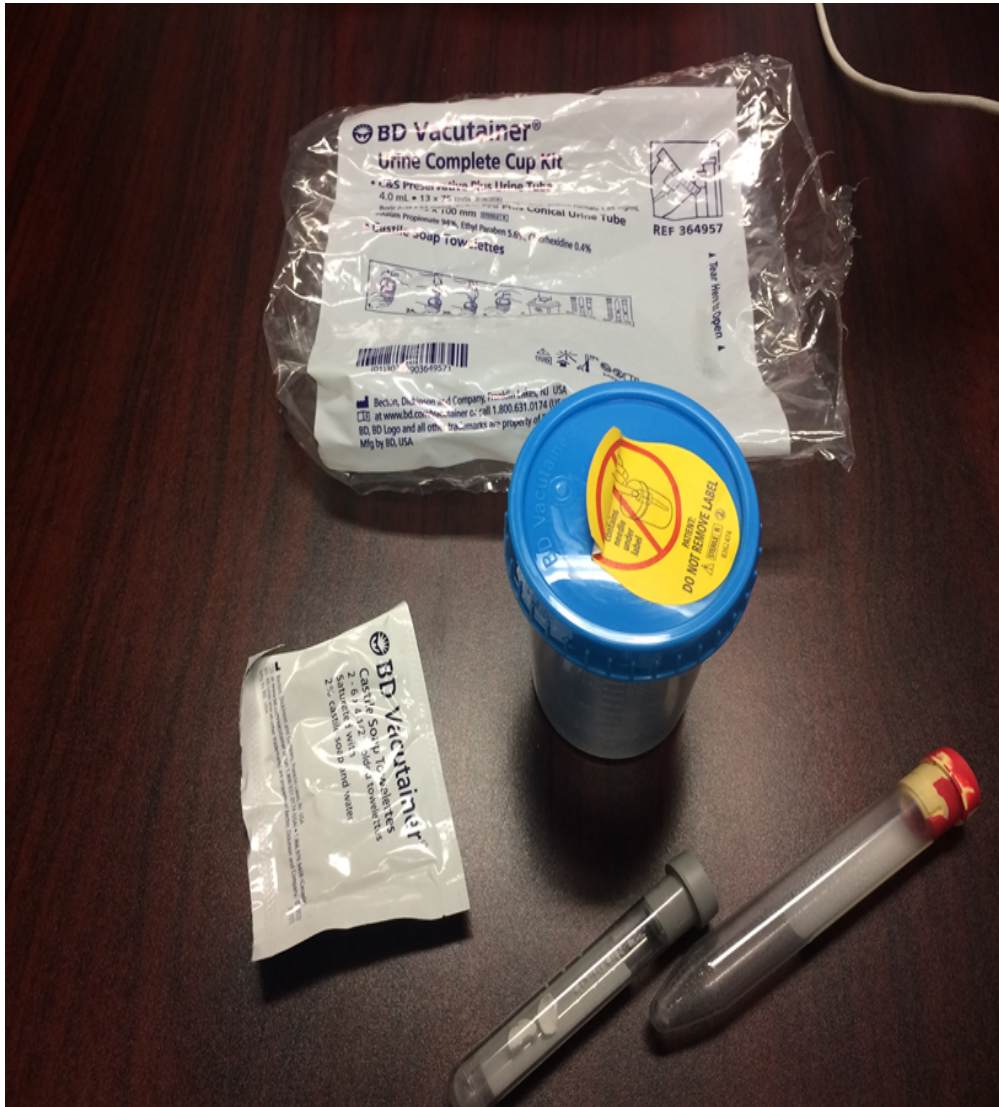
- Urine cultures are pre-emptively collected in the Emergency Department for non-specific indications, to facilitate subsequent patient management

