

Controversies in CAUTI Prevention

Mohamad Fakh, MD, MPH

Associate Professor of Medicine

Wayne State University School of Medicine
St John Hospital and Medical Center, Detroit, MI

Controversies

1. Appropriate indications
2. Where and how do we intervene?
3. Improvement in appropriateness or reduction in use?
4. How do we define CAUTI?
5. NHSN vs. population based CAUTI rates
6. Screening urine cultures
7. Bacteriuria and antimicrobial use

Controversy #1: what are the appropriate indications?

- We support the 2009 CDC HICPAC guidelines
- Consensus based guidelines that provide a reasonable guide to institutions, healthcare workers
- Hospitals are encouraged to have a clear identification of what is considered appropriate
- Disseminate to healthcare workers the acceptable indications for use at your facility

2009 Prevention of CAUTI HICPAC Guidelines

(Gould et al, Infect Control Hosp Epidemiol 2010; 31: 319-326)

Table 2.

A. Examples of Appropriate Indications for Indwelling Urethral Catheter Use ¹⁻⁴

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:

- Patients undergoing urologic surgery or other surgery on contiguous structures of the genitourinary tract
- Anticipated prolonged duration of surgery (catheters inserted for this reason should be removed in PACU)
- Patients anticipated to receive large-volume infusions or diuretics during surgery
- Need for intraoperative monitoring of urinary output

To assist in healing of open sacral or perineal wounds in incontinent patients

Patient requires prolonged immobilization (e.g., 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 of obtaining urine for culture or other diagnostic tests when the patient can voluntarily void

For prolonged postoperative duration without appropriate indications (e.g., structural repair of urethra or contiguous structures, prolonged effect of epidural anaesthesia, etc.)

Note: These indications are based primarily on expert consensus.

Controversy #2: where and how do we intervene?

- Avoid placement?
- Prompt removal when no longer needed?
- Proper insertion technique?
- Proper maintenance?
- All?
- The absence of the catheter= no CAUTI+ no mechanical complications

Reducing Risk of CAUTI

Limit catheter use to indications (Avoid placing the catheter unless appropriately indicated)

