“4 E’s” Ways That Clinicians Can Reduce Low-Value Care on Medical Wards

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Disclosures

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Faculty: Dr. Jerome Leis

Relationships with financial sponsors:

- Salary Support from Choosing Wisely Canada to lead Using Antibiotics Wisely

No other relevant conflicts of interest to declare

We thank Dr. Chris Moriates (UCLA) for his contributions.

Objectives

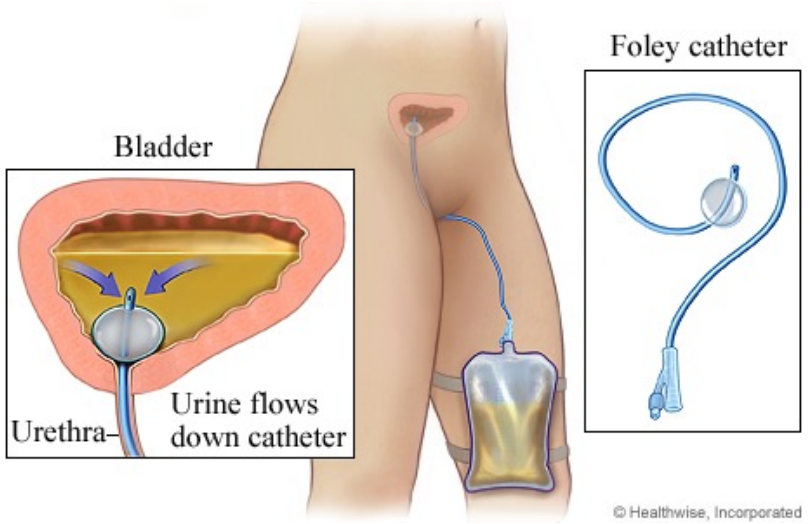
1. Describe evidence-based indications for three common forms of low-value care on medical wards
2. Discuss documented harms and epidemiology of overuse
3. Summarize quality improvement initiatives that can reduce provision of these forms of inappropriate care

Clinical Insights | LESS IS MORE

"4 E's" Ways That Clinicians Can Reduce Low-Value Care on Medical Wards

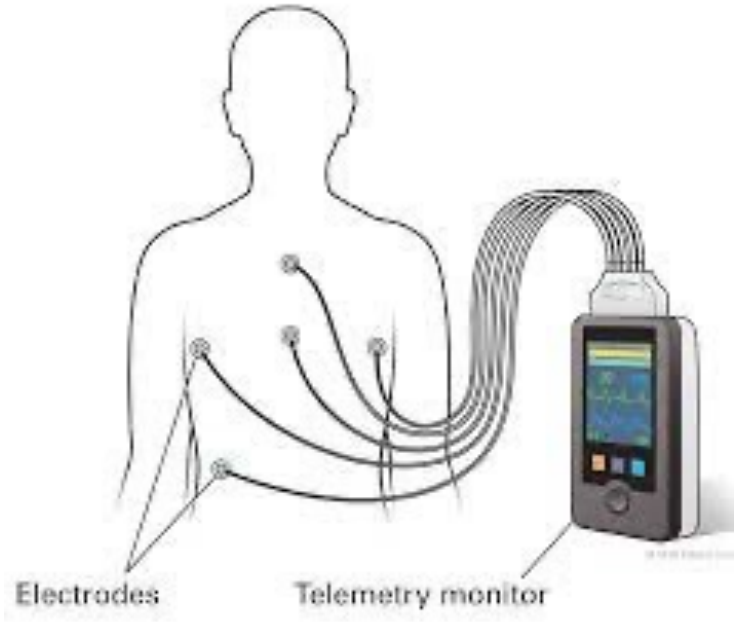
William K. Silverstein, MD, MSc; Jerome A. Leis, MD, MSc; Christopher Moriates, MD

Urinary catheters



Routine, repetitive bloodwork

Telemetry



Eleven Tests and Treatments to Question

by
Canadian Society of Internal Medicine
Last updated: August 2022

2 **Don’t place, or leave in place, urinary catheters without an acceptable indication (such as critical illness, obstruction, palliative care).**

4 **In the inpatient setting, don’t order repeated CBC and chemistry testing in the face of clinical and lab stability.**

10 **Don’t order continuous telemetry monitoring outside of ICU without using a protocol that governs discontinuation.**

2 **Don't place, or leave in place, urinary catheters without an acceptable indication (such as critical illness, obstruction, palliative care).**

COLLEGE OF INTENSIVE CARE MEDICINE
OF AUSTRALIA AND NEW ZEALAND

AAFP

CHOOSING WISELY J APAN

4 **In the inpatient setting, don't order repeated CBC and chemistry testing in the face of clinical and lab stability.**

Società Scientifica FADOI di Medicina Interna

The Faculty of Intensive Care Medicine

aaBB

shm Society of Hospital Medicine
Hospitalists. Transforming Healthcare. Revolutionizing Patient Care.

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Critical Care Societies Collaborative - **Critical Care**

AMERICAN ASSOCIATION of CRITICAL-CARE NURSES · CHEST AMERICAN COLLEGE of CHEST PHYSICIANS · ATS We help the world breathe · Society of Critical Care Medicine

10 **Don't order continuous telemetry monitoring outside of ICU without using a protocol that governs discontinuation.**

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Internal Medicine Society of Australia & New Zealand

The Faculty of Intensive Care Medicine

RIGHT CARE

Do you still struggle with inappropriate use of

1. Urinary catheters
2. Telemetry
3. Routine, repetitive bloodwork
4. Two or more of the above

Urinary catheters

Recommended indications (on medicine wards):

1. Pre-admission permanent indwelling catheter
2. Bladder outlet obstruction (urology is consulting)
3. Continuous bladder irrigation for gross hematuria
4. Stage 3 or 4 sacral/perianal ulcers AND incontinence in female patient
5. Comfort care in end of life as per patient wishes

Commonly overused (as many of 56% of inpatients)

ORIGINAL ARTICLE

Regional Variation in Urinary Catheter Use and Catheter-Associated Urinary Tract Infection: Results from a National Collaborative

Approximately 30%–40% of catheters in non-ICUs were placed without an appropriate indication.

Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: an integrative review

between 21% and 55.7%[2,4,20,23–25] of urinary catheters are placed in patients who do not have an appro-

Urinary catheters

Harmful

CAUTI

CDC/NHSN definition (2019)
Patient had indwelling urinary catheter in place more than 2 consecutive days in an inpatient location on the date of event AND was either present for any portion of the calendar day on date of the event OR removed the day before the date of the event
Patient has at least one of the following: fever, suprapubic tenderness, costovertebral angle pain or tenderness, urinary urgency, urinary frequency, dysuria
Positive urine culture with no more than two species of organisms identified, at least one of which is a bacterium $>10^5$ CFU/ml
Diagnosis of UTI must be documented in patient's medical record.

Urinary catheters

Harmful

CAUTI

Urethral trauma

Reduced mobility

Prolonged length-of-stay

Impaired quality-of-life

Delirium

Pressure ulcers

Fakih et al, *Infect Control Hosp Epidemiol*, 2016

Routine and repetitive bloodwork

Routine and repetitive ordering of blood tests in patients without a clinical indication.

No validated criteria exists for what constitutes routine and repetitive bloodwork

Table 1 | Blood tests considered routine by Choosing Wisely campaigns[11]

Blood test group	Specific blood test
CBC	Complete blood count
Electrolytes	Sodium, potassium, chloride, magnesium, phosphate, calcium
Liver enzymes	Alanine transaminase, aspartate transaminase, alkaline phosphatase, bilirubin
Coagulation parameters	International normalised ratio, partial thromboplastin time

BMJ 2022;379:e070698

Routine and repetitive bloodwork

Common

- Can be avoided up to 60% of the time

Low-Value

- Seldom changes management or outcomes
- Does not meaningfully improve diagnostic accuracy

Routine and repetitive bloodwork

Harmful

Cost—This practice is expensive, costing $150 (£135) per patient per day[24]

BMJ 2022;379:e070698

Routine and repetitive bloodwork

Harmful

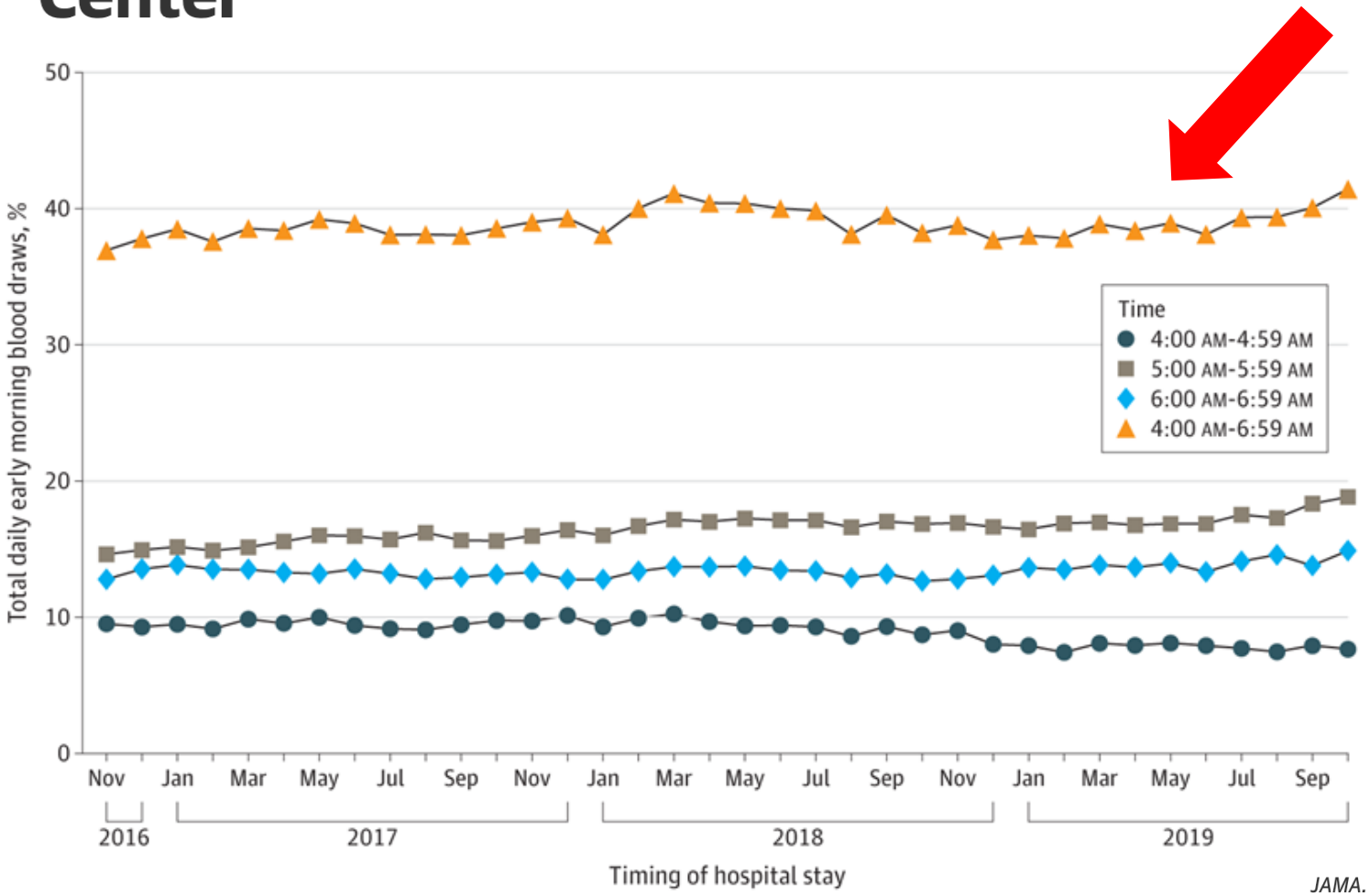
Cost—This practice is expensive, costing $150 (£135) per patient per day[24]

Disruption to patient sleep—Routine laboratory tests are often drawn in the early morning and sleep interruption may be associated with a greater risk of readmissions or emergency department visits after discharge[25 26]

BMJ 2022;379:e070698

Routine and repetitive bloodwork

Timing of Blood Draws Among Patients Hospitalized in a Large Academic Medical Center



JAMA. 2023;329(3):255-257.

Routine and repetitive bloodwork

Harmful

Cost—This practice is expensive, costing $150 (£135) per patient per day[24]

Disruption to patient sleep—Routine laboratory tests are often drawn in the early morning and sleep interruption may be associated with a greater risk of readmissions or emergency department visits after discharge[25 26]

Venipuncture harms—Includes pain, bruising, and vascular injuries[27]

More frequent bloodwork is associated with increased lengths of stay, readmission rates, and mortality[9 28 29]

Increased risk of blood transfusion, and if transfused, patients are likely to receive more blood.[9 30 31]

Contributes to the climate crisis

BMJ 2022;379:e070698

Telemetry

In-hospital continuous electrocardiographic monitoring initially developed in 1949

Three primary applications:

1. Diagnosis and monitoring of arrhythmias
2. Detection of myocardial ischemia
3. Monitoring of ST segments and QT intervals

Cardiac monitoring of adult cardiac patients in NSW public hospitals

BHRS
British Heart Rhythm Society

Standards for continuous cardiac monitoring in-hospital (telemetry)

Update to Practice Standards for Electrocardiographic Monitoring in Hospital Settings

A Scientific Statement From the American Heart Association

Telemetry

Indications

Acute coronary syndrome

Acute decompensated heart failure

Critical illness

Electrolyte abnormalities

Pro-arrhythmic agents (ingestion, monitoring)

High-grade arrhythmias

Infective endocarditis

Pending ICD/PPM insertion

Post-cardiac intervention/non-cardiac major thoracic surgery

Stroke

Suspected cardiac syncope

Telemetry

Common (30-90% have no indication)

Use and Outcomes of Telemetry Monitoring on a Medicine Service

Only 11 patients in our cohort met AHA class I indications for the use of telemetry.

Met AHA class I criteria	
Yes	11 (11)
No	89 (89)

Arch Intern Med. 2012;172(17):1349-1350.

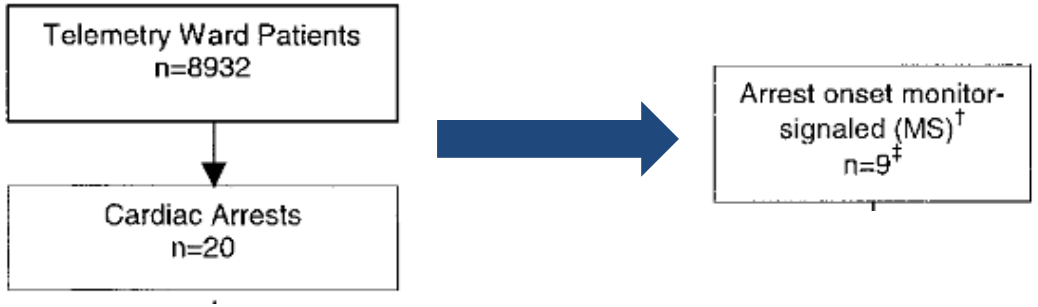
Telemetry

Low-Value

Evidence supporting benefit of telemetry in those without an indication is weak

- Single RCTs, non-randomized studies, consensus expert opinion
- AHA Scientific Statement Writing Panel unable to identify multiple RCTs or meta-analyses

Inappropriately monitored patients rarely, if ever, have a clinically significant arrhythmia that was identified and changed management to improve outcomes



Cardiac arrest is an uncommon event among telemetry ward patients, and monitor-signaled survivors are extremely rare. Routine telemetry offers little cardiac arrest survival benefit to most monitored patients, and a more selective policy for telemetry use might safely avoid ECG monitoring for many patients.