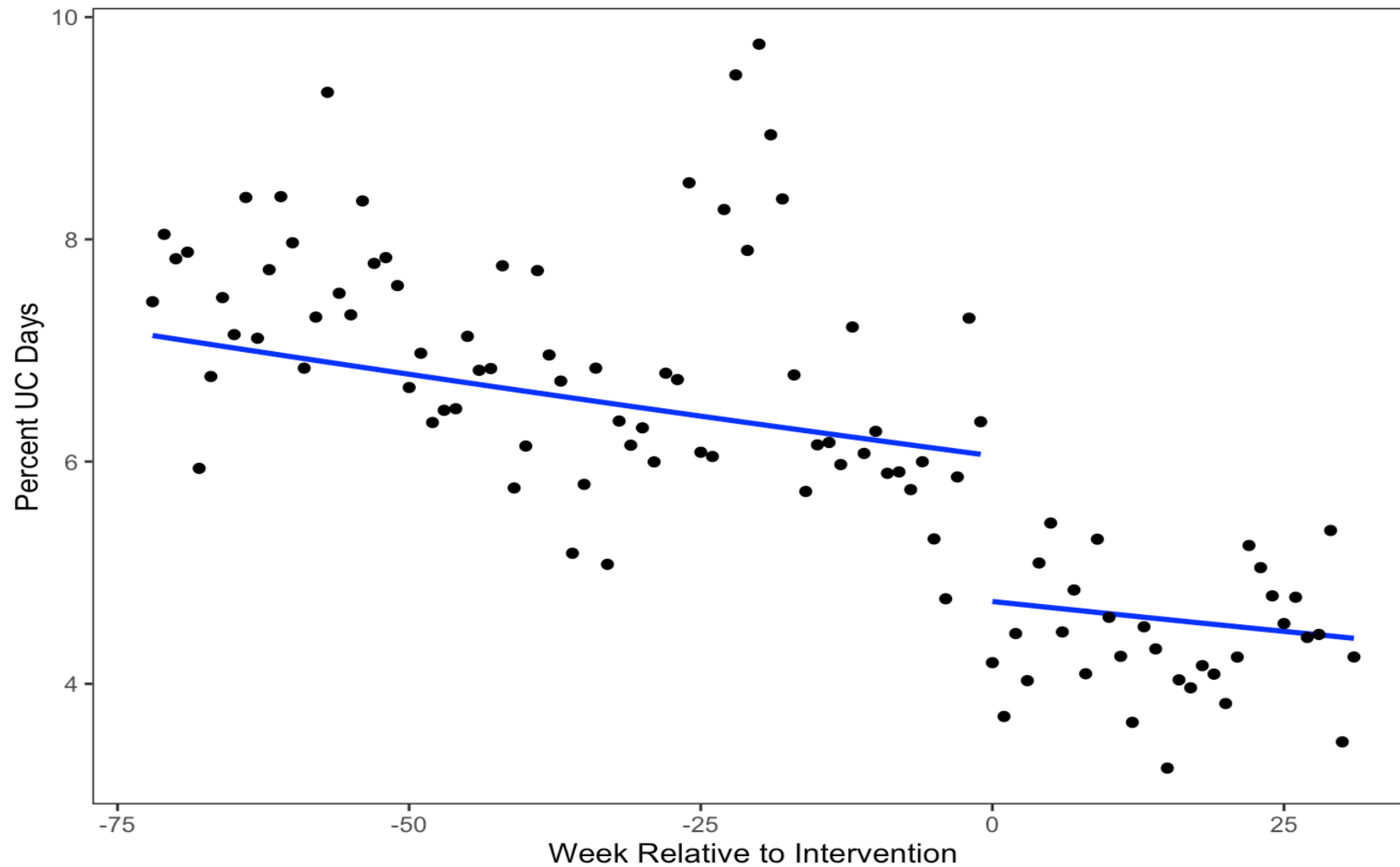


# System re-design at Michael Garron Hospital









# Sustained change in practice

Outcome	Baseline	Intervention	p value
Weekly ED Urine Culture (%)	5.97	4.68	<.001
Monthly ED callback (%)	1.84	1.12	<.001
Monthly overall antibiotic treatment (% admitted patients)*	61.0	49.1	.02
Monthly antibiotic treatment for UTI (% admitted patients)*	20.6	10.9	<0.01

\* Chart abstraction of 1-month



# Balancing measures

Measure	Baseline	Intervention	p value
Repeat ED visit within 7-days (%)	10.6	10.6	0.2
ED Length of Stay (hours)	5.4	5.1	0.07
False omission rate (%)	2.3-4.7*	1.3 (0.7-2.2)	

\* Jones et al, *J Emerg Med* 2014;46(1):71-76.  
Hertz et al, *Am J Emerg Med* 2015; 33(12):1838-39



# What are the key “ingredients” for implementation?

- Computerized Physician Order Entry (CPOE)
- Urine culture collection replaced by the BD Vacutainer plus urine C&S preservative tubes system<sup>©</sup> (New Jersey, USA)
- Urinalysis turnaround time ensuring result available when Emergency physician sees the patient