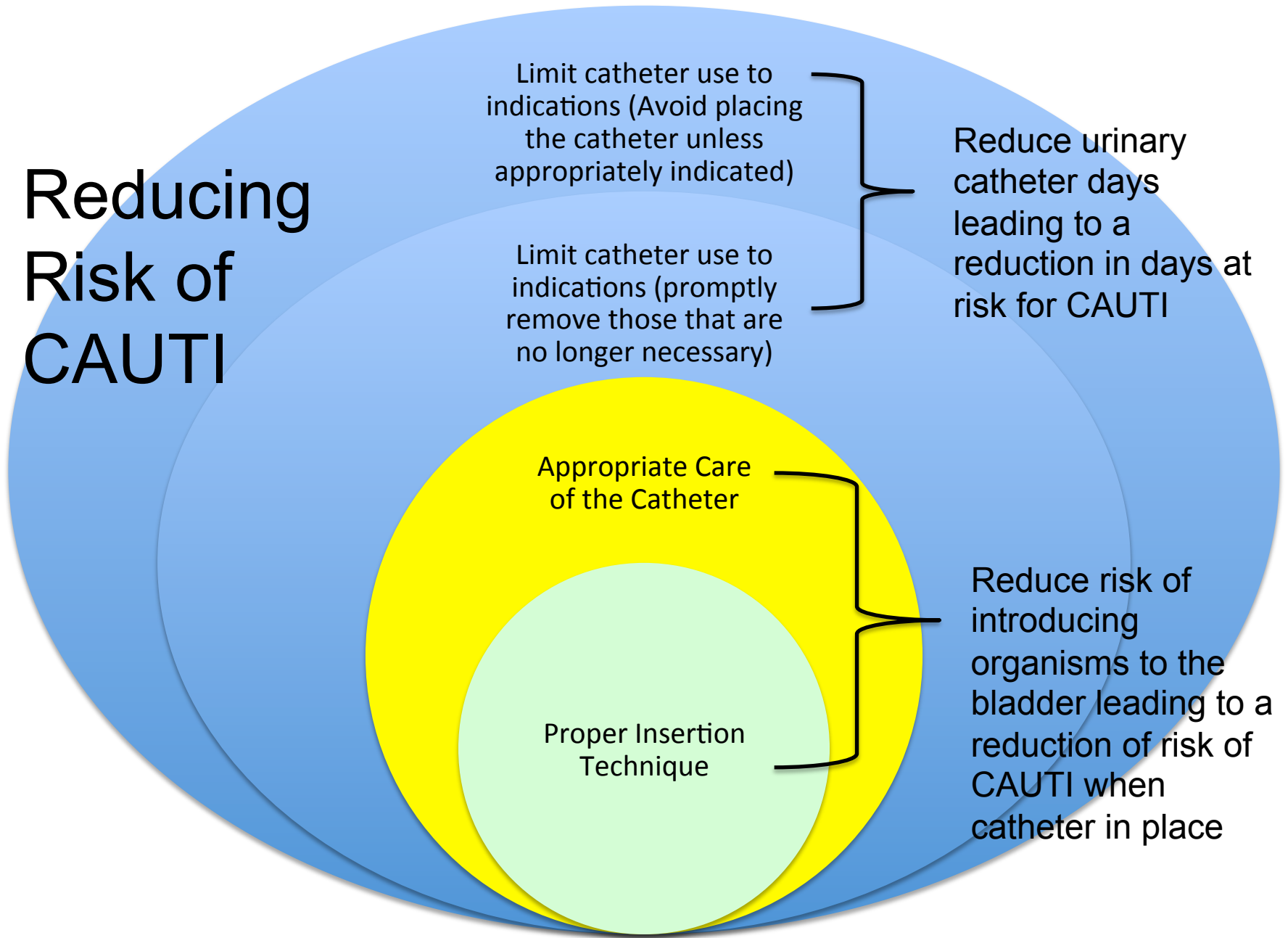
Limit catheter use to indications (promptly remove those that are no longer necessary)