Telemetry

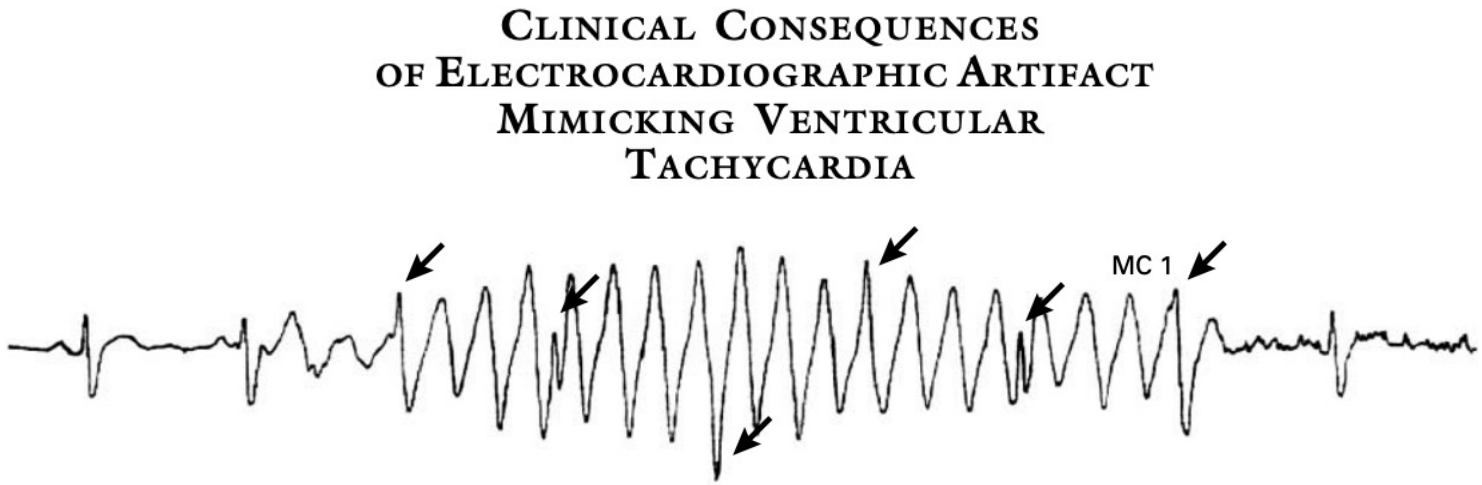
Harmful

Delirium

Anxiety

Reduced mobility

Insomnia



N Engl J Med 1999; 341:1270-1274

Telemetry

Diagnostic cardiac catheterization was performed in three patients solely because of the incorrect diagnosis of ventricular tachycardia. Unnecessary medical therapies included intravenous lidocaine in seven patients, intravenous nitroglycerin in one patient, and sublingual nitroglycerin in one patient. Two patients were given a precordial thump that was interpreted as a successful cardioversion. One patient in whom torsade de pointes was incorrectly diagnosed underwent implantation of a permanent pacemaker to prevent a recurrence by keeping bradycardia, which typically precedes polymorphic ventricular tachycardia, from occurring. One patient underwent placement of an implantable cardioverter–defibrillator after an episode of artifact was misdiagnosed as polymorphic ventricular tachycardia. Another patient was given a blood transfusion because it was thought that his ventricular tachycardia had been caused by anemia.

N Engl J Med 1999; 341:1270-1274

Telemetry

Harmful

Increased workload

- 30 min/12-hour shift monitoring
- As load increases, so do delays in identification of arrhythmias

Alarm fatigue

Costly - $53/day

Leads to overcrowded ED and increased ED LOS

Can we improve care?

Clinicians can make everyday changes in their own practice to reduce these forms of overuse.

Figure. The 4 E's: A Quality Improvement Approach to Reduce Low-Value Care on Medical Wards

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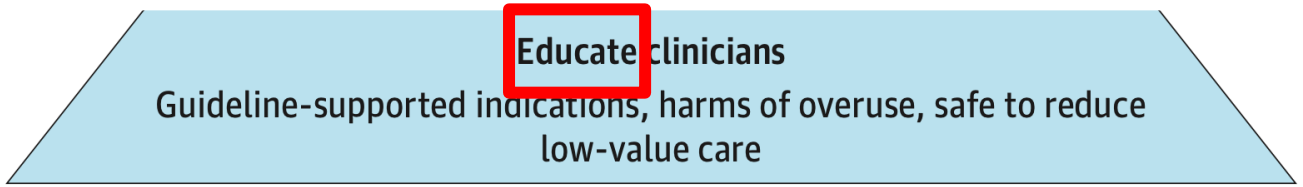

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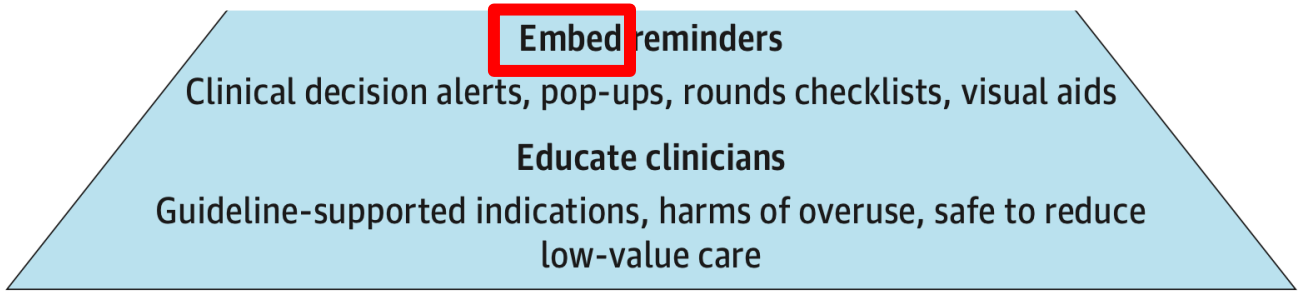

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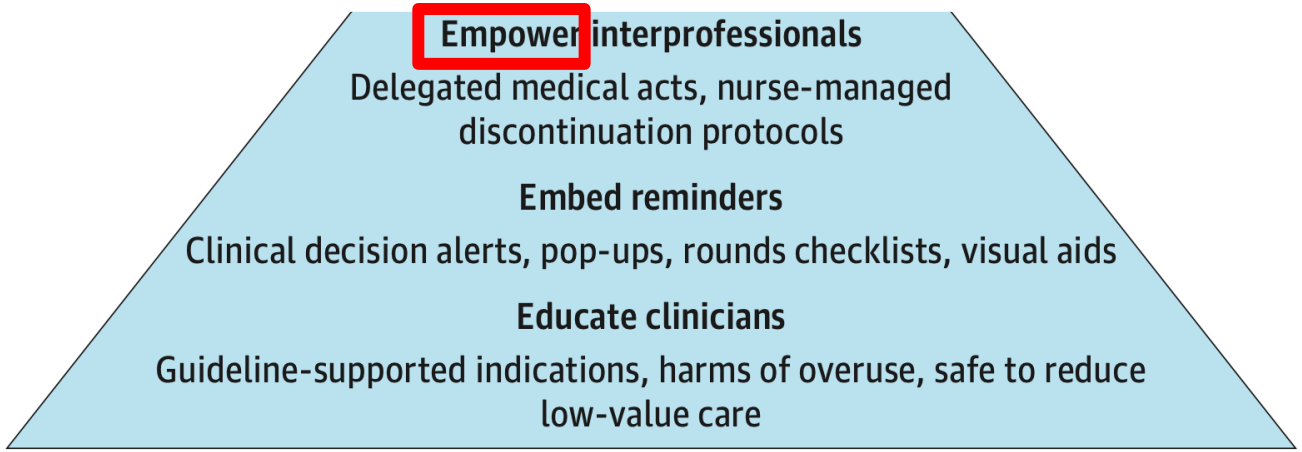

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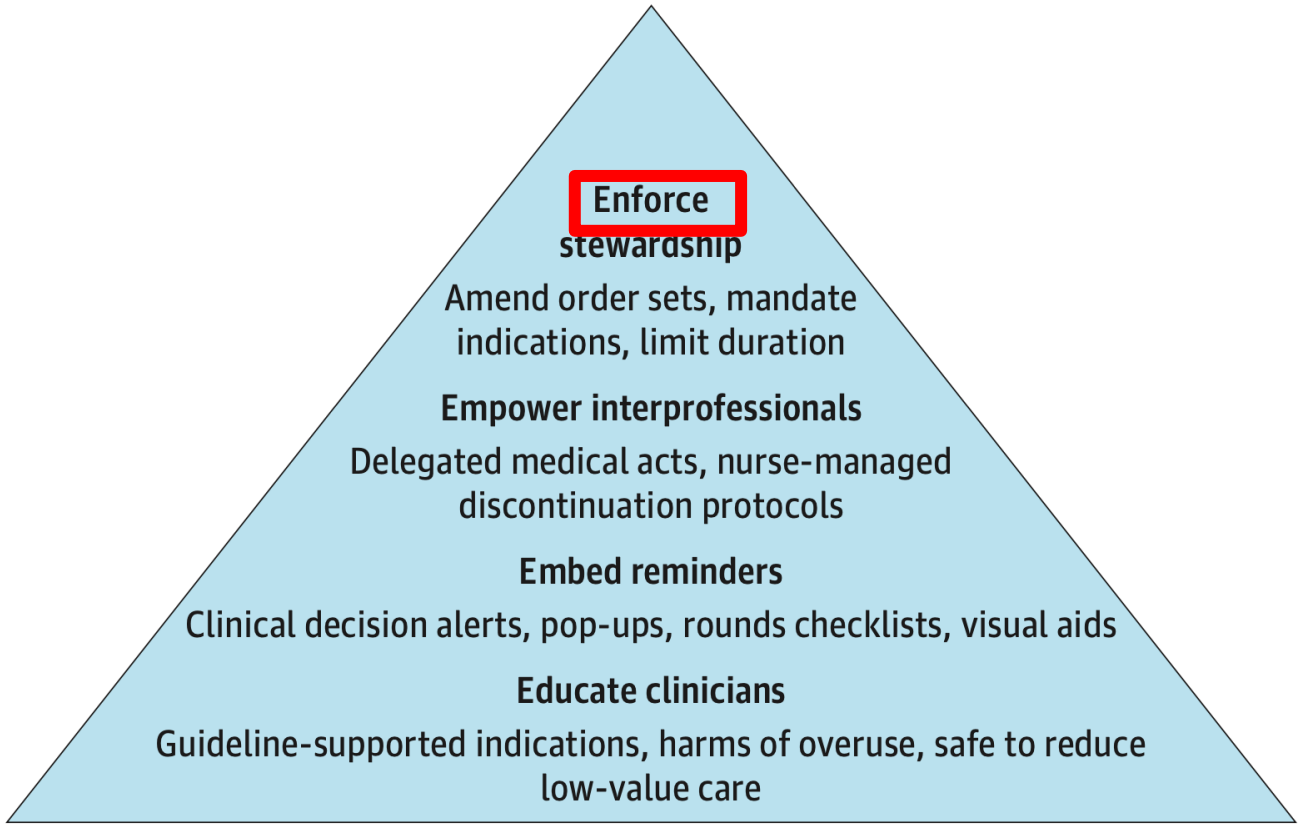
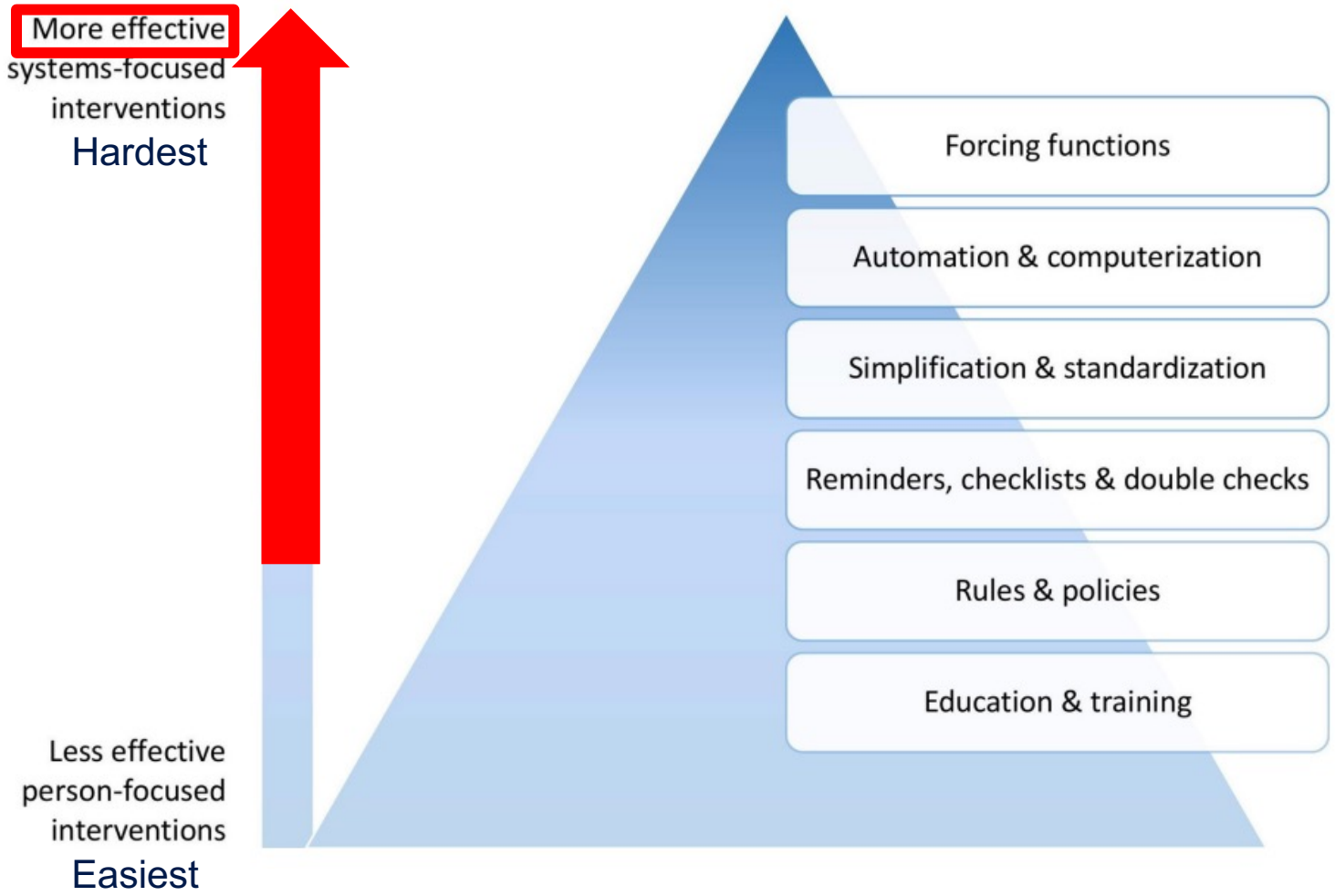


Which do you find to be most effective

1. Education
2. Embedded reminders
3. Empowering teams
4. Enforcement

The 4 E’S

Modeled after the Hierarchy of Effectiveness

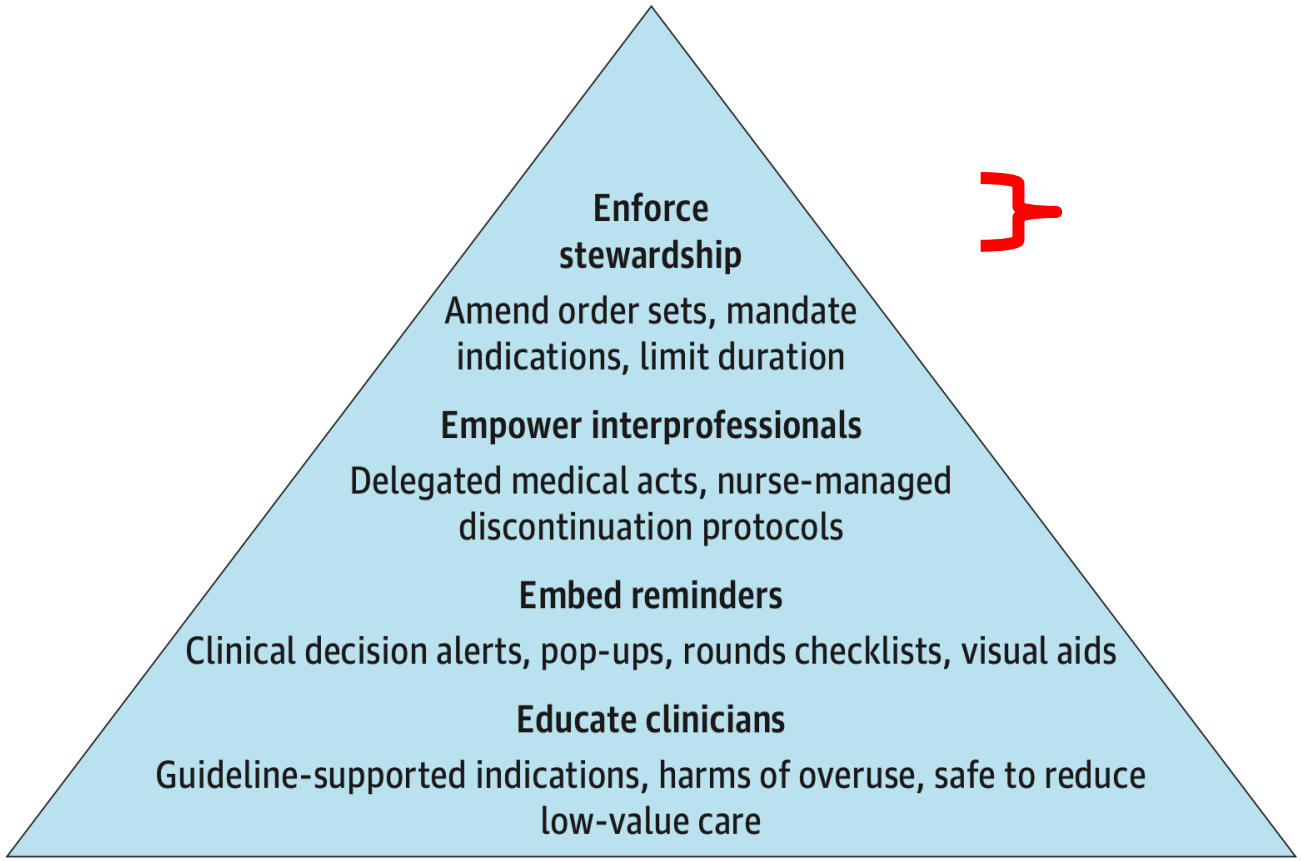


To cite: Soong C, Shojania KG. *BMJ Qual Saf* 2020;**29**:353–357.