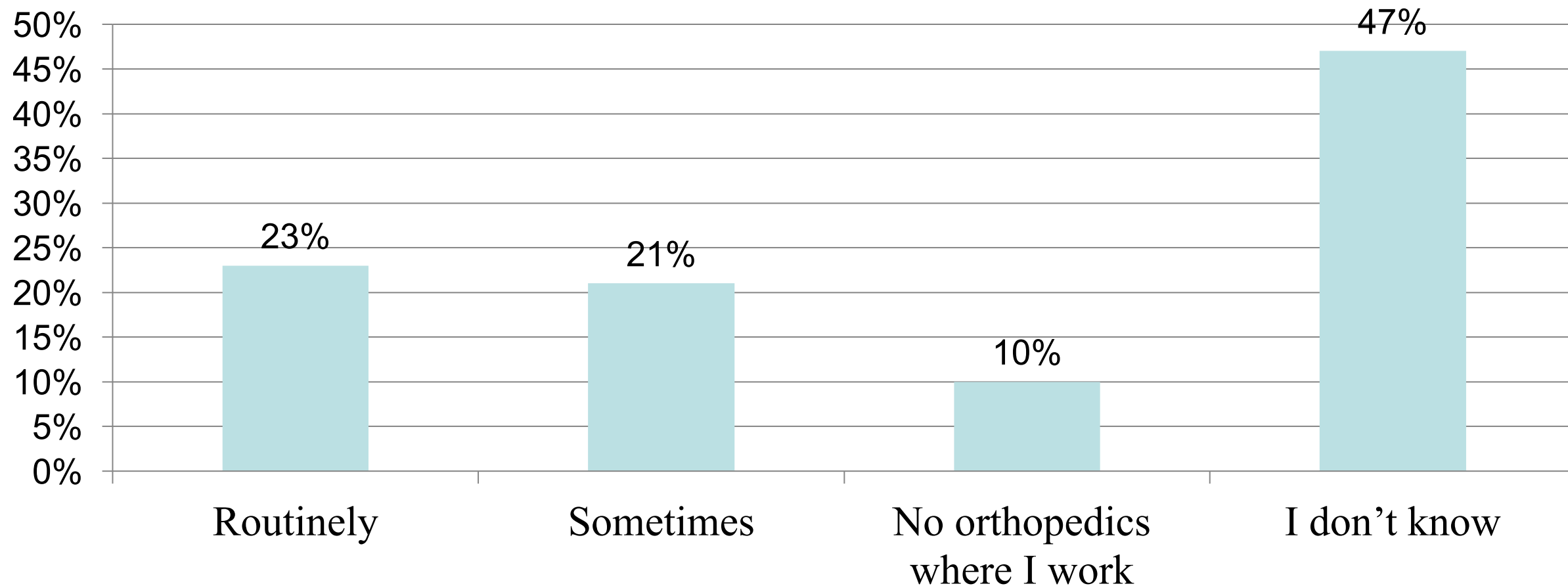


# How often are screening urine cultures performed prior to elective joint arthroplasty at your hospital?

1. Routinely
2. Sometimes
3. No orthopedics where I work
4. I don't know



## How often are screening urine cultures performed prior to elective joint arthroplasty at your hospital?



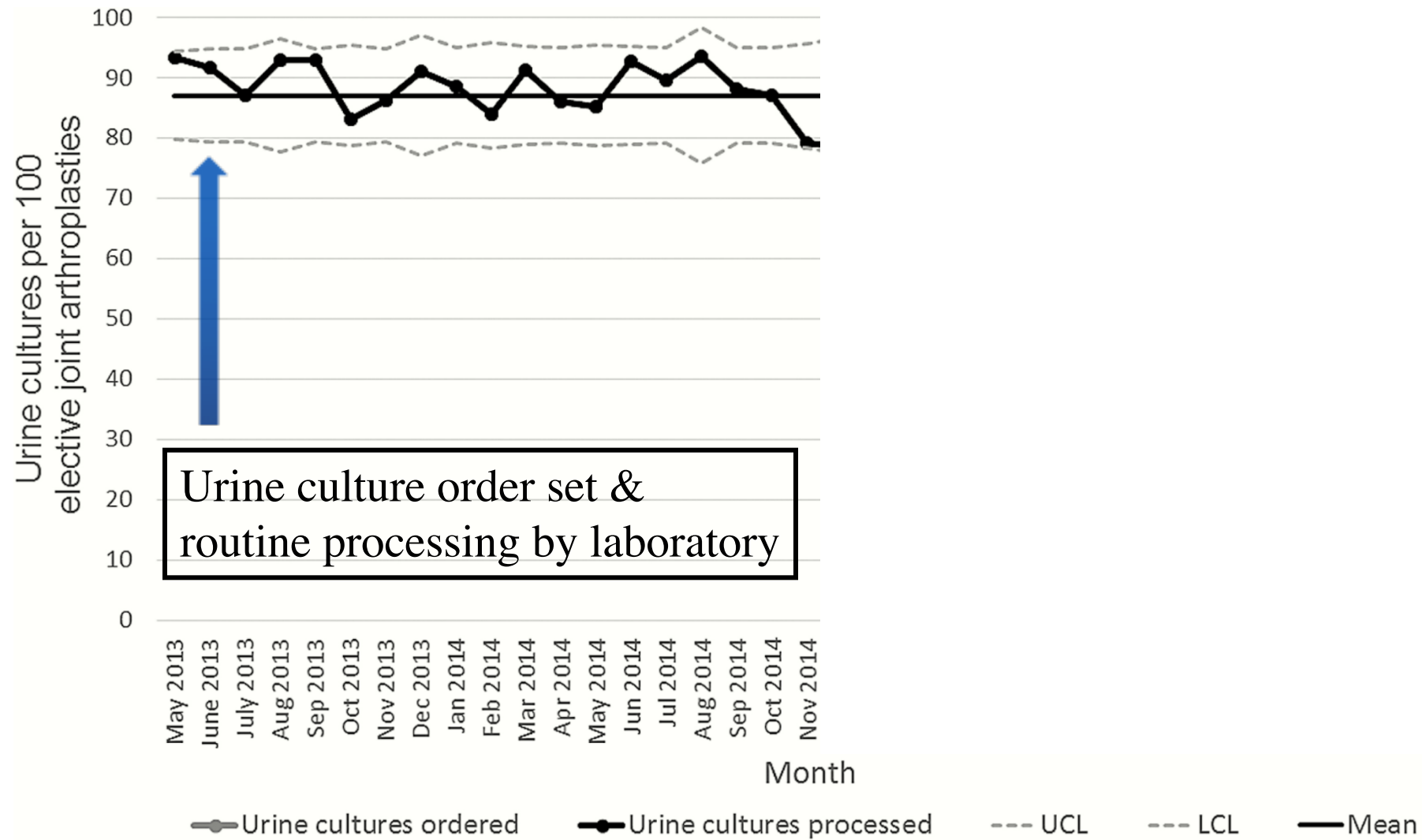


# Screening urine cultures prior to elective joint arthroplasty

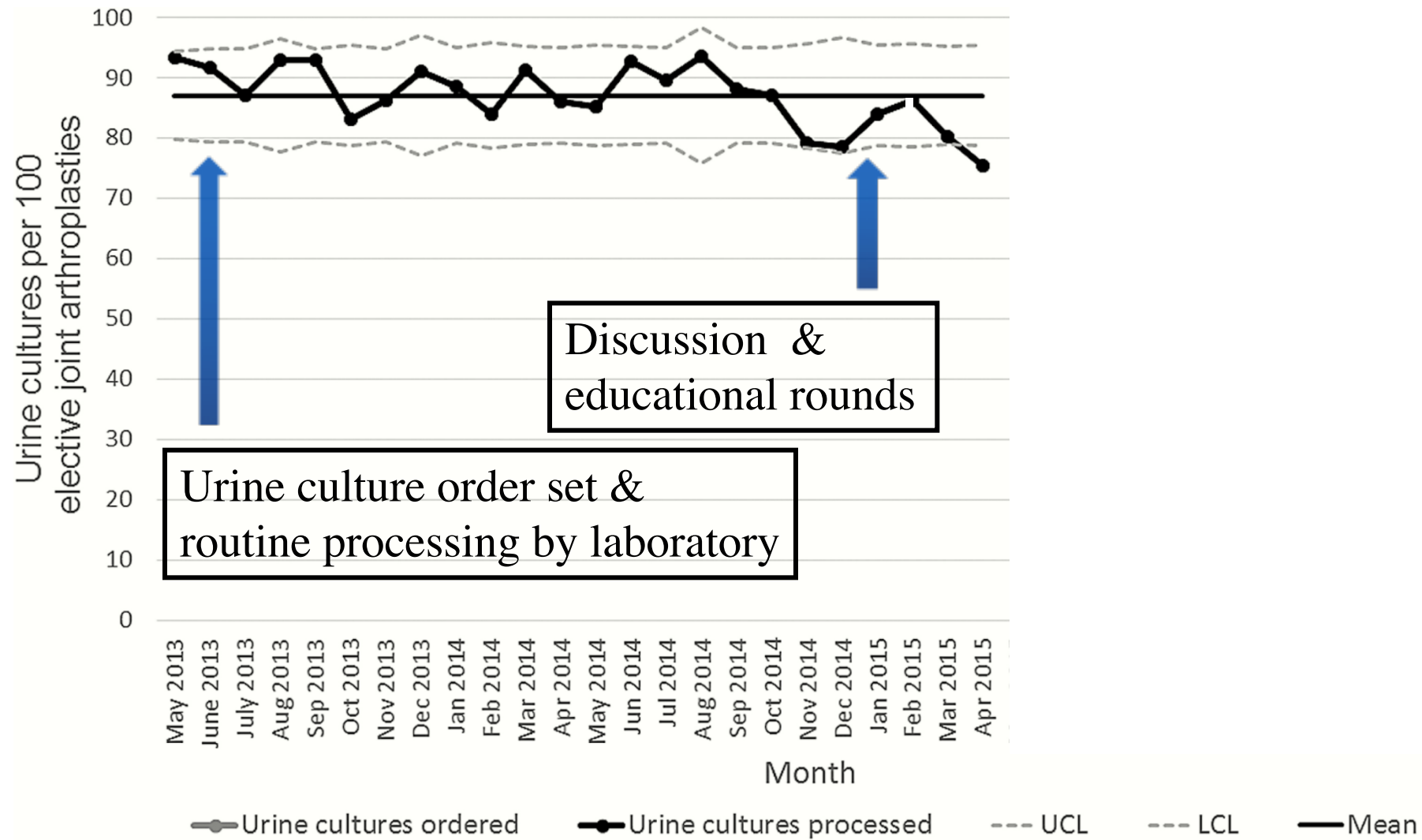
- Screening urine cultures prior to non-urologic surgery remains a common practice
  - Two-thirds of orthopedic surgeons surveyed
- Observational studies suggest that asymptomatic bacteriuria is an independent risk factor for prosthetic joint infection (PJI) but that its treatment does NOT reduce this risk