Reduce urinary catheter days leading to a reduction in days at risk for CAUTI

Appropriate Care of the Catheter

Proper Insertion Technique

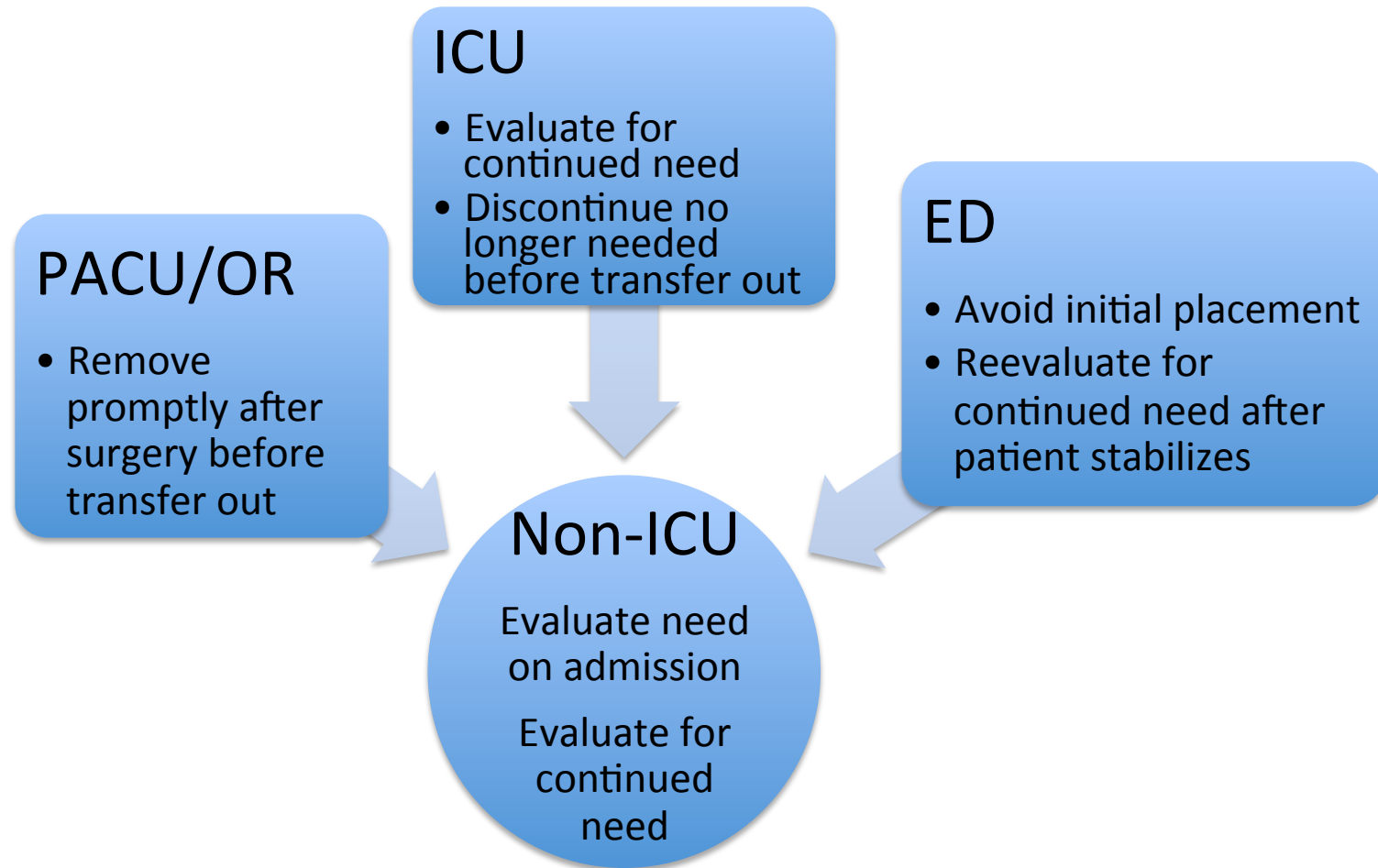
Reduce risk of introducing organisms to the bladder leading to a reduction of risk of CAUTI when catheter in place



Controversy #2: where and how do we intervene?

- Wish list: multi-departmental, multidisciplinary approach (whether on the same unit or in between units)
- In addition to non-ICU, target areas of high placement (ED), or high use (ICU, OR)
- Synergy/ support between the different units

Controversy #2: where do we intervene?



Controversy #3: improvement in appropriateness or reduction in use?

- Should we follow changes in use or improvements in appropriateness or both?
- Reduction in catheter use should translate to an improvement in appropriateness
- Evaluation for appropriateness is helpful if no changes in use are seen with intervention

Improvements in utilization depend on the reduction of the inappropriate use

	Baseline			Intervention		
Patient Days	Catheter days	UC Prevalence	Inappropriate UC days	Inappropriate UC days	Catheter Days	UC Prevalence
1,000	200	20%	40% (80 cath-days)	20% (40 cath-days)	160	16%
1,000	200	20%	40% (80 cath-days)	10% (20 cath-days)	140	14%

So you have intervened...

- The results show marked improvement in appropriate indications, but no significant change in urinary catheter utilization
- What are the possibilities?

Improved appropriateness but not utilization

- Change in population to those that are more likely to need the catheter (very unlikely unless there was a shift in the types of patients admitted to the unit)
- Labeling of cases as having appropriate indications although they are not

Controversy #4: what is CAUTI?

- Multiple definitions
- Clinical (IDSA)
- Clinician (the physician's impression)
- Surveillance (NHSN)

IDSA Guidelines for Diagnosis of CAUTI

(Hooton, Clin Infect Dis 2010; 50:625–663)

- Signs and symptoms: “new onset or worsening of fever, rigors, altered mental status, malaise, or lethargy with no other identified cause; flank pain; costovertebral angle tenderness; acute hematuria; pelvic discomfort”



Many signs and symptoms are not specific for CAUTI!!