The 4 E'S

Higher value improvement strategies = *right thing easy to do*

More effective systems-focused interventions
Hardest



Less effective person-focused interventions
Easiest

The 4 E’S

To be successful, you must match your problem to a solution

Take the time to engage stakeholders for a thoughtful and thorough root cause analysis

Think about a clinical outcome of interest (e.g., CAUTI rates)

Interventions tend to 1) avoid ordering; 2) discontinue early if ordered

Education

Multiple QI studies show that *only* relying on educational interventions to change clinician behaviours tend to produce *no* improvement.

Education alone rarely leads to sustained behaviour change

However, education can support QI interventions by engaging clinicians and making them aware why an intervention is needed

Education – Urinary catheters

Promote knowledge for healthcare providers

Indications

1. Pre-admission permanent indwelling catheter
2. Bladder outlet obstruction (urology is consulting)
3. Continuous bladder irrigation for gross hematuria
4. Stage 3 or 4 sacral/perianal ulcers AND incontinence in female patient
5. Comfort care in end of life as per patient wishes

Harms

Safety

Systematic Review and Meta-Analysis:
Reminder Systems to Reduce Catheter-Associated Urinary Tract Infections and Urinary Catheter Use in Hospitalized Patients

Recatheterization rates were similar in control and intervention groups.

Clinical Infectious Diseases 2010;51(5):550–560

Education – Urinary catheters

Promote knowledge of indications for healthcare providers

Education alone fails to substantially reduce catheterization use

> Although educational interventions are a common and important first step to decrease inappropriate catheter use, more effective and potentially more sustainable interventions go a step further

Meddings J, *et al*. *BMJ Qual Saf* 2014;**23**:277–289.

Education – Routine bloodwork

Promote knowledge for healthcare providers

Appropriate reasons to test

Costs of testing

Harms

Safety

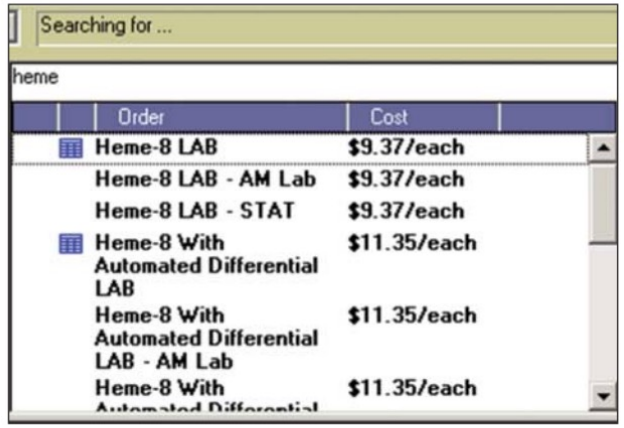


Figure 1. Computerized provider order entry example. AM indicates morning; Heme-8, complete blood count; Lab/LAB, laboratory; STAT, immediately.

and repetitive blood tests can be safely reduc
initiatives without increasing readmission rates, length of stay, adverse events, missed biochemical diagnoses, or mortality.[32-35]

JAMA Intern Med. 2013;173(10):903-908.

Education – Routine bloodwork

Promote knowledge for healthcare providers

Appropriate reasons to test

Costs of testing

Harms

Safety

For example, in one study from the US, several measures were introduced to reduce unnecessary laboratory tests. At the end of three years, rates of readmission (2009: 12.16%; 2011:11.92%) and mortality (2009: 2.24%; 2011: 2.07%) did not change significantly.[34]

Education – Routine bloodwork

Promote knowledge of indications for healthcare providers

Education alone fails to substantially reduce bloodwork

One study (Miyakis 2006) showed short-term improvement (not sustained) reduction in ordering

One systematic review (Roman 2017) showed cost display changed ordering behaviours

One RCT (Sedarek 2017) showed cost display does NOT change ordering behaviours

Education – Telemetry

Promote knowledge of indications for healthcare providers (only 20% of providers can name evidence-based reasons for telemetry)

Telemetry practice-standard supported indications

Harms

Low-value

Safe

Eliminating Inappropriate Telemetry Monitoring
An Evidence-Based Implementation Guide

Meaning Successful implementation of these interventions can mitigate "false alarms," reduce unnecessary downstream testing, and improve value without sacrificing patient safety outcomes.

Code Blues, ICU Activation, Mortality

Published Online: June 4, 2018.
doi:10.1001/jamainternmed.2018.2409

Education – Telemetry

Promote knowledge of indications for healthcare providers

Education as a standalone can:

1. *Decrease overall telemetry use*
2. *Increase appropriateness of use*
3. *Reduce duration of monitoring*

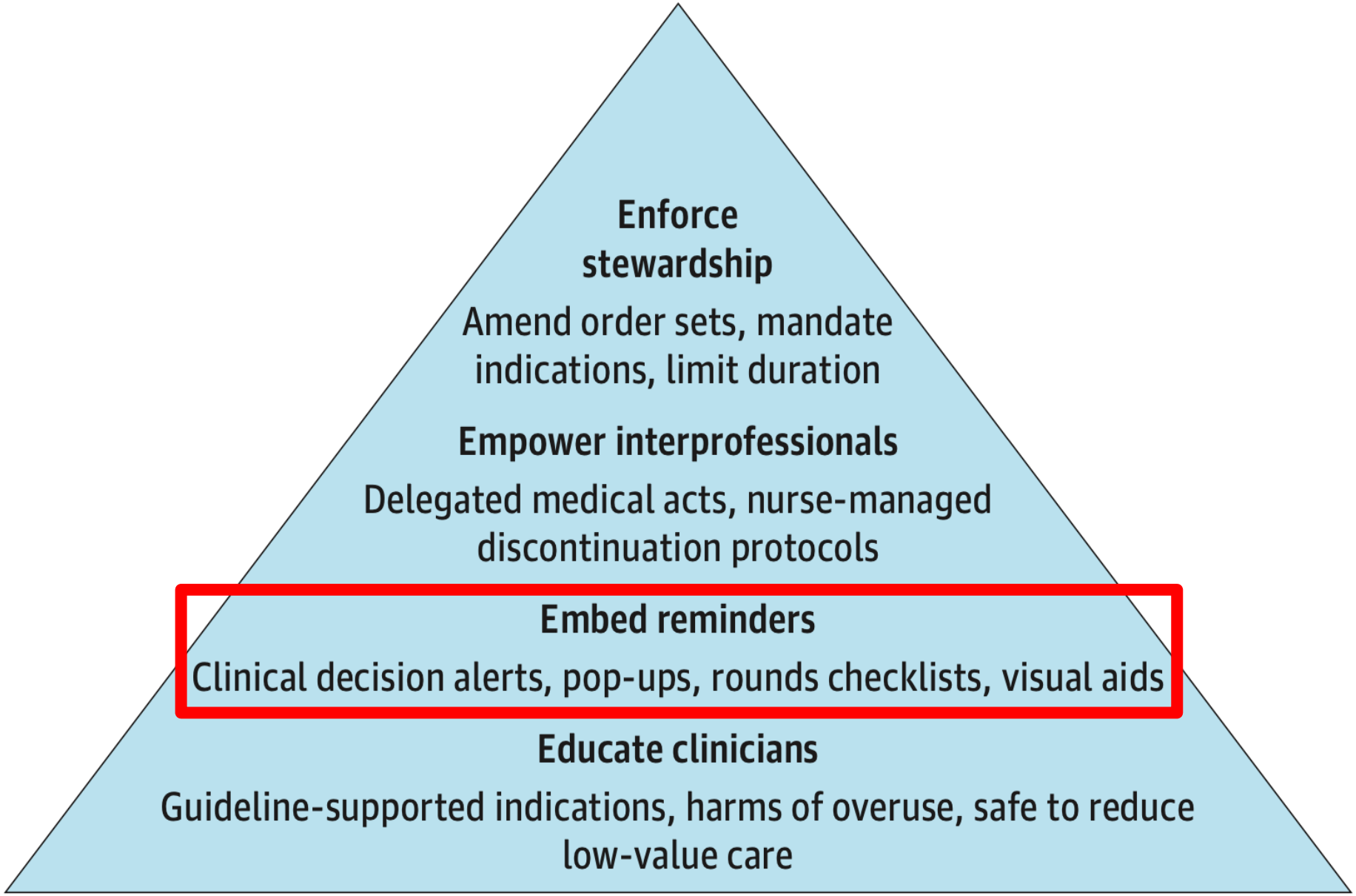
Table. Effect of Educational Intervention
Among 4 Medical Teams at a Tertiary Car

Effect of Educational Intervention	Intervention, Prior
Discontinuation of telemetry prior to discharge	23/141 (16)
Inappropriate indication for telemetry	33/141 (23)
Inappropriate continuation of telemetry (after initial short term indication)	26/55 (47)

e implementation of a relatively simple edu-
e saw substantial decreases in inappropriate use

JAMA Intern Med. 2015;175(5):864-865.

The 4 E’S


Enforce stewardship
Amend order sets, mandate indications, limit duration
Empower interprofessionals
Delegated medical acts, nurse-managed discontinuation protocols
Embed reminders
Clinical decision alerts, pop-ups, rounds checklists, visual aids
Educate clinicians
Guideline-supported indications, harms of overuse, safe to reduce low-value care

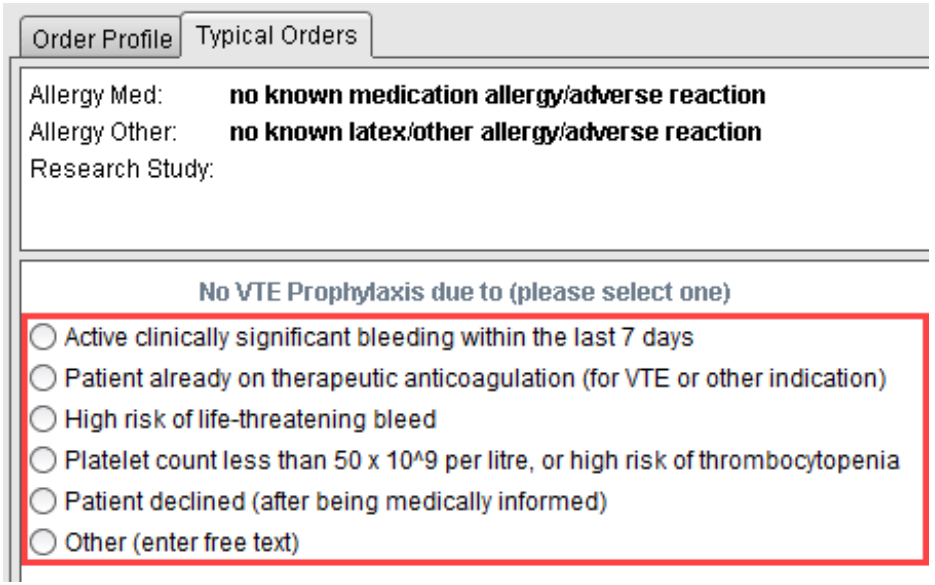
Reminders

Delivered at the point of care to providers/patients

Prompt healthcare professionals to recall information that they may already know but could easily forget amid performing other activities of care

Provide information or guidance in an accessible format at a particularly relevant time.

- Paper
- At point of care
- EMR



Cochrane Database of Systematic Reviews 2009, Issue 3. Art. No.: CD001096.

Reminders – Urinary catheters

Several studied forms

- ...us into ...
- ...RP

Date :

Physician:

Please evaluate need for urinary catheter.

Thank You.

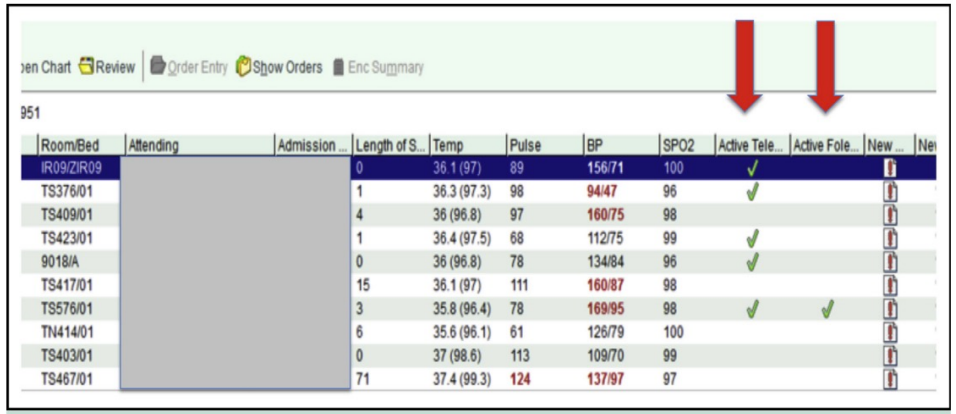


Fig 1. A reminder sticker placed on t... record binder. This figure is available in c... in Epic Electronic Health Record. Check marks indicate ... Systems Corporation.

American Journal of Infection Control

The American Journal of Medicine, Vol 130, No 9, September 2017

Reminders – Urinary catheters

Delivered at the point of care to providers/patients

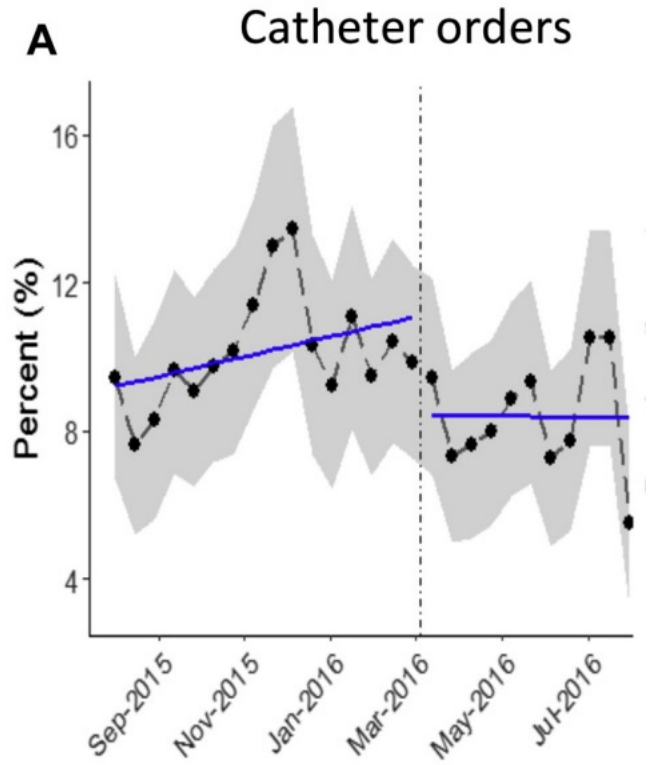
Prompt healthcare professionals to recall information that they may already know but could easily forget amid performing other activities of care

Provide information or guidance in an accessible format at a particularly relevant time.

Reduce urinary catheterization rates

Reduce catheter-associated complications

Do NOT increase rates of re-catheterization



The American Journal of Medicine, Vol 130, No 9, September 2017

Reminders – Routine bloodwork

Several studied forms

Audit and Feedback

Table 3 | Examples of audit-and-feedback practices that reduce routine, repetitive laboratory testing in patients without clinical indications

Setting	Intervention	Result
Swedish Hospital Medicine Seattle, WA Target group: Hospitalist medicine providers	Introductory email recommending cessation of routine, repetitive bloodwork in stable patients sent to all providers. Monthly emails reiterating this recommendation Laboratory ordering frequency for each physician plus an actual example of a case where a patient had one common test ordered on five consecutive days with no mention of the results in progress note. Individual emails sent to the five clinicians who ordered the most, informing them of their status	10% reduction in the number of four common laboratory tests ordered over seven months[44]
Mayo Clinic Rochester, MN Target population: hospital internal medicine providers	Individual feedback and discussion with clinicians ordering the most ionised calcium tests	66% reduction in ordered ionised calcium level tests by the internal medicine service[45]
University of Utah, Salt Lake City, UT Target population: hospitalist medicine providers	Monthly peer feedback session amongst a hospitalist group. Individual utilisation data presented and compared against peers' utilisation patterns	10% reduction in number of tests per patient[46]

Displaying previously stable results

Asking if MD wishes to discontinue daily testing after a pre-determined duration (e.g., 72 hours)

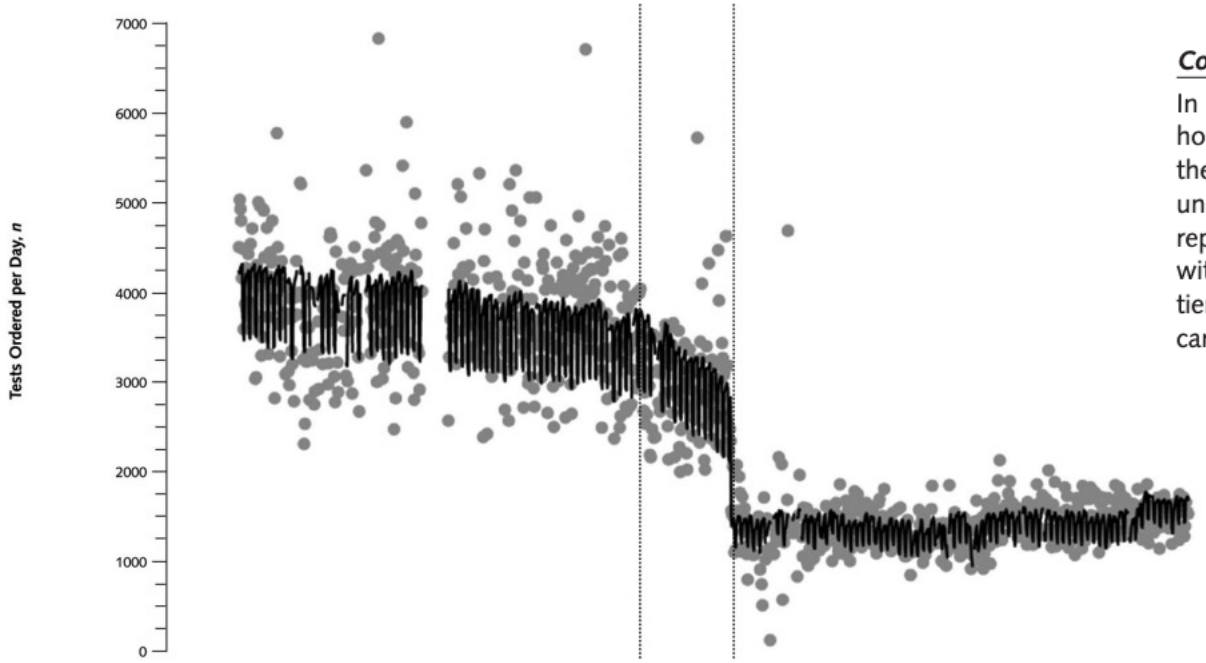
Reminders – Routine bloodwork

Delivered at the point of care to providers/patients

Prompt healthcare professionals to recall information that they may already know but could easily forget amid performing other activities of care

Provide information or guidance in an accessible format at a particularly relevant time.