## Results

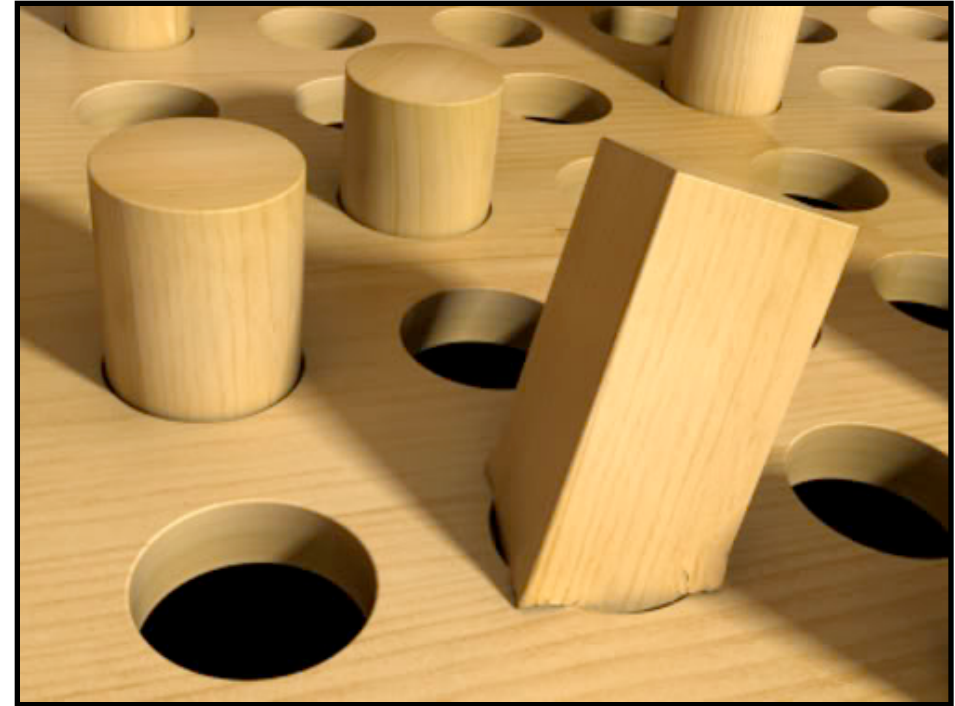


# Results



# Matching the solution to the problem

- In some centres, urine culture screening prior to orthopedic surgery is completely engrained in practice



# New system of care

- Multidisciplinary team developed change in policy, which was approved by preoperative clinic
  - ✓ Urine culture removed from pre-op order-set
  - ✓ Urine specimens resulted with following message

*Routine preoperative urine cultures are not indicated and not processed.  
If specimen was submitted for symptomatic urinary tract infection, call microbiology within 24 hours to request culture*