IDSA Guidelines for Diagnosis of CAUTI

(Hooton, Clin Infect Dis 2010; 50:625–663)

- If catheter removed: “dysuria, urgent or frequent urination, or suprapubic pain or tenderness”
- Spinal cord injury: “increased spasticity, autonomic dysreflexia, or sense of unease”

Pyuria is not diagnostic of CAUTI

(Hooton, Clin Infect Dis 2010; 50:625–663)

- Pyuria does **not** help differentiating asymptomatic bacteriuria from CAUTI
- Pyuria + bacteria **≠** CAUTI

Inappropriate Treatment of Asymptomatic Bacteriuria

(Cope, Clin Infect Dis 2009; 48: 1182-8)

- The study evaluated those with asymptomatic bacteriuria and the factors associated with inappropriate antibiotic use
- Advanced age, type of predominant organism (gram negative), and an elevated urine white blood cells count were significantly associated with inappropriate treatment

The Clinician's Practice

- Bacteriuria or candiduria are common in patients with an indwelling urinary catheter
- Clinicians tend to treat asymptomatic bacteriuria
- Reduce inappropriate antibiotic use with obtaining urine cultures **only when indicated**

NHSN Symptomatic CAUTI

(www.cdc.gov/nhsn/PDFs/pscManual/7pscCAUTIcurrent.pdf)

- Surveillance definition: depends on having a **positive urine culture** and clinical/ laboratory findings.
- Heavily dependent on the presence of **fever**
- May help evaluate improvement for the same hospital over time for those that are catheterized

Figure 1: Identification and Categorization of SUTI Indwelling Catheter at the Time of Specimen Collection