Reduce routine and repetitive testing



Contribution

In this interrupted time-series study from a large academic hospital, a committee of peer leaders selected ways to use their care provider order entry (CPOE) system to reduce unnecessary test ordering. Computer prompts questioning repetitive orders for routine tests within metabolic panel tests both reduced test orders. Patient readmission rates, length of stay, transfer to intensive care units, and mortality rates remained stable.

Ann Intern Med. 2004;141:196-204.

Reminders – Telemetry

Several studied forms

Guideline-sur[illegible] to discontinue

Incorp[illegible]

Assessment of a Targeted Electronic Health Record Intervention to Reduce Telemetry Duration

A Cluster-Randomized Clinical Trial

Interventions The EHR alert was randomized to half of the teams on the general medicine service. The alert displayed during daytime hours when physicians attempted to place an order for patients not in the intensive care unit whose telemetry order duration exceeded the recommended duration for a given indication.

The American Journal of Medicin *JAMA Intern Med.* 2019;179(1):11-15.

Reminders – Telemetry

Reduce duration of monitoring

Reduce number of orders place

Increase rates of appropriate orders

No difference in code blue/ICU/mortality

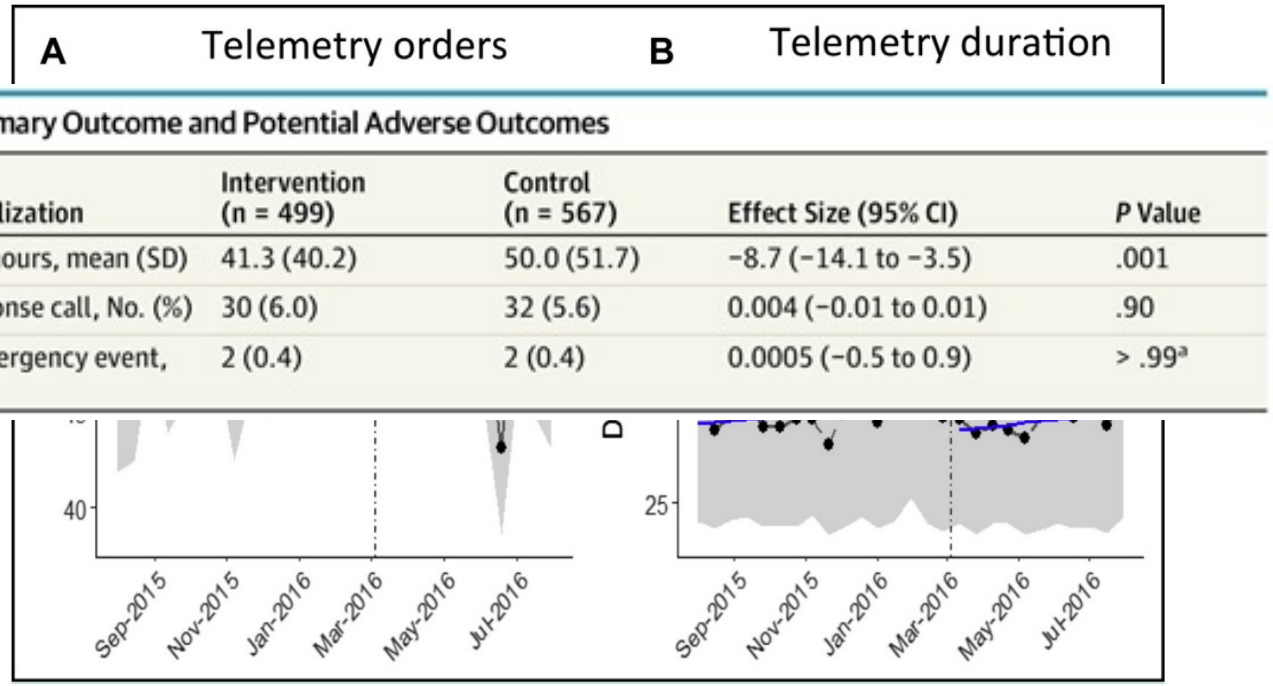
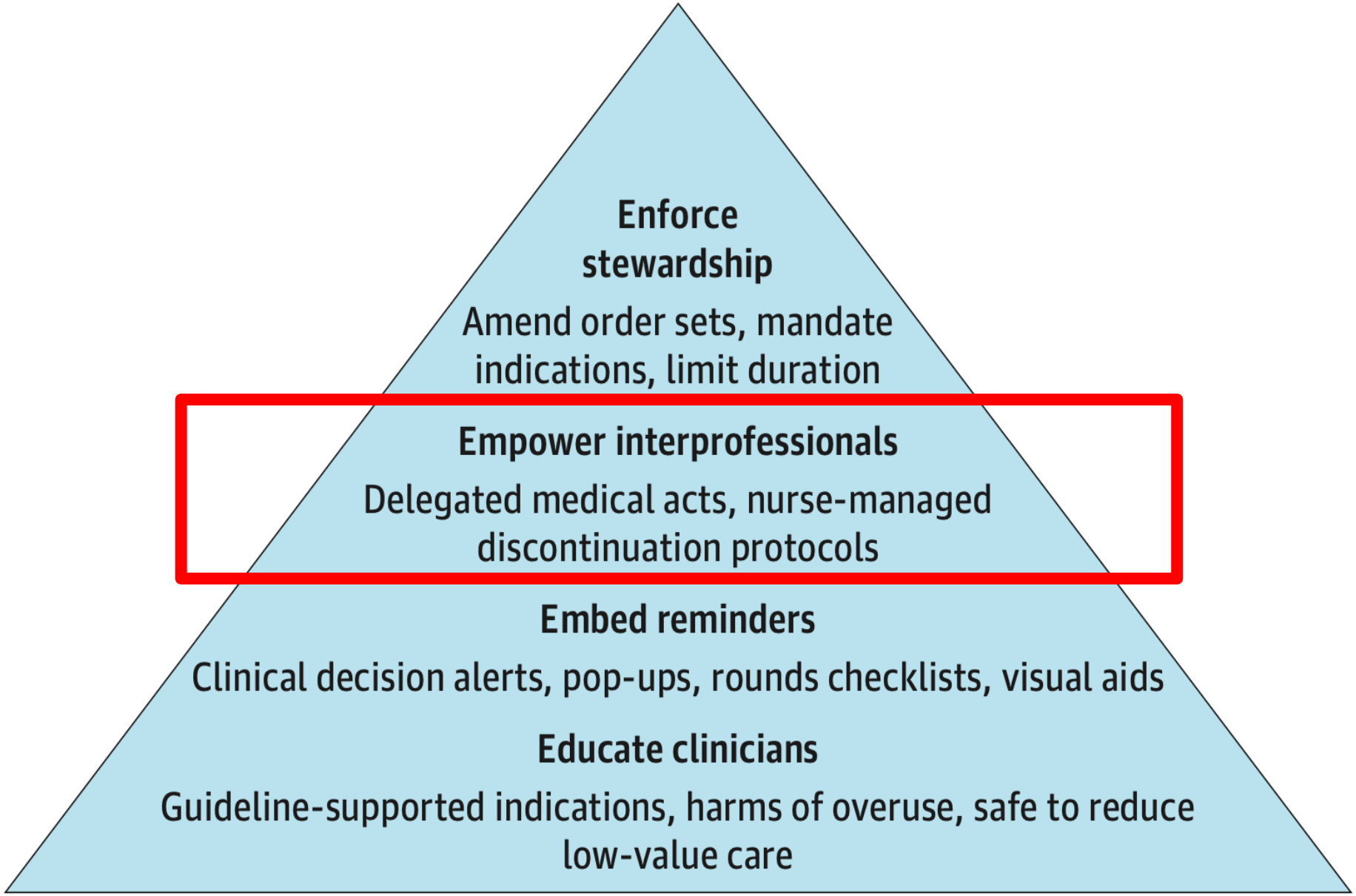


Table 3. Primary Outcome and Potential Adverse Outcomes

Per Hospitalization	Intervention (n = 499)	Control (n = 567)	Effect Size (95% CI)	*P* Value
Telemetry hours, mean (SD)	41.3 (40.2)	50.0 (51.7)	−8.7 (−14.1 to −3.5)	.001
Rapid-response call, No. (%)	30 (6.0)	32 (5.6)	0.004 (−0.01 to 0.01)	.90
Medical emergency event, No. (%)	2 (0.4)	2 (0.4)	0.0005 (−0.5 to 0.9)	> .99[a]

The American Journal of Medicin *JAMA Intern Med.* 2019;179(1):11-15.

The 4 E’S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Empowerment – Urinary catheters

Audits in April 2014 showed that > 60% of catheters on medical wards were unnecessary

Resident were slow to re-assess need for urinary catheters and some nurses were keen to have increased autonomy

Medical directive was proposed to:

- Align nurses and physicians
- Streamline the process of catheter re-assessment

Empowerment – Urinary catheters

Medical directive should make it *easier* for nurses

- More autonomy
- Not chasing residents for orders

Medical directive should make it *easier* for residents

- Less catheters on the ward to worry about

Krein et al, *JAMA Int Med*, 2013

Empowerment – Urinary catheters

How was it developed?

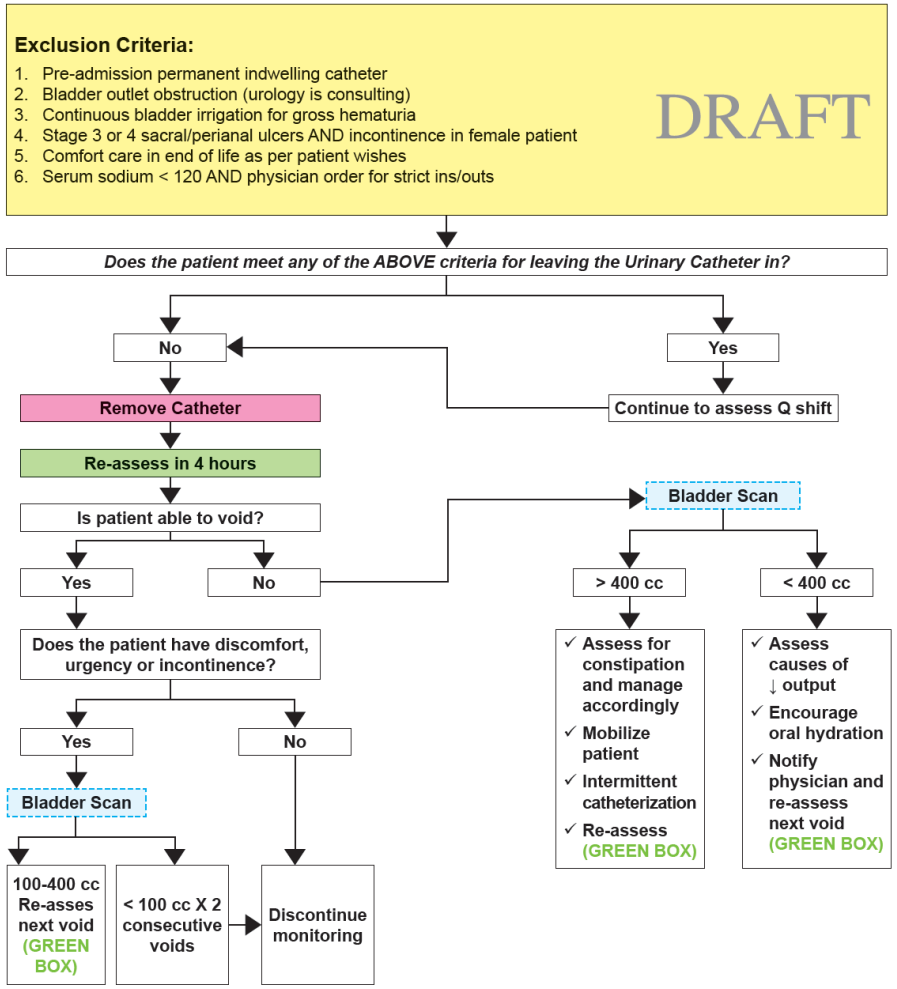
1) Got physicians to agree on indications for leaving a catheter in place

2) Shared with advanced practice nurses who created a medical directive for nurses

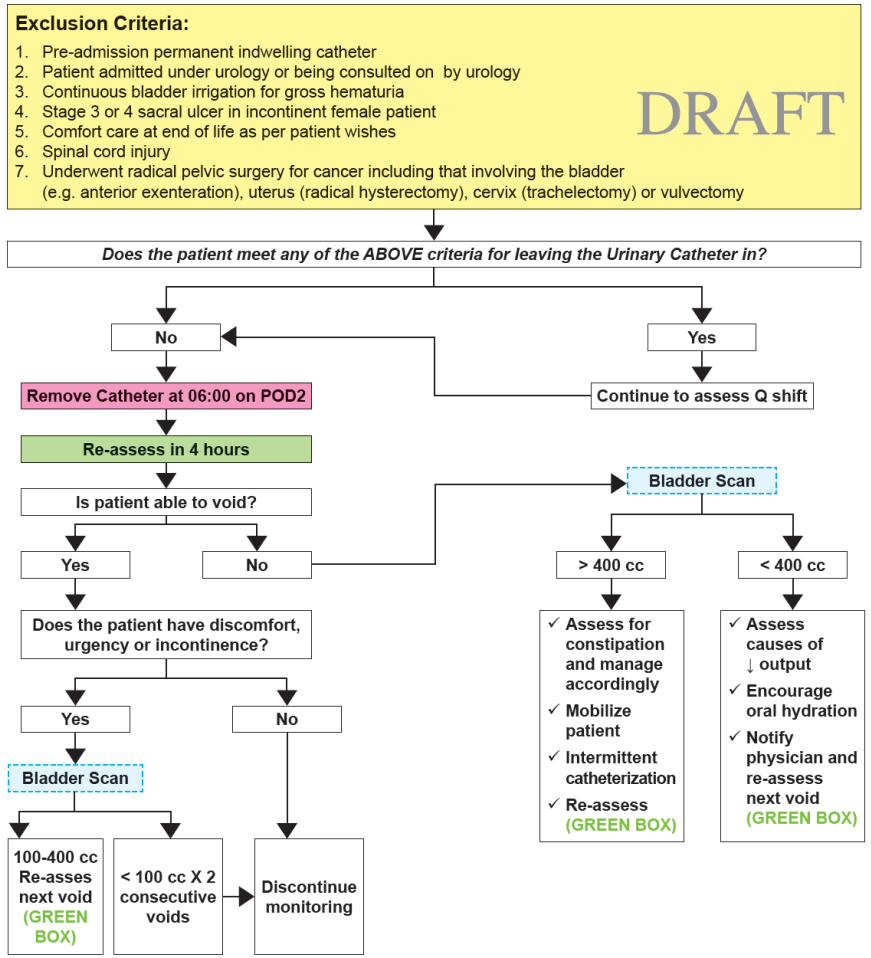
3) Ensured that front-line nurses knew they had nurse management and physician support