# Balancing measures – tracked prospectively

- Telephone log of urine culture requests
- Prosthetic joint infection rates
  - 90-days prospective surveillance using CDC/NSHN criteria



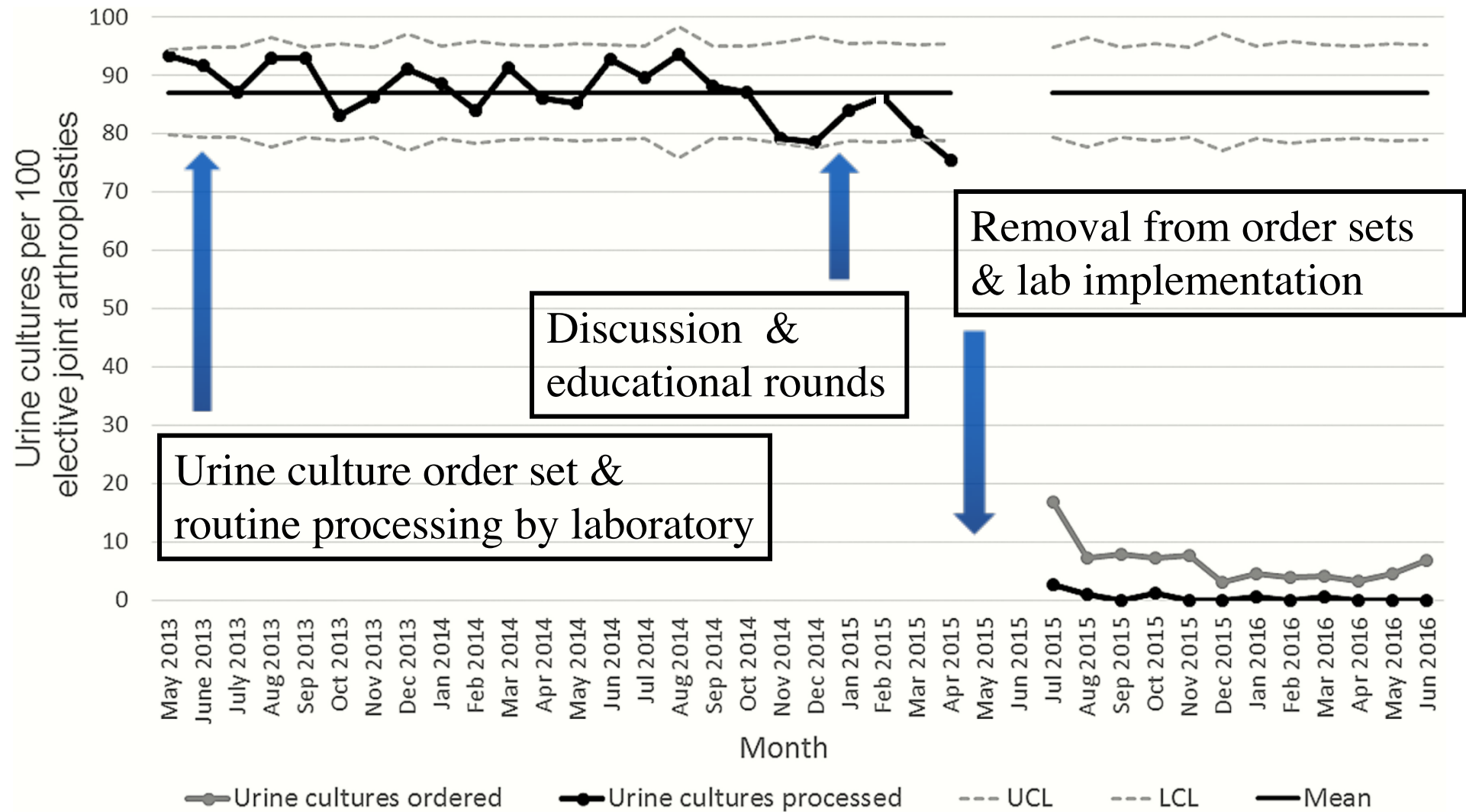
# Results

	Baseline Period	Intervention Period
Characteristic	(n = 3523)	(n = 1891)
Demographics		
Age, y, median	66	67
Female sex, No. (%)	2253 (64)	1191 (63)
Arthroplasty, No. (%)		
Hip	1332 (38)	786 (42)
Knee	2004 (57)	1020 (54)
Shoulder	135 (4)	55 (3)
Other lower limb	8 (0.2)	2 (0.1)
Other upper limb	44 (1)	28 (1)





# Results



# Results

## Screening UC

No. ordered per 100 EJAs	87 (3069/3523)	7 (126/1891)
No. processed per 100 EJAs	87 (3069/3523)	1 (10/1891)
No. positive per 100 EJAs	12 (352/3069)	0 (0/10)

## Clinical outcomes

Inpatient antibiotics per 100 EJAs	1.2 (43/3523)	0 (0/1891)
PJIs per 100 EJAs	0.03 (1/3523)	0.2 (3/1891)

## Microbiology of PJIs, No.

<i>Staphylococcus aureus</i>	0	3
<i>Escherichia coli</i>	1	0
Other	0	0



# Sustained change in practice

- Laboratory system change was highly effective in changing practice while respecting individual clinician autonomy
- Improved antimicrobial stewardship without any significant increase in prosthetic joint infections



# What are the key “ingredients” for implementation?

- Laboratory identification of urine cultures by location (eg. pre-operative clinic)
- Consensus from multidisciplinary team



# Limiting urinary catheter insertions without indication



# Limiting urinary catheter insertions without indication

- Approximately 80% of healthcare-associated UTIs are catheter related
- Between 15-25% of patients are catheterized during their hospital stay
- At least 50% of catheter days lack an appropriate indication