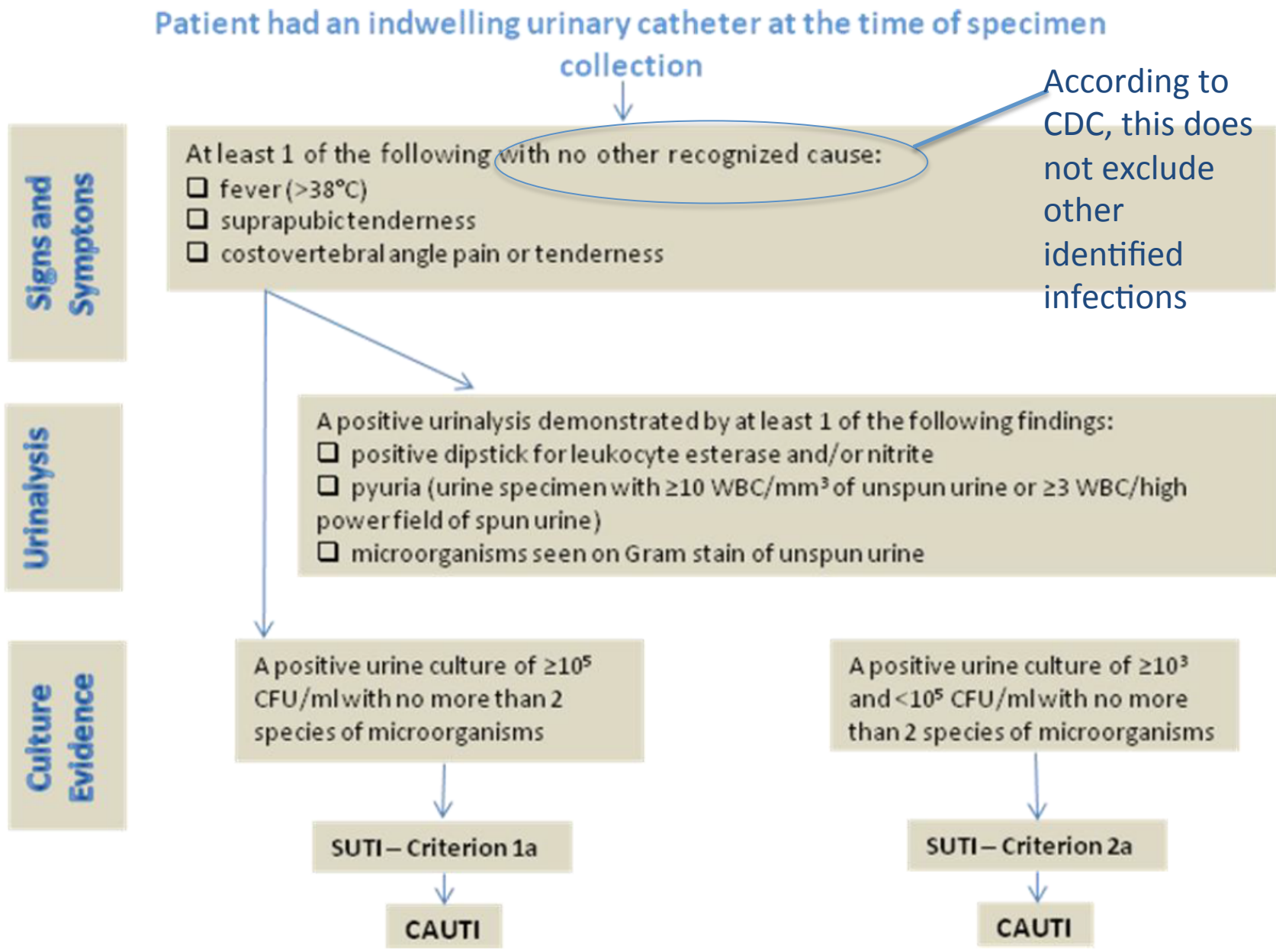
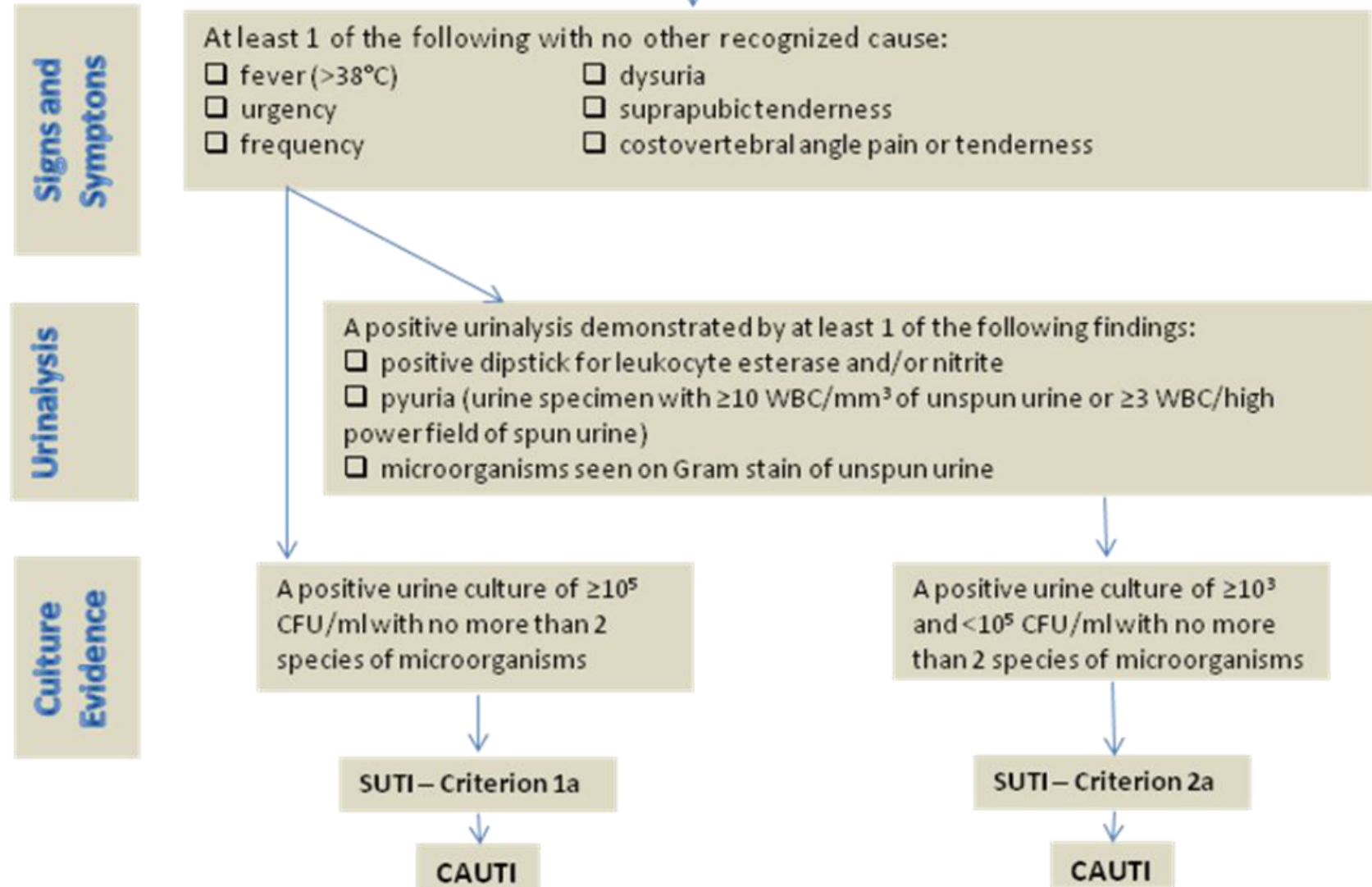