Empowerment – Urinary catheters

Medical Directive For Early Removal of Urinary Catheters in MEDICINE Patients



Medical Directive For Early Removal of Urinary Catheters in SURGICAL Patients



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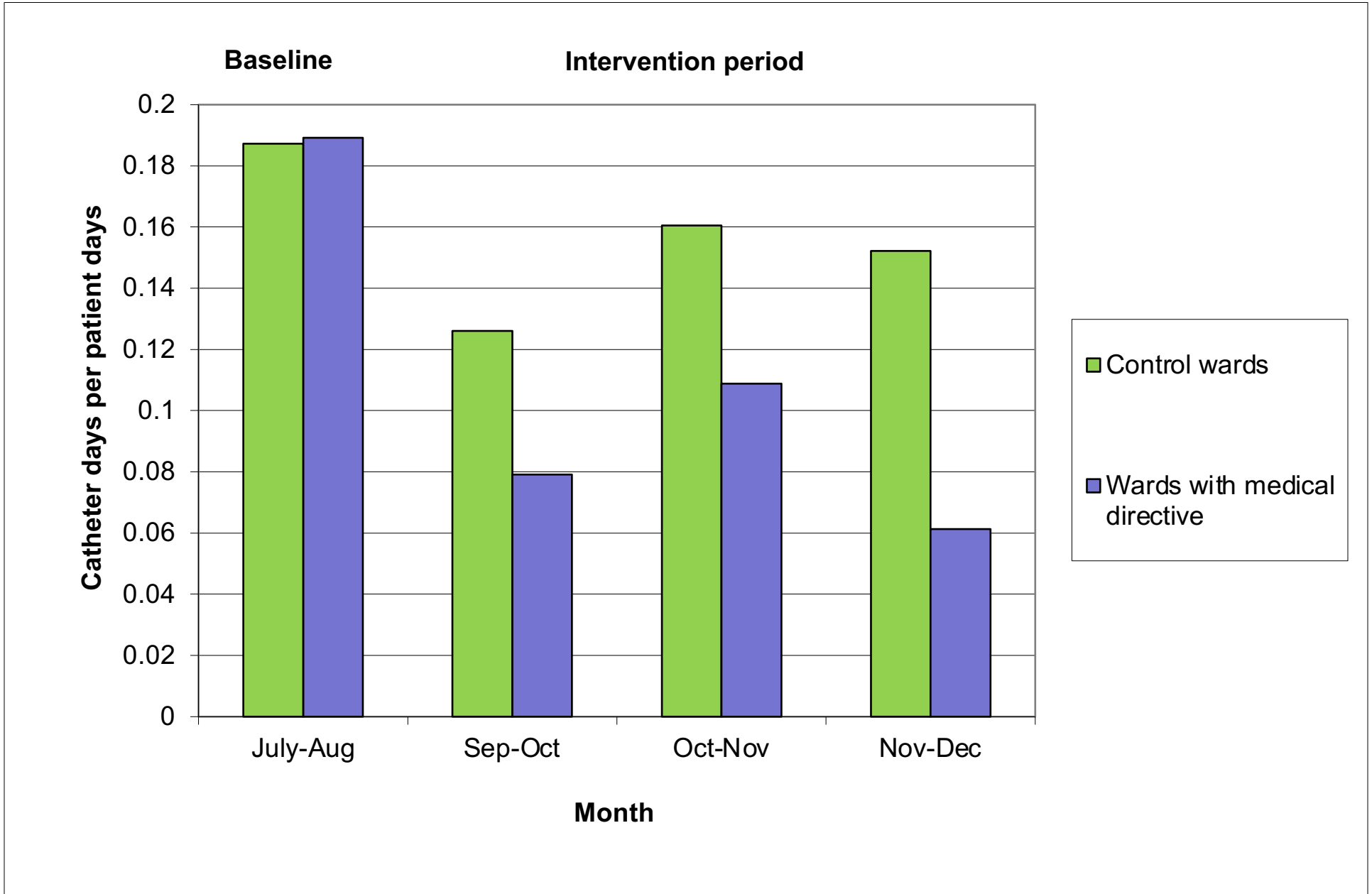
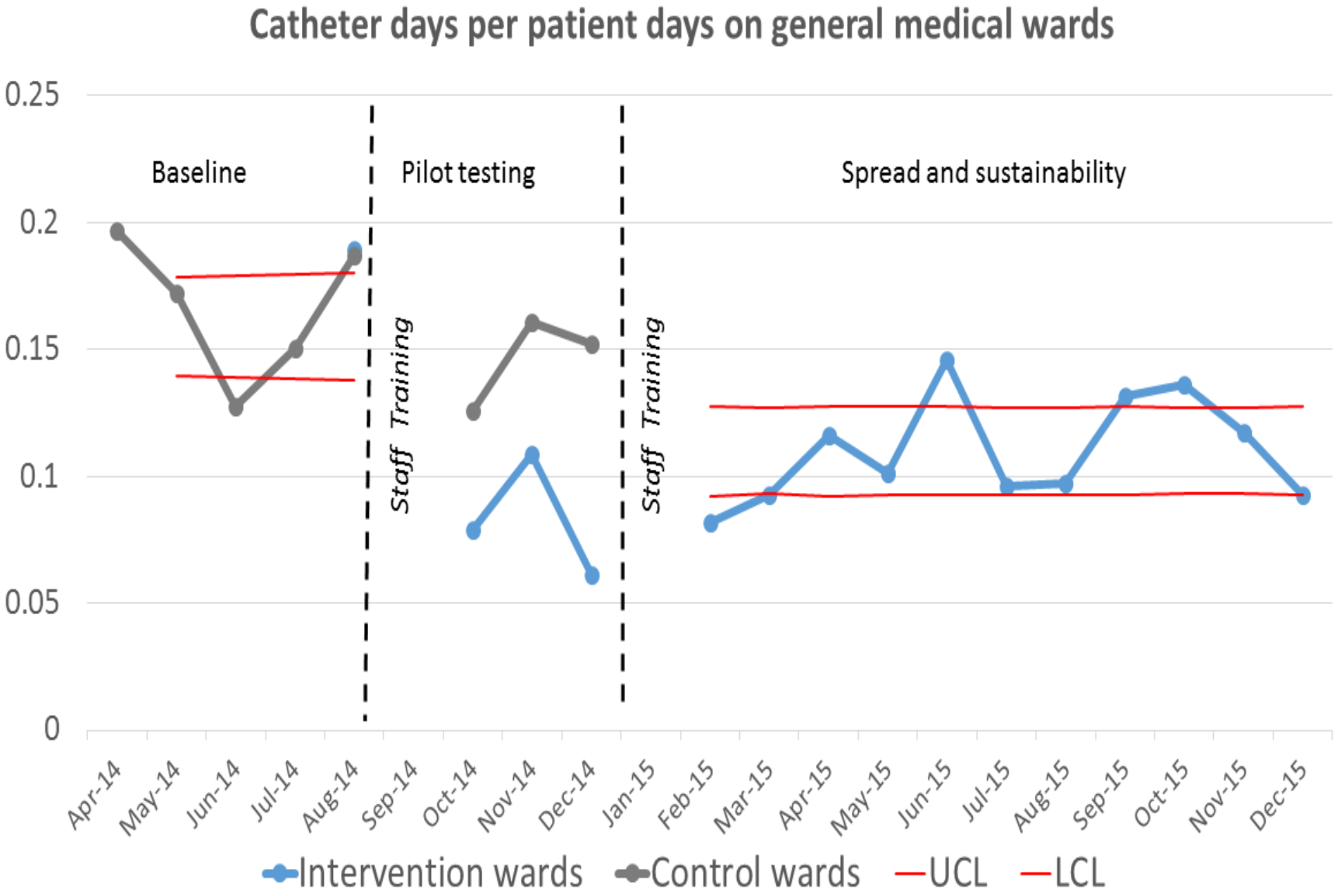
Empowerment – Urinary catheters



Empowerment – Urinary catheters

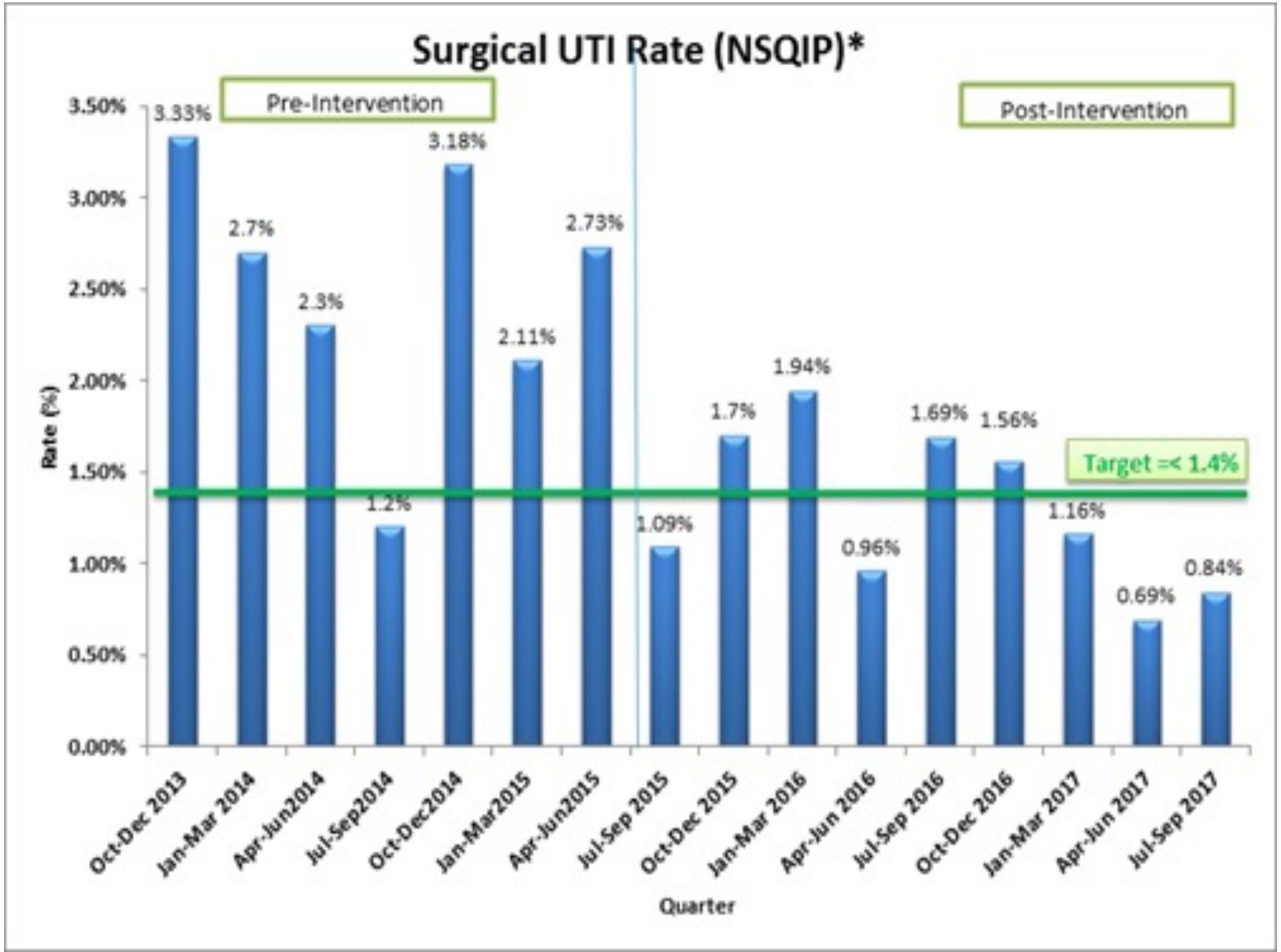


Empowerment – Urinary catheters

Urinary Tract Infection
Some urinary tract infections are avoidable. We are implementing new initiatives based on research and best practice to reduce the rate of infection and improve the recovery and comfort of our patients.

What's our goal?
Reduce urinary tract infection rates post-surgery to achieve a rate better than the 1.4% rate in the NSQIP database for simlar hospitals. (NSQIP is the National Surgical Quality Improvement Program of the American College of Surgeons)

Empowerment – Urinary catheters



Empowerment – Urinary catheters

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

Empowerment – Urinary catheters

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)

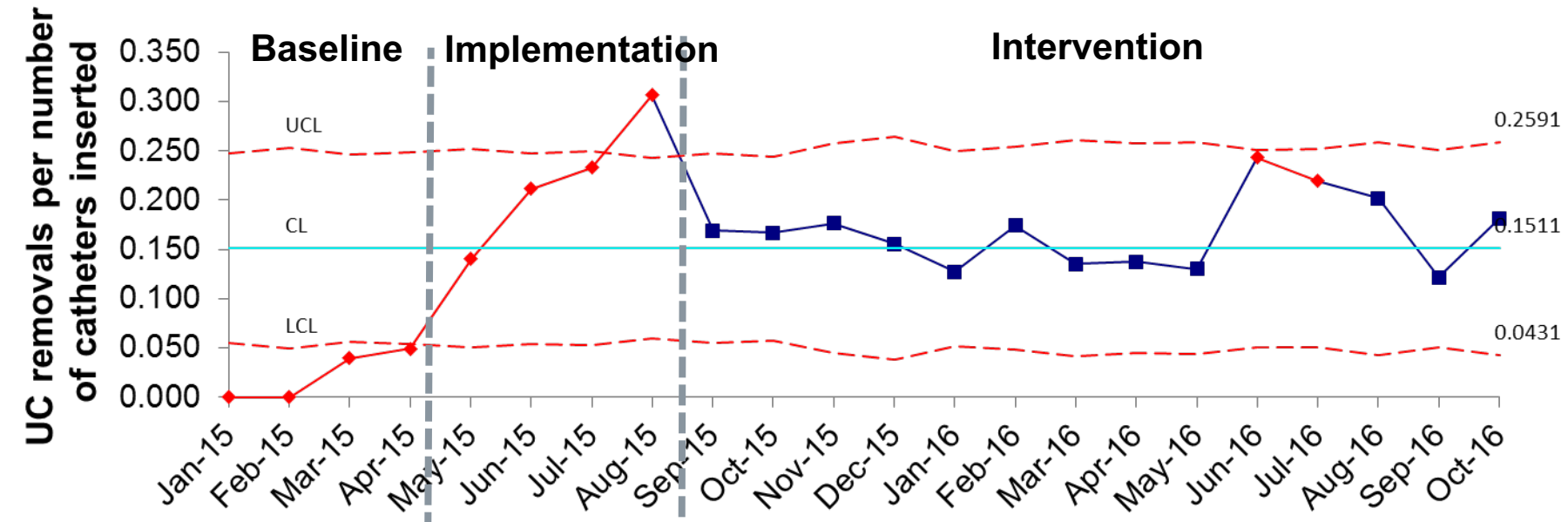
Five surgical services

- General surgery
- Trauma
- Obstetrics and Gynecology
- Cardiac and Vascular
- Orthopedic surgery

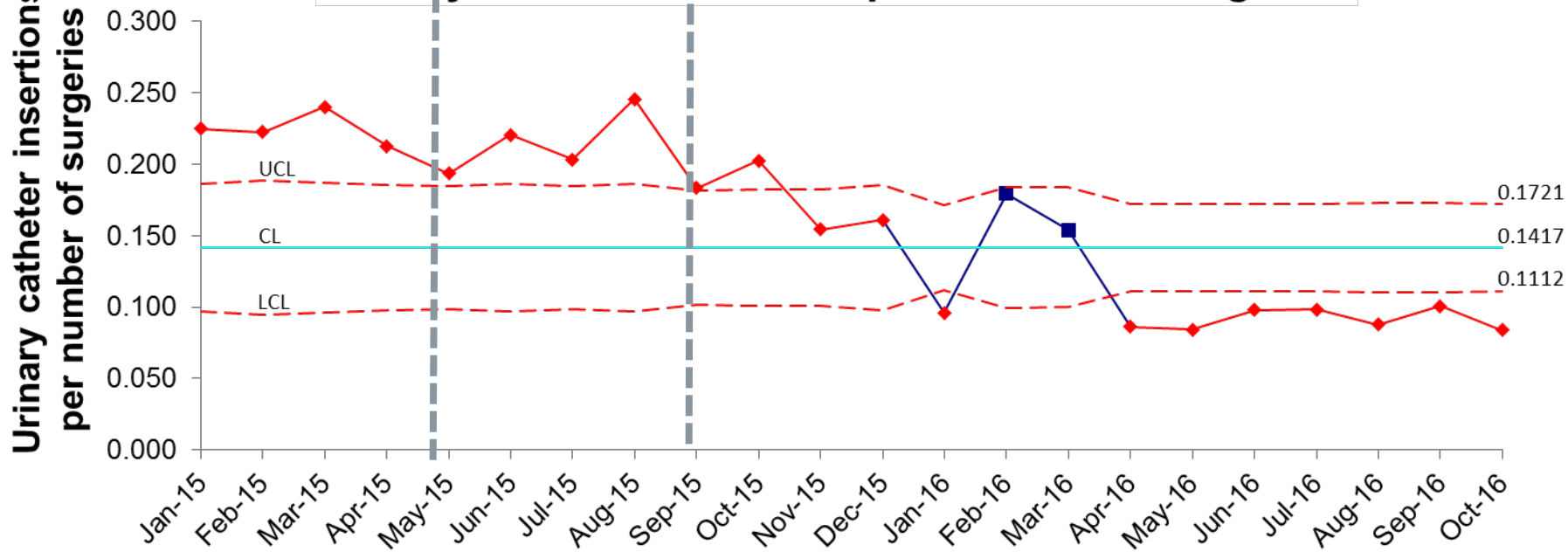
Empowerment – Urinary catheters

Indications for inserting urinary catheter	Indications for maintaining a 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?**	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)