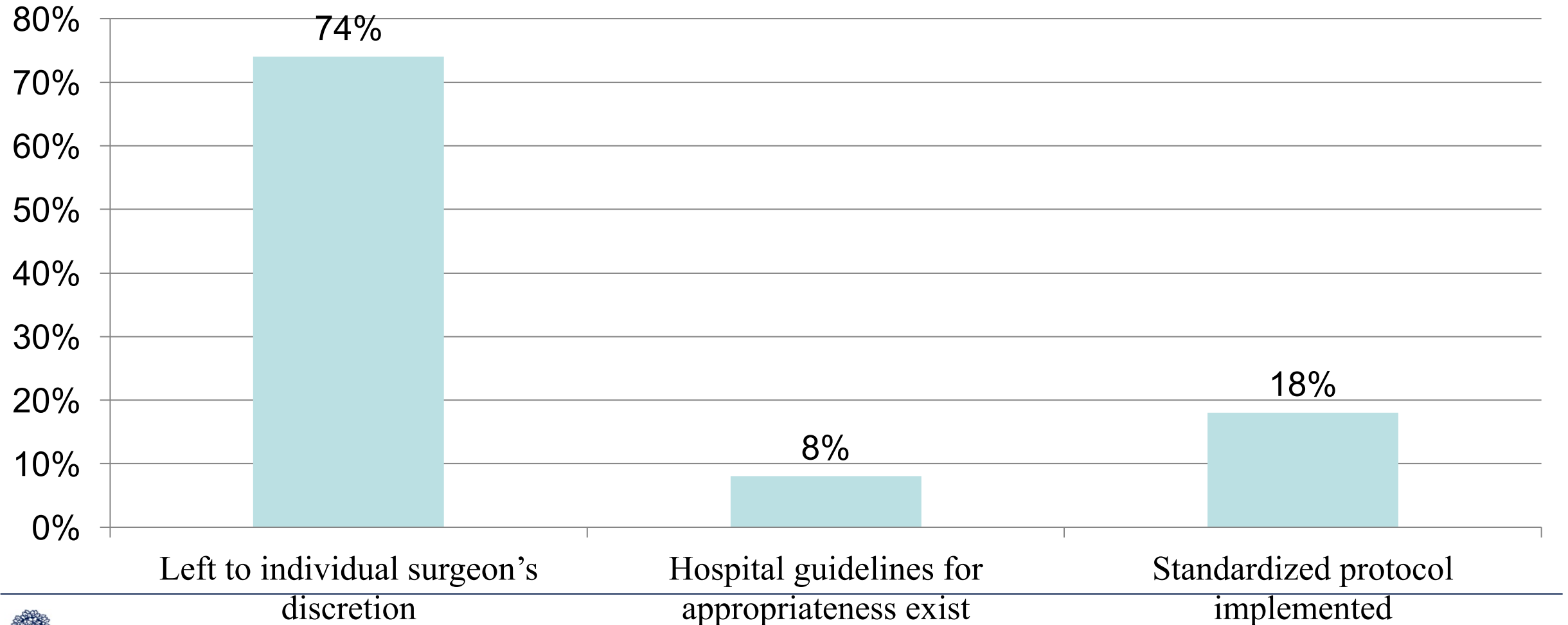
# What is your hospital's current approach to urinary catheter insertions in the Operating Room?

1. Left to individual surgeon's discretion
2. Hospital guidelines for appropriateness exist
3. Standardized protocol implemented





# What is your hospital's current approach to urinary catheter insertions in the Operating Room?



# When to insert a UC in the OR?

## HICPAC guidelines for peri-operative UC use

Undergoing urologic or other surgery on contiguous structures of genitourinary tract

Anticipated prolonged surgery duration; catheters inserted for this reason should be removed in post-anesthesia care unit

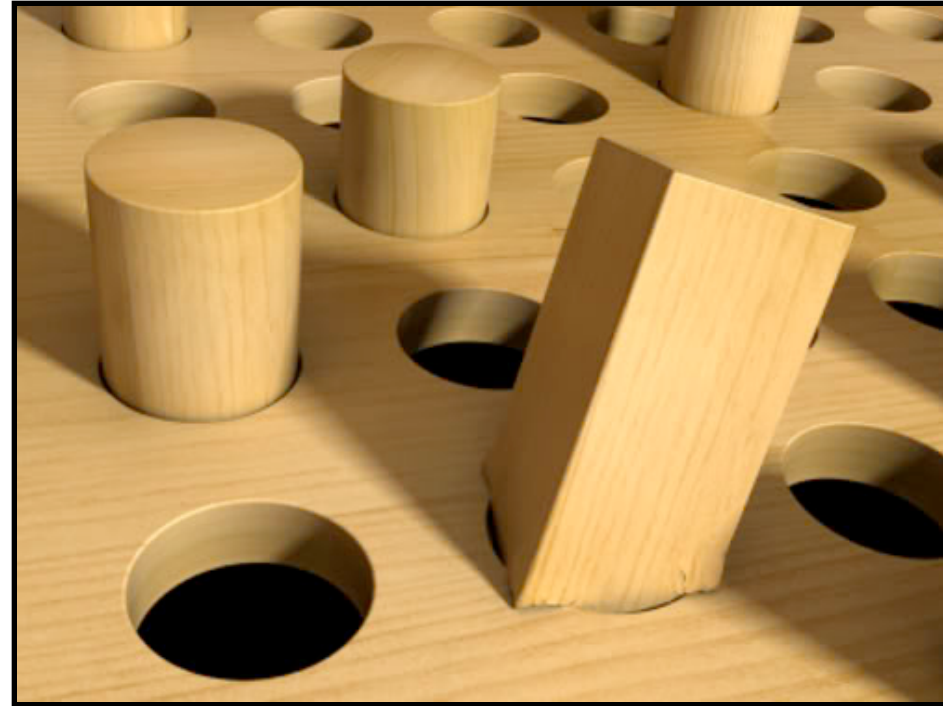
Anticipated to receive large-volume infusions or diuretics during surgery