Figure 2: Identification and Categorization of SUTI Indwelling Catheter Discontinued in Prior 48 Hours

Patient had an indwelling urinary catheter discontinued within 48 hours prior to specimen collection



NHSN Symptomatic CAUTI

(www.cdc.gov/nhsn/PDFs/pscManual/7pscCAUTIcurrent.pdf)

- Caution: if practice of obtaining urine cultures changes, the NHSN rate may be influenced without a change in true CAUTI
- Changing the frequency of obtaining urine cultures will affect the number of NHSN symptomatic CAUTI

Number of NHSN CAUTIs with a change in urine cultures (n=1,000 patients)

	Prevalence of Bacteriuria	% of Urine Cultures Obtained	Prevalence of Fever >38°C	Number of Symptomatic NHSN CAUTIs
Scenario1	30%	30%	20%	18
Scenario2	30%	60%	20%	36
Scenario3	30%	10%	20%	6

- If we increase the number of urine cultures, we risk overestimating the NHSN CAUTI rate and not seeing an improvement with our interventions
- The opposite may happen if we reduce the use of urine cultures (for example, treat for possible CAUTI without obtaining a urine culture)

What may increase NHSN CAUTI rate despite improvements in process?

- An increase in obtaining urine cultures
- An intervention that leads to significant reduction in urinary catheter use, selecting a **higher risk population** (Fakih et al, *Am J Infect Control*. 2011 Aug 24; Wright et al, *Infect Control Hosp Epidemiol* 2011;32:635-640)

Controversy #5: NHSN vs. population based CAUTI rate

- NHSN rate reflects the risks related to insertion and maintenance of the catheter
- May be very helpful in settings where there are no significant changes in use of catheter
- Used in the ICU, may be difficult to calculate in the non-ICU because of data collection burden (catheter-days)

Population CAUTI rate: advantages

- The population based rate (with patient-days as a denominator) would help identify if there was improvement in CAUTI related to a reduction in urinary catheter use (Fakih et al, Am J Infect Control 2012; 40: 359-64)
- Easier to use in the non-ICU (saves the data collection burden of obtaining catheter-days)
- Reflects both changes in NHSN rate and utilization ratio
- Population rate= NHSN rate x UR x10