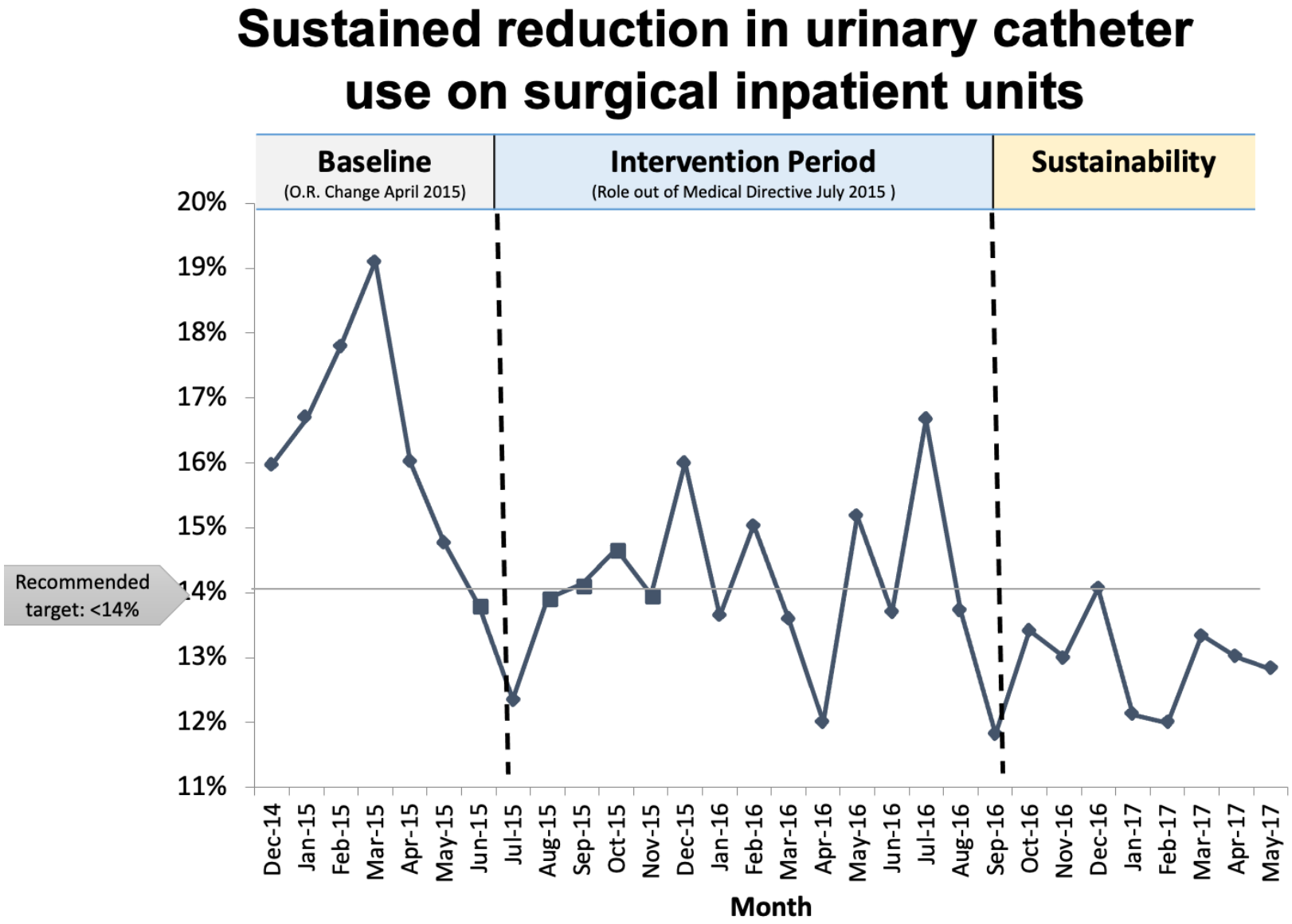
Urinary catheters removed at end of surgery



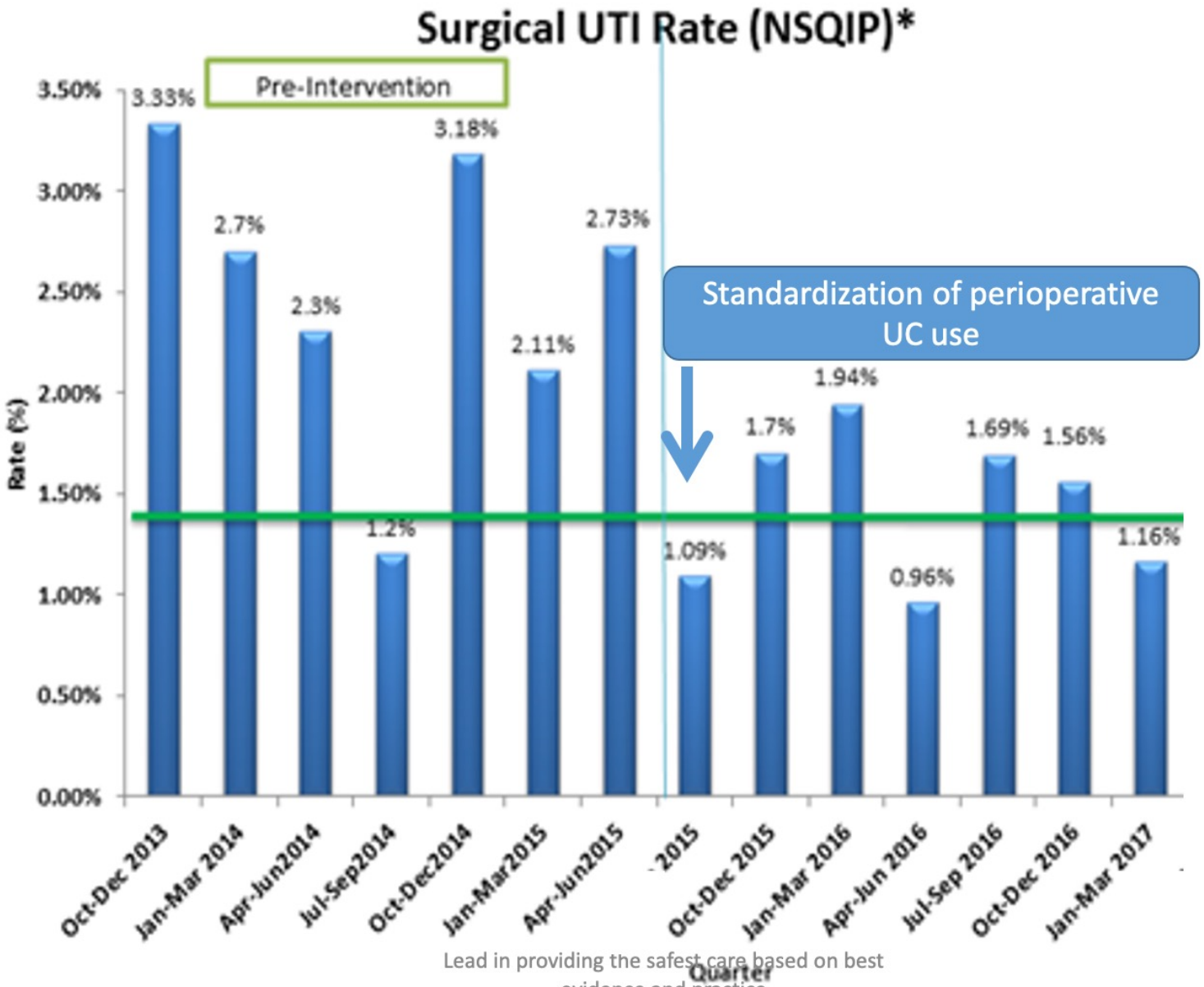
Urinary catheter insertions per number of surgeries



Empowerment – Urinary catheters



Empowerment – Urinary catheters



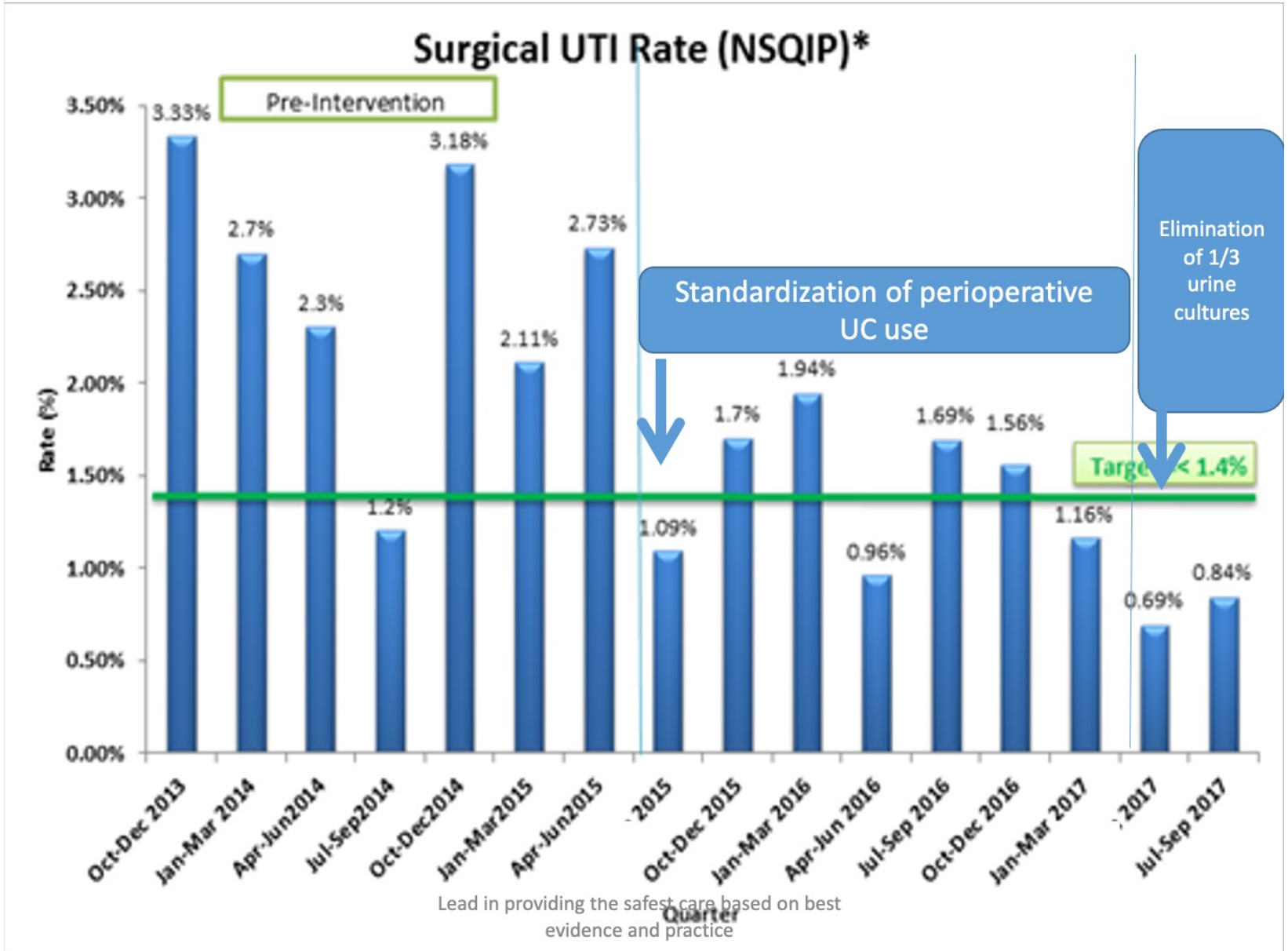
Empowerment – Urinary catheters

Change in Microbiology practice to avoid over-diagnosis of UTI

March 2017

"This specimen has low colony counts of organisms. This usually represents asymptomatic bacteriuria or contamination, not requiring treatment. If patient is pregnant, will have a urological procedure or has typical UTI symptoms please call extension 4242 within 48 hours to request further workup."

Empowerment – Urinary catheters



Empowerment – Telemetry

LESS IS MORE

Altering Overuse of Cardiac Telemetry in Non–Intensive Care Unit Settings by Hardwiring the Use of American Heart Association Guidelines

determined telemetry duration (**Box**. Bedside nurse assessment guidelines were embedded in the EOS to facilitate safe, timely, and automatic discontinuation of cardiac telemetry. When telemetry discontinuation was believed to be unsafe, such as in a patient with unstable blood pressure, the nurse was required to contact the physician, and telemetry could be reordered when appropriate.

Box. Duration of Cardiac Telemetry by Clinical Indication[a]

24 Hours
- Chest pain, rule out MI
- Nonurgent percutaneous coronary interventions
- Implantation of an automatic defibrillator lead or a pacemaker lead
- Uncomplicated ablation of an arrhythmia
- Syncope of truly unknown origin
- Major surgery
- Other

48 Hours
- Acute MI
- CHF, acute and subacute
- Syncope with suspected arrhythmia
- Thoracic (noncardiac) surgery
- Stroke, acute
- Complex major surgery

Indefinite
- Cardiac surgery during this admission
- Use of a wearable personable automatic defibrillator (LifeVest; ZOLL Medical Corp)
- Complex cardiac disorders (eg, ventricular tachycardia storm)

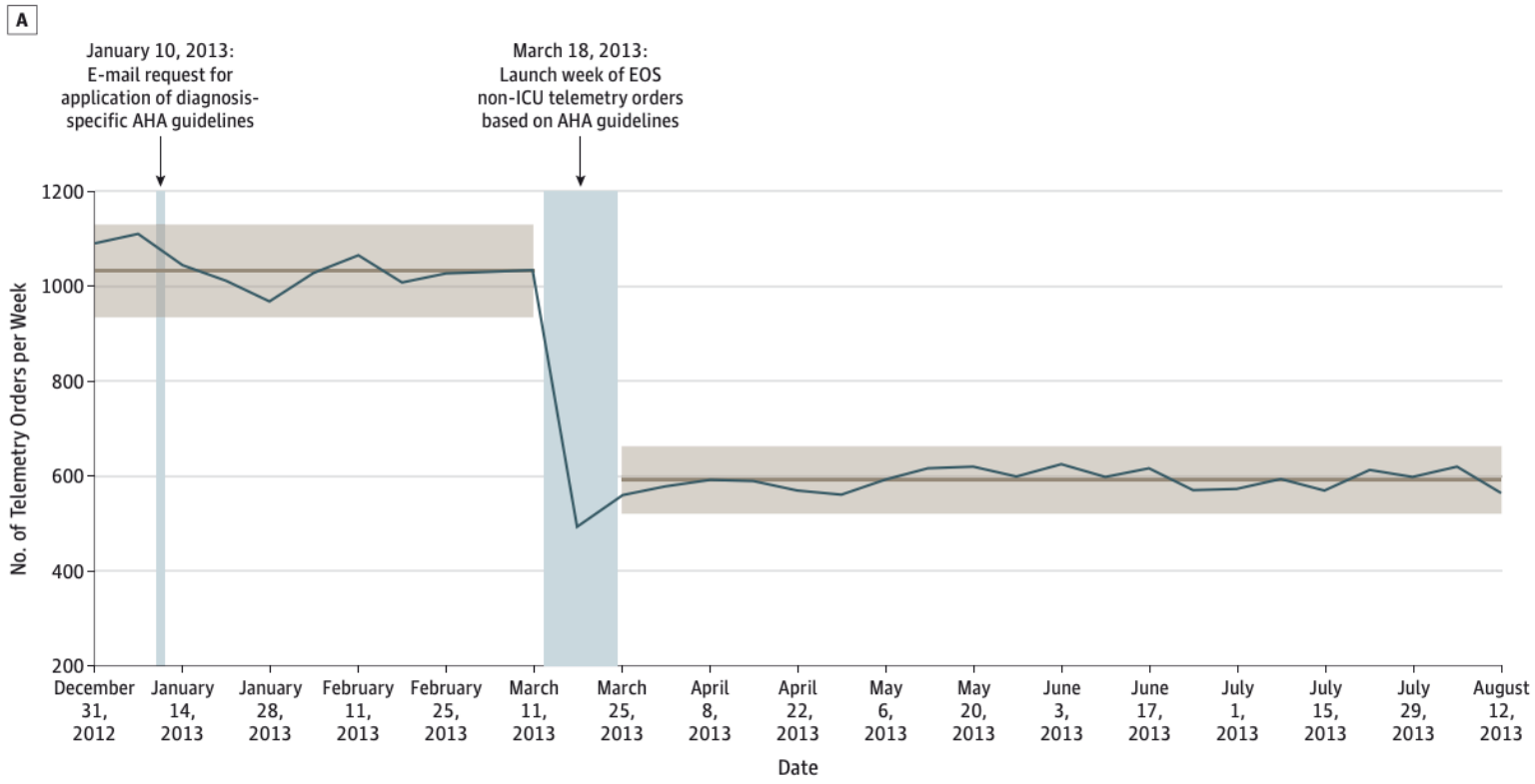
Abbreviations: CHF, congestive heart failure; MI, myocardial infarction.