Need for intraoperative monitoring of urinary output



# Matching the solution to the problem

- Lack of clarity and consensus regarding indications for perioperative urinary catheter use leads to variation in practice



# Achieving consensus

- Large tertiary care trauma centre in Toronto (104 surgeons)
- Five surgical services
  - General surgery
  - Trauma
  - Obstetrics and Gynecology
  - Cardiac and Vascular
  - Orthopedic surgery



## Indications for inserting urinary catheter

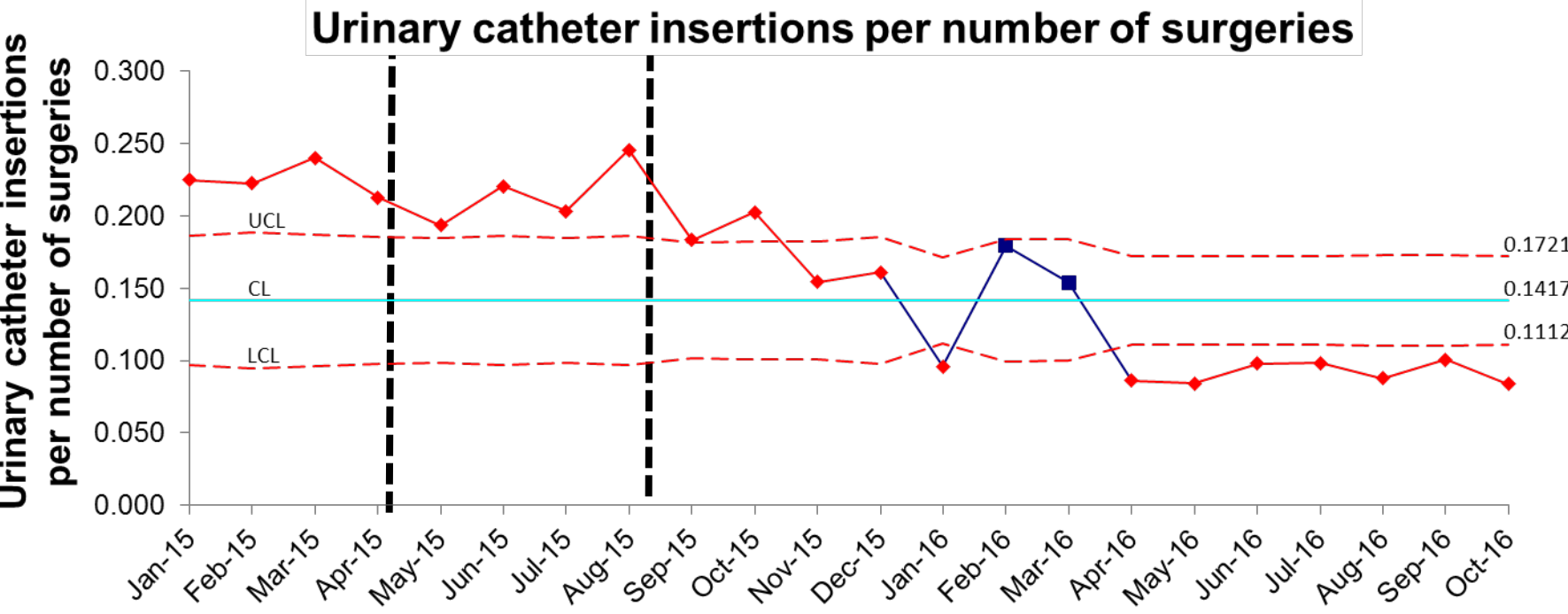
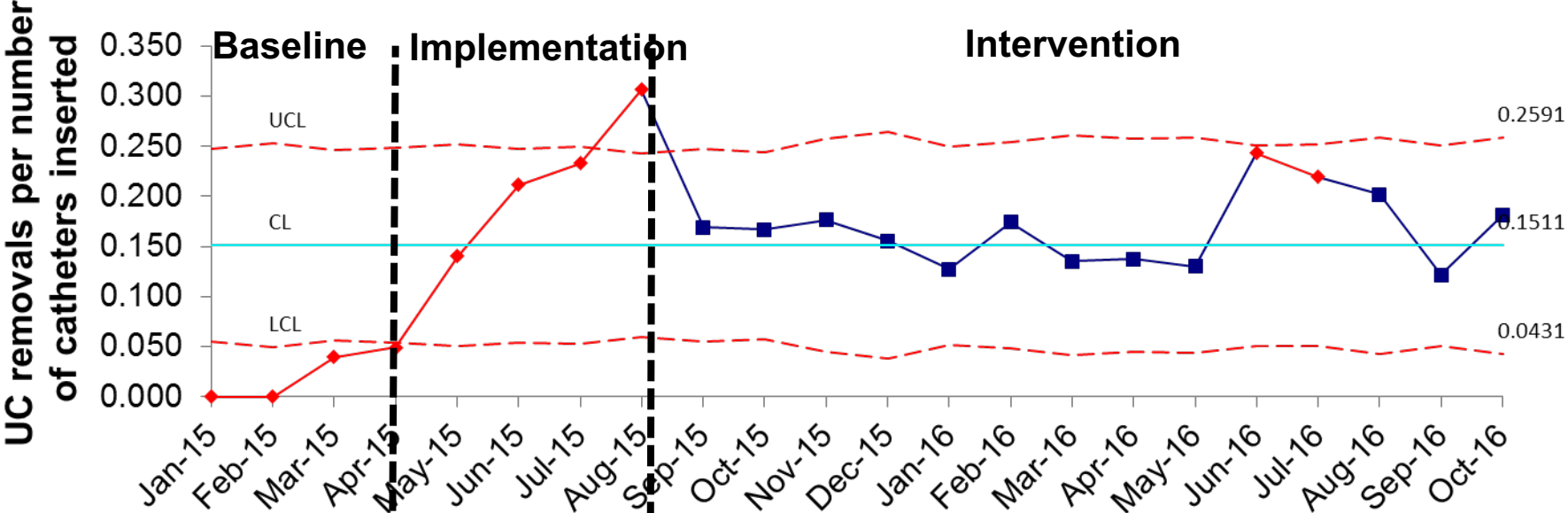
1. Anticipated fluid shifts/blood loss
2. Surgery involving genitourinary tract
3. Surgery anticipated to last greater than 4 hours
4. If one of these indications is met, can the urinary catheter be removed at the end of the case?