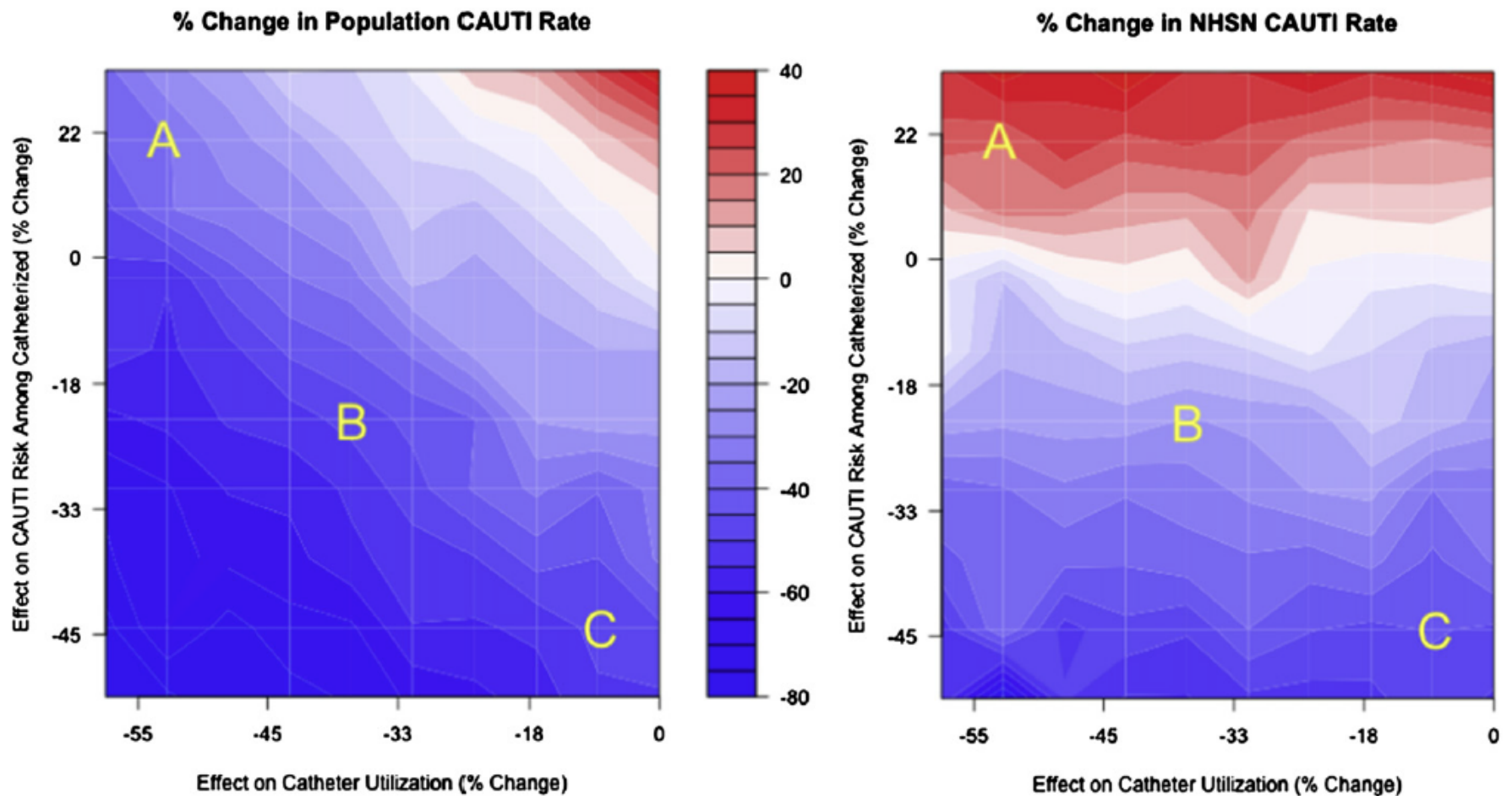


Fig 2. Percent change in population CAUTI rate and NHSN CAUTI rate across a wide range of interventions. Points A, B, and C reflect different simulated interventions. Red areas indicate that for interventions represented by these areas, the measure increased from preintervention to postintervention; blue areas indicate that the measure decreased over this period. The magnitude of the increase or decrease is reflected by the bar in the center in terms of percent change.