[a] Adapted from Drew et al.[2]

doi:10.1001/jamainternmed.2014.4491

Empowerment – Telemetry

Reduced number of orders placed



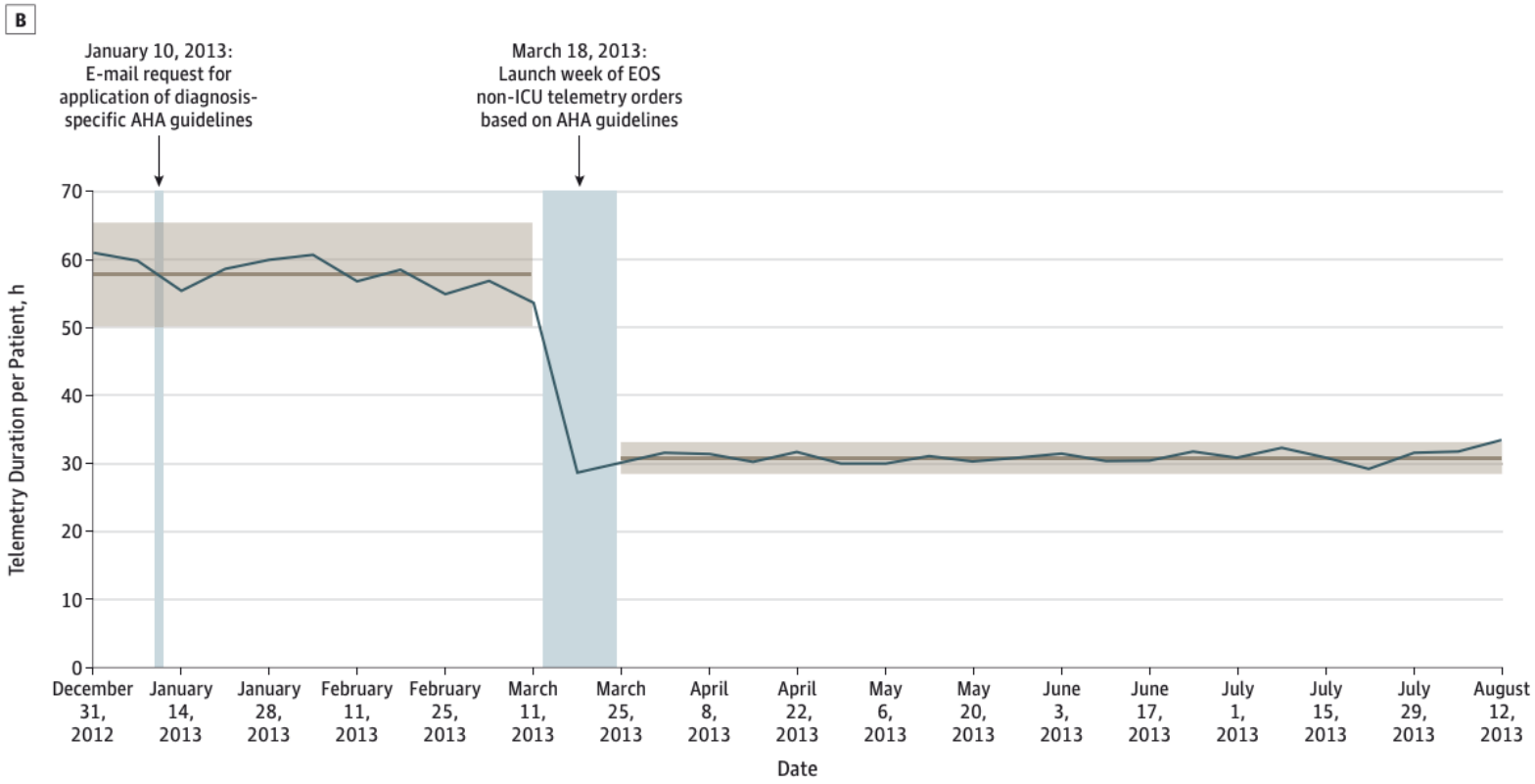
doi:10.1001/jamainternmed.2014.4491

Empowerment – Telemetry

Reduced duration of monitoring

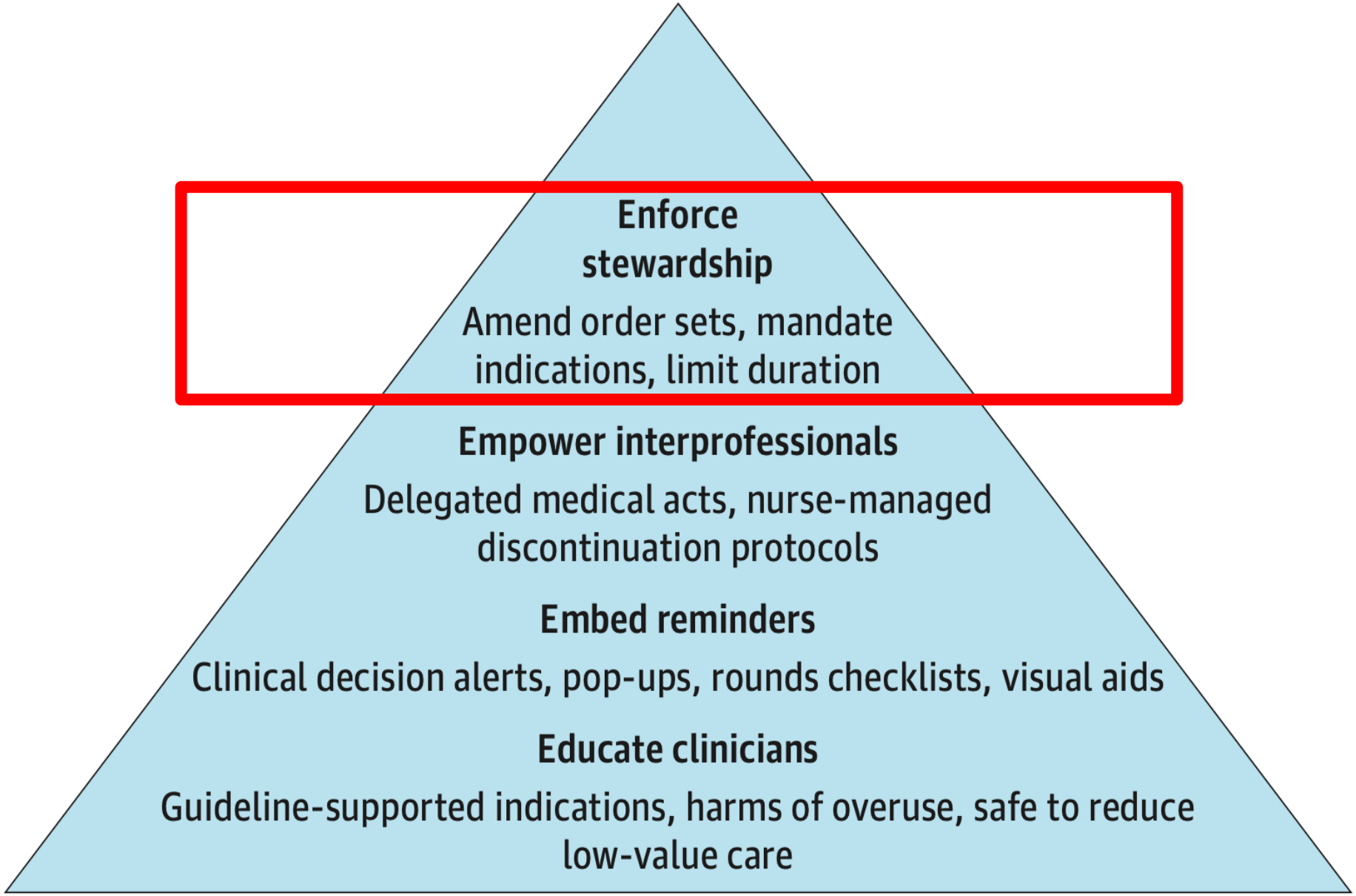
No change in adverse outcomes

Decreased costs



doi:10.1001/jamainternmed.2014.4491

The 4 E'S


Enforce stewardship
Amend order sets, mandate indications, limit duration
Empower interprofessionals
Delegated medical acts, nurse-managed discontinuation protocols
Embed reminders
Clinical decision alerts, pop-ups, rounds checklists, visual aids
Educate clinicians
Guideline-supported indications, harms of overuse, safe to reduce low-value care

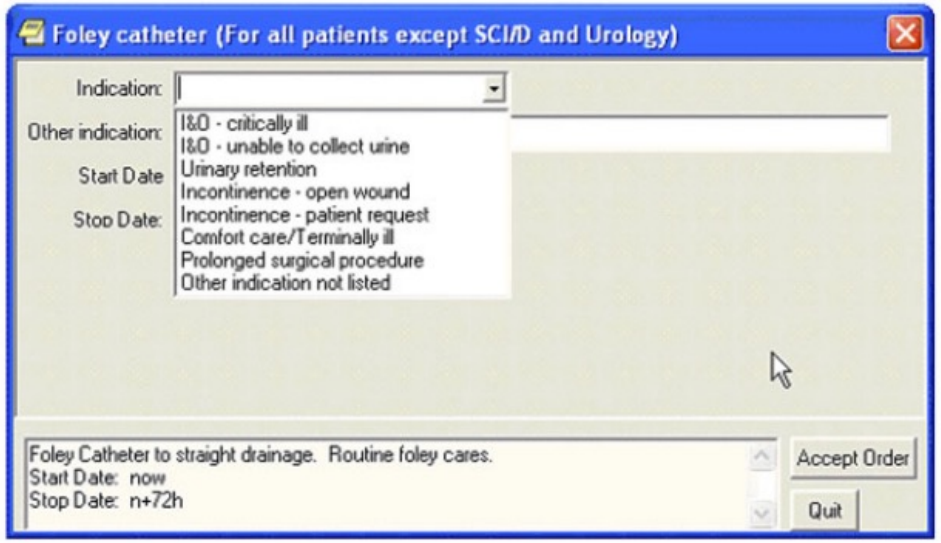
Enforcement

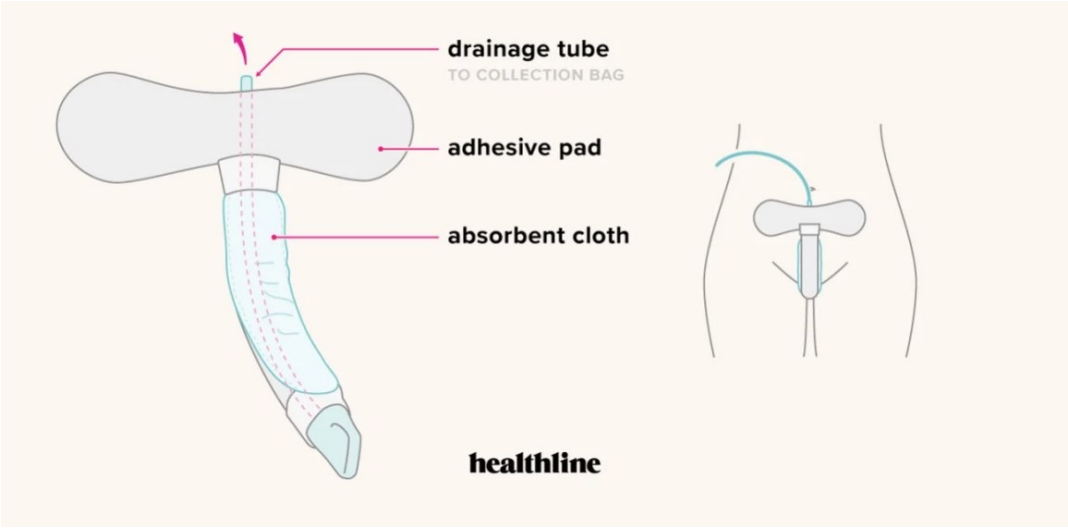
Hardwiring rules that promote high-value care into the electronic medical record.

Adds to the other E’s and enforces stewardship

Tends to be the most effective type of intervention but hardest to implement

Enforcement – Urinary catheters





Box 1 Indications for indwelling urethral catheter use (from 2009 Centers for Disease Control and Prevention guideline[14])

A. Examples of appropriate indications for indwelling urethral catheter use

- Patient has acute urinary retention or bladder outlet obstruction
- Need for accurate measurements of urinary output in critically ill patients
- Perioperative use for selected surgical procedures:
  1. Patients undergoing urologic or other surgery on contiguous structures of genitourinary tract
  2. Anticipated prolonged surgery duration; catheters inserted for this reason should be removed in postanesthesia care unit
  3. Patients anticipated to receive large-volume infusions or diuretics during surgery
  4. Need for intraoperative monitoring of urinary output
- To assist in healing of open sacral or perineal wounds in incontinent patients
- Patient requires prolonged immobilisation (eg, potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures)
- To improve comfort for end-of-life care if needed

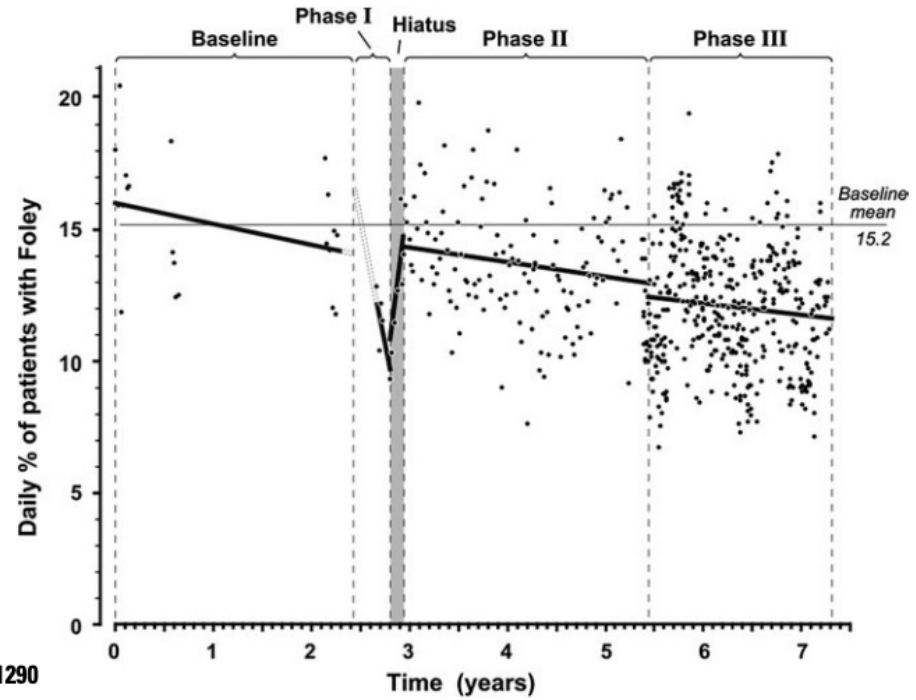
B. Examples of inappropriate uses of indwelling catheters

- As a substitute for nursing care of the patient or resident with incontinence
- As a means to obtain urine for culture or other diagnostic tests when patient can voluntarily void
- For prolonged postoperative duration without appropriate indications (eg, structural repair of urethra or contiguous structures, prolonged effect of epidural anesthesia, etc.)

Enforcement – Urinary catheters

Lower catheterization rates

Reduces rate of complications (e.g., CAUTI)



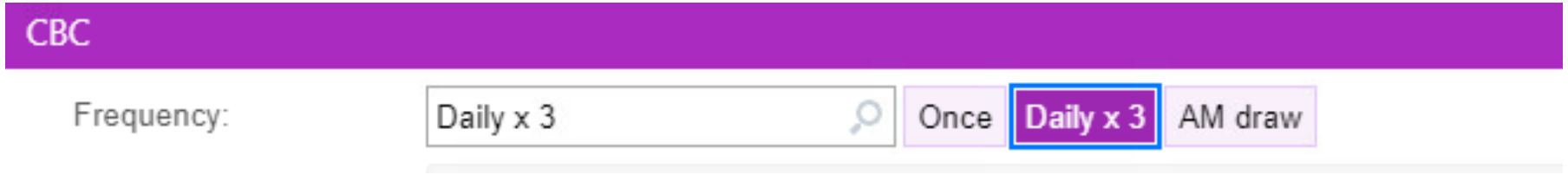
Clinical Infectious Diseases 2011;52(11):1283–1290

Results. The daily prevalence of FC use dropped steeply during intervention phase I (5.5 months), from a 15.2% baseline mean to a 9.3% nadir, but rebounded quickly during the subsequent hiatus phase (1.2 months). It dropped again (mean, 13.6%) during intervention phase II (27.3 months) and even further (mean, 12.0%) during intervention phase III (22.8 months) ($P \leq .001$, phase II or III vs baseline). Compared with baseline, during phase III (with the dedicated FC nurse) the mean daily percentages of nonordered and nonindicated FCs dropped from 17% to 5.1% and from 15% to 1.2%, respectively. During phases II and III combined, an estimated total of 6691 FC days were avoided.

Enforcement – Routine bloodwork

Limit ordering periods to pre-defined timeframes (e.g., 72 hours)

Remove ability to order daily labs



Enforcement – Routine bloodwork

Decrease overall testing

Increase number of test-free days

Results The search yielded 5646 studies with 41 articles that met inclusion criteria. We grouped interventions into one or more categories: audit and feedback, cost display, education, electronic medical record (EMR) change, and policy change. Most interventions lasted less than a year and used a multipronged approach. All five strategies were effective in most studies with EMR change being the most commonly used independent strategy. EMR change and policy change were the strategies most frequently reported as effective. EMR change was the strategy most frequently reported as highly effective.