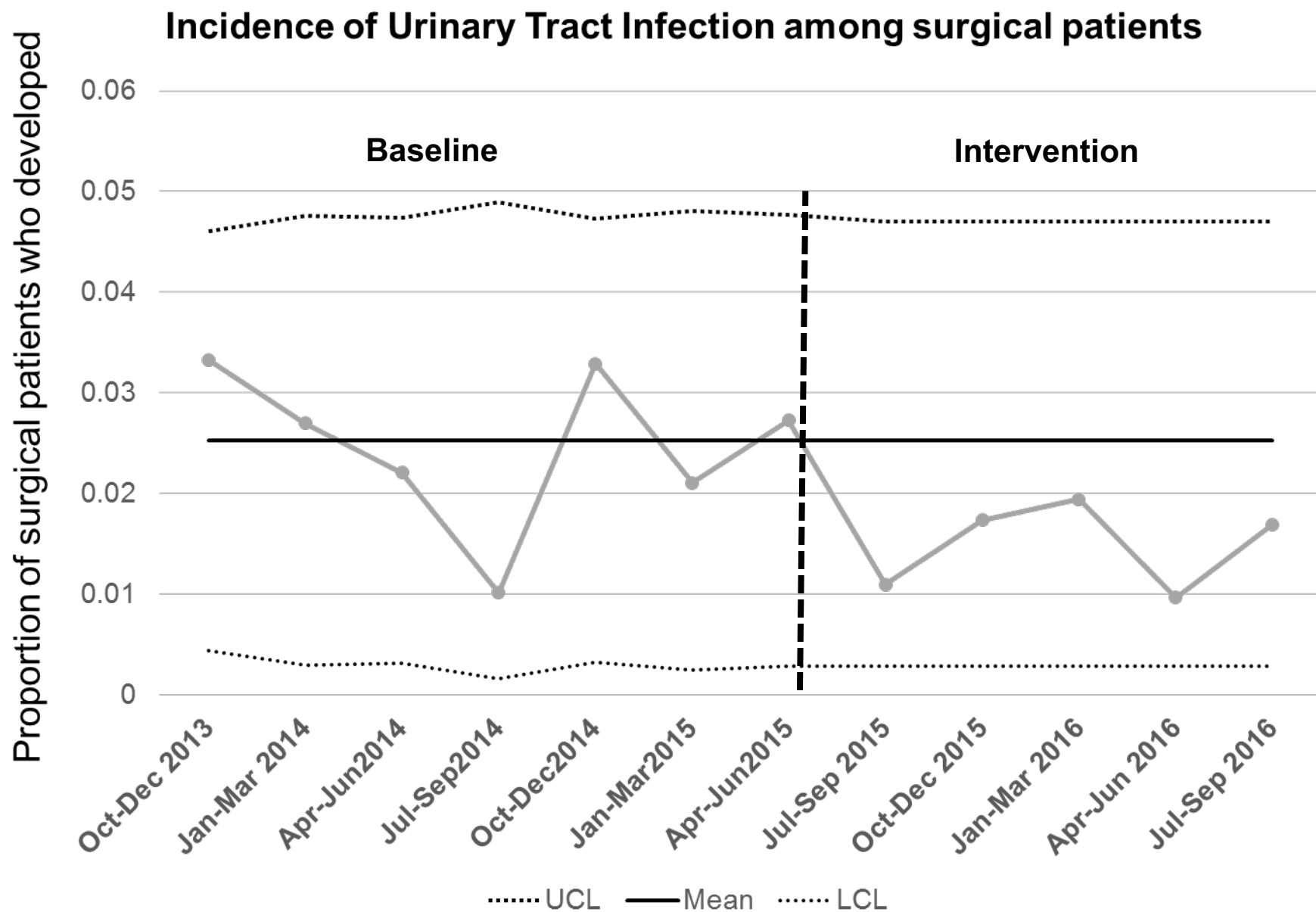
## Indications for maintaining a urinary catheter

1. pre-admission urinary catheter
2. urology involved in care
3. continuous bladder irrigation
4. stage 3 or 4 sacral ulcer in incontinent female patient
5. comfort care at end of life as per patient wishes
6. admitted with spinal cord injury
7. underwent radical pelvic surgery involving bladder (cystectomy), uterus (hysterectomy), cervix (trachelectomy), or vulva (vulvectomy)



# Urinary catheters removed at end of surgery





Data from NSQIP

# What are the key “ingredients” for implementation?

- Standardization based on consensus criteria co-created with surgical staff
- Iterative change – start with removal at end of case





# Closing thought: Culture is not the culprit

*Culture isn't something you "fix"...*

*Cultural change is what you get after you've put new processes or structures in place...*

*The Culture evolves after you have done this important work.*



# Questions?

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