(Fakih et al, Am J Infect Control 2012; 40: 359-64)

Controversy #6: Screening Urine Cultures

- The practice: “screening culture on admission”, “standing orders” or “reflex orders” for urine cultures based on urinalysis results
 1. may not help the hospital avoid non-reimbursement
 2. May increase utilization of additional resources (testing, antibiotics, consults)
 3. May adversely affect patients exposing them to inappropriate testing and treatments

Patient presents with CHF from nursing home with chronic urinary catheter...

- On admission, urine culture is done to “document present on admission” and grows *E. coli*
- Six days later, the patient develops fever (102°F) and chills. Repeat urine culture grows *E. coli*.
- The case fits the NHSN definition of symptomatic CAUTI and also would not be reimbursable by CMS.

Controversy #7: Antimicrobial use and bacteriuria

- So we have a positive urine culture: when should we use antibiotics?
- Understanding the prevalence of asymptomatic bacteriuria in patients with indwelling urinary catheters
- Understanding the risks associated with inappropriate antimicrobial use

Table 2. Prevalence of asymptomatic bacteriuria in selected populations.

Population	Prevalence, %	Reference
Healthy, premenopausal women	1.0–5.0	[31]
Pregnant women	1.9–9.5	[31]
Postmenopausal women aged 50–70 years	2.8–8.6	[31]
Diabetic patients		
Women	9.0–27	[32]
Men	0.7–11	[32]
Elderly persons in the community ^a		
Women	10.8–16	[31]
Men	3.6–19	[31]
Elderly persons in a long-term care facility		
Women	25–50	[27]
Men	15–40	[27]
Patients with spinal cord injuries		
Intermittent catheter use	23–89	[33]
Sphincterotomy and condom catheter in place	57	[34]
Patients undergoing hemodialysis	28	[28]
Patients with indwelling catheter use		
Short-term	9–23	[35]
Long-term	100	[22]

^a Age, ≥70 years.

IDSA Guidelines for Asymptomatic Bacteriuria

(Nicolle et al, Clin Infect Dis 2005; 40:643–54)

- Screening and treatment of bacteriuria recommended for:
 1. Pregnancy
 2. Before transurethral resection of the prostate
 3. Urologic procedures for which mucosal bleeding is anticipated

IDSA Guidelines for Asymptomatic Bacteriuria

(Nicolle et al, Clin Infect Dis 2005; 40:643–54)

- Screening and treatment of **asymptomatic** bacteriuria not recommended for
 1. Non-pregnant women
 2. Diabetic women
 3. Elderly in the community or institutionalized
 4. Persons with spinal cord injury
 5. Patients with indwelling catheter

Risk of Obtaining Cultures with no Symptoms

Urinary catheter present in an asymptomatic patient



Cloudy, odorous urine, sediments



Inappropriate use of urine culture



Inappropriate antimicrobial use



More resistant organisms, *Clostridium difficile*, increased cost, Patient harm

Reduce urinary catheter
use

Avoid obtaining urine
cultures unless clinically
indicated

Reducing
CAUTI

Promote aseptic
insertion and
maintenance

Do not treat
asymptomatic
bacteriuria except for
selected conditions

Summary: steps to success

1. Have clearly identified appropriate indications for urinary catheter use
2. Multi-departmental/ multidisciplinary approach to reduce urinary catheter use
3. Promote proper insertion and maintenance
4. Avoid obtaining urine cultures unless clinically indicated
5. Do not treat asymptomatic bacteriuria except for selected conditions

Numbers are important, but more important is establishing a process to improve safety at your hospital...



You do not want to run after one carrot and miss a whole bunch!