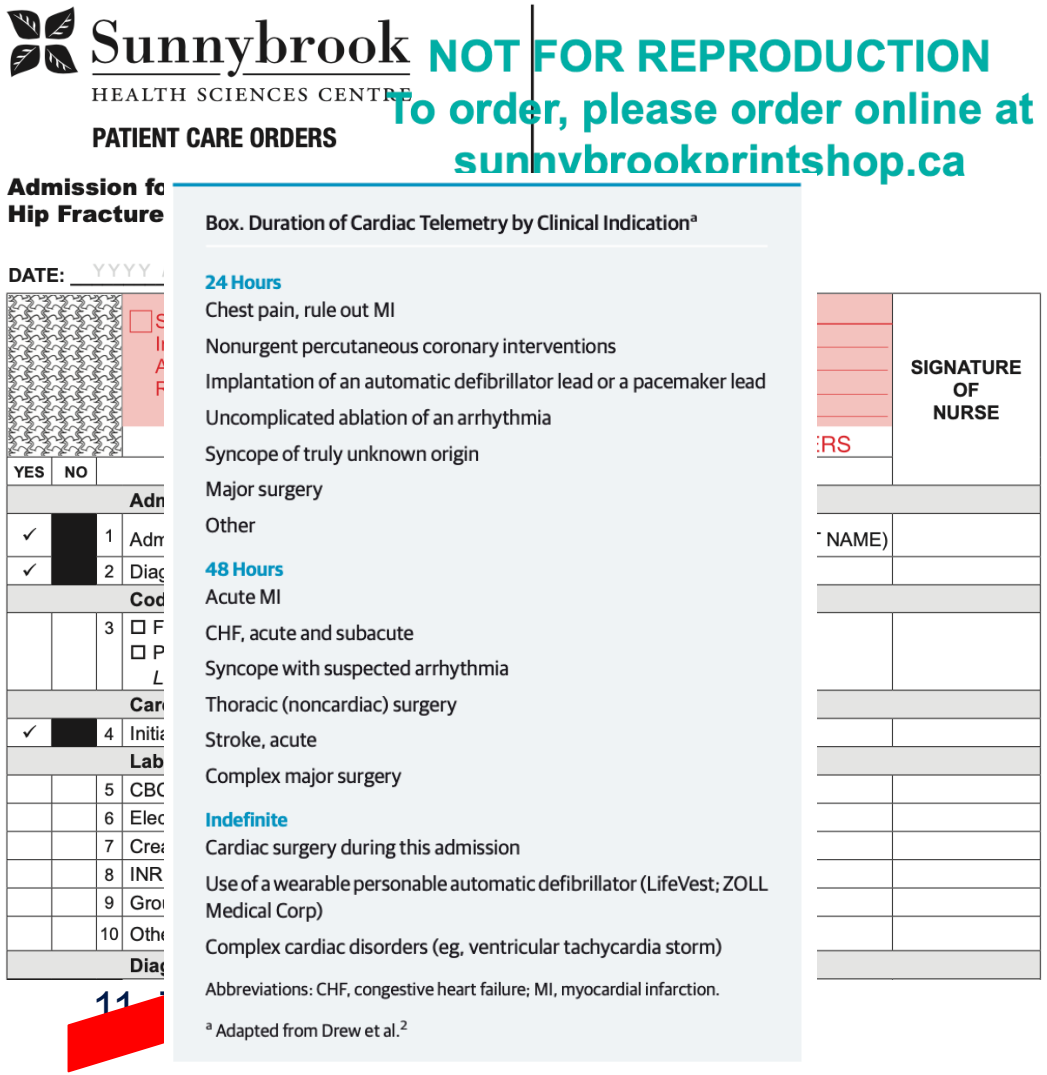
. *BMJ Open Quality* 2023;**12**:e002128.

Enforcement – Telemetry

Remove telemetry from order sets of non-supported indications

Mandating a dura

Forcing providers



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PATIENT CARE ORDERS

Admission fo
Hip Fracture

DATE: YYYY

YES	NO		
			Adm
✓		1	Adm
✓		2	Diag
			Cod
		3	☐ F ☐ P L
			Car
✓		4	Initia
			Lab
		5	CBC
		6	Elec
		7	Crea
		8	INR
		9	Gro
		10	Othe
			Diag

SIGNATURE OF NURSE

RS

NAME)

11

Box. Duration of Cardiac Telemetry by Clinical Indication[a]

24 Hours

Chest pain, rule out MI

Nonurgent percutaneous coronary interventions

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CHF, acute and subacute

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Complex cardiac disorders (eg, ventricular tachycardia storm)

Abbreviations: CHF, congestive heart failure; MI, myocardial infarction.

[a] Adapted from Drew et al.[2]

Table 1. 2017 American Heart Association Practice Standards, Class I Recommendations[a]

Indication	Duration of Monitoring (if Specified)
High-risk chest pain/coronary artery disease	
Early-phase ACS (<24 h)	24-48 h or until ruled out with biomarkers
After MI, with or without revascularization	12-24 h if revascularization of all lesions; 24-48 h if residual lesions
Newly diagnosed left main coronary lesion	Until revascularized
Targeted temperature management (ie, therapeutic hypothermia)	Clinical judgment
Vasospastic angina (ie, Prinzmetal)	Until symptom resolution
Apical ballooning syndrome (ie, Takotsubo cardiomyopathy)	Until symptom resolution
Periprocedure monitoring	
After open heart surgery, complicated or uncomplicated	48-72 h; until discharge from acute care if high risk for AF[b]
After implantation of mechanical circulatory support or if hemodynamic deterioration in patient with preexisting support device	Until discharge
Clinically significant cardiovascular or hemodynamic deterioration in patient with mechanical circulatory support	Until discharge
TAVR/TAVI	72 h
Other transcatheter procedures (ie, VSD, ASD, valvuloplasty)	Duration varies based on procedure and patient factors
Serious comorbidities (ie, heart failure) undergoing any ablation	12-24 h
Complex ablations (ie, pulmonary vein isolation)	12-24 h
After atrioventricular nodal ablation	12-24 h
Temporary pacemaker (transcutaneous or transvenous)	Until device removed or replaced with permanent device
After pacemaker or ICD placement in pacemaker-dependent patient	12-24 h
Arrhythmias	
Postresuscitation or hemodynamically unstable VT	Until ICD implantation, arrhythmia suppression, or resolution of reversible cause
Atrial tachyarrhythmias (new, recurrent, ongoing rate management, initiation of new antiarrhythmic; regardless of hemodynamic stability)	During active treatment planning or therapy management
Symptomatic sinus bradycardia	Until definitive therapy rendered
Symptomatic or asymptomatic second or third-degree atrioventricular block (except asymptomatic Wenckebach [no indication])	Clinical judgment
Hemodynamically unstable or symptomatic congenital or genetic arrhythmic syndromes (ie, WPW, Brugada, LQTS)	Until stabilization of rhythm, appropriate therapy, or resolution of reversible cause
Event requiring ICD shocks, requiring admission	Duration of hospitalization
Syncope of suspected cardiac origin	
Syncope suspected to be of cardiac origin	>24 h, until cause and treatment initiated
Other conditions	
Acute decompensation of congestive heart failure	Until event precipitating presentation treated
Cerebrovascular accident	24-48 h
Moderate to severe imbalance of potassium or magnesium	Until normalization
Drug overdose	Until free of influence of drug and clinically stable

Enforcement – Telemetry

Remove telemetry from order sets of non-supported indications

Mandating a duration of monitoring

Forcing providers to include an indication

Decrease default duration of monitoring from 72 to 48 hours

For our intervention, we reduced the duration of telemetry within our electronic ordering system in November 2013 so that orders had to be renewed within 48 hours or they were discontinued.

Enforcement – Routine bloodwork

Improves ordering appropriateness

Decreases overall telemetry orders

Reduces duration monitored

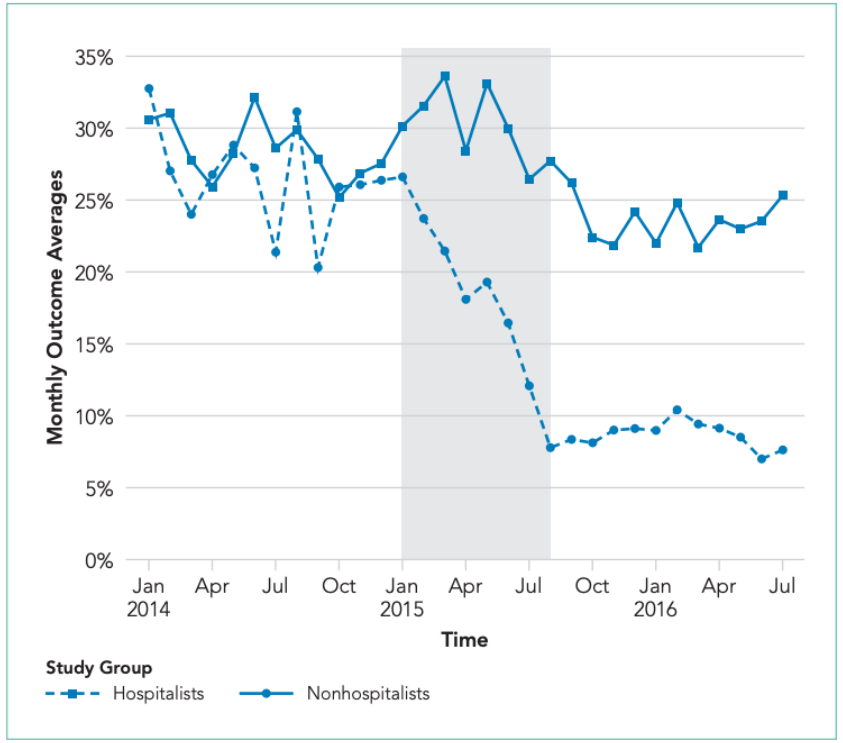


FIG. Primary outcome: telemetry utilization per patient visit. Gray area represents the "run-in period" during which the interventions were being rolled out on the hospitalist service. Removal of the telemetry order from the hospitalist admission order set occurred on March 23, 2015. System-wide change to the EHR telemetry order occurred on July 6, 2015

RESULTS: Among hospitalist service patients, telemetry utilization was reduced by 69% (95% confidence interval [CI], −72% to −64%; $P < .001$), whereas on other services the reduction was a less marked 22% (95% CI, −27% to −16%; $P < .001$). There were no significant increases in mortality, code event rates, or care escalation, and there was a trend toward improved utilization appropriateness.

The 4 E’S

Enforce stewardship
Amend order sets, mandate indications, limit duration
Empower interprofessionals
Delegated medical acts, nurse-managed discontinuation protocols
Embed reminders
Clinical decision alerts, pop-ups, rounds checklists, visual aids
Educate clinicians
Guideline-supported indications, harms of overuse, safe to reduce low-value care

Multi-component interventions

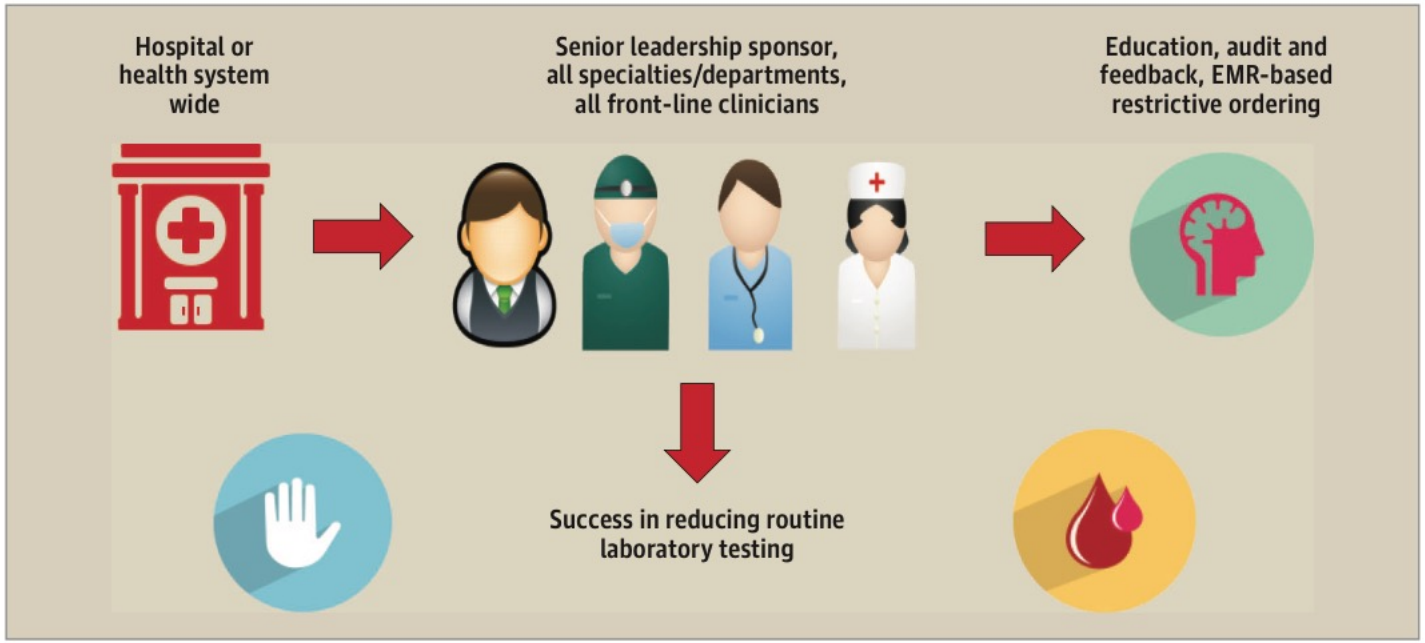
DISCUSSION

In summary, healthcare providers should strongly consider employing interventions to avoid unnecessary catheter placement (such as catheter placement restrictions) and to prompt removal of unnecessary catheters by reminders and stop orders, with special consideration for nurse-initiated removal protocols. The strength of the evidence is moderate to high. These

To cite: Meddings J, Rogers MAM, Krein SL, *et al*. *BMJ Qual Saf* 2014;**23**: 277–289.

Multi-component interventions

Figure. Algorithm for Implementation of Interventions to Reduce Repetitive Laboratory Testing[56]



JAMA Intern Med. 2017;177(12):1833-1839.

Multi-component interventions

Hospitalist Intervention for Appropriate Use of Telemetry Reduces Length of Stay and Cost

OBJECTIVE: Our intervention for appropriate use included: (1) a hospitalist-led, daily review of bed utilization, (2) hospitalist-driven education module for trainees, (3) quarterly feedback of telemetry usage, and (4) financial incentives.

CONCLUSIONS: A multipronged, hospitalist-driven intervention to improve appropriate use of telemetry reduces LOS and cost, and increases knowledge of cost-saving actions among trainees. *Journal of Hospital Medicine* 2015;10:627–632. © 2015 Society of Hospital Medicine

Keys to the The 4 E’S

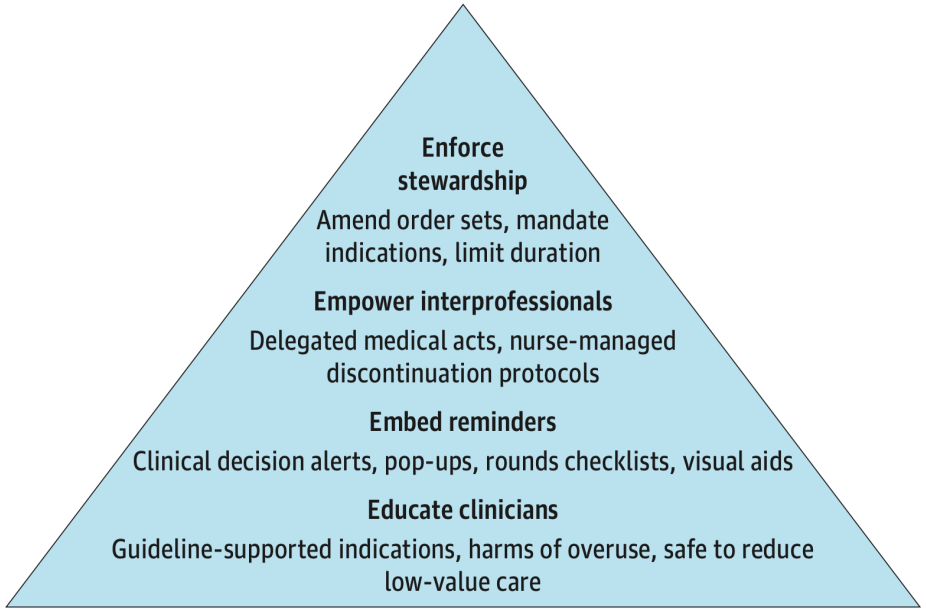
Forming a multidisciplinary QI team

Setting realistic aims

Engaging with a variety of stakeholders

Addressing what is within your control

Matching your solution to your problem



Objectives

1. Describe evidence-based indications for three common forms of low-value care on medical wards
2. Discuss documented harms and epidemiology of overuse
3. Summarize quality improvement initiatives that can reduce provision of these forms of inappropriate care

Thank you!

Any questions?

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