"Test Smart, Treat Smart": Optimizing Bacteriuria Management in Veterans with Spinal Cord Injury and Disorder

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Objectives



To describe the implications of national and VHA policies surrounding bacteriuria management on clinical practice



To visualize the unique challenges and opportunities of bacteriuria management of Veterans with spinal cord injury and disorder (SCI/D)



To explore previous work done on outcomes of bacteriuria management for Veterans with SCI/D



To discuss our current work to aimed to provide diagnostic and antibiotic stewardship for bacteriuria management to this population

Disclosure of Conflict of Interest

- Felicia Skelton-Dudley has no financial conflicts of interest relevant to this activity.
- Grant/research support
 - VA Health Services R&D Career Development Award 1 IK2 HX002484-03 (Optimizing Bacteriuria Management in Veterans with Spinal Cord Injury)
 - VA RR&D Merit Award 1 I01 RX002595-01A2 (Bacteriophage to treat Multi-Drug Resistant UTI after Spinal Cord Injury)
- Advisory Board:
 - American Paraplegia Society Board of Directors

Poll Question #1

- What is your primary role in VA?
 - Student, trainee, or fellow
 - Clinician
 - Researcher
 - Administrator, manager or policy-maker
 - Other

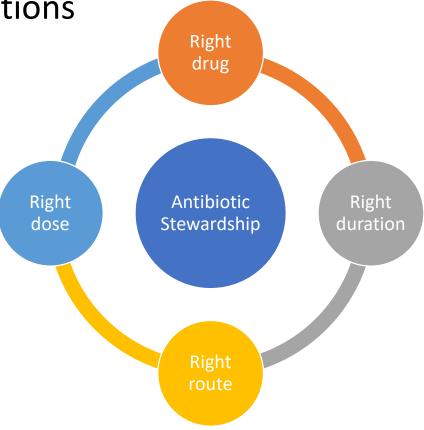
Poll Question #2

- How familiar are you with the VHA System of Care for Spinal Cord Injury and Disorder (SCI/D)?
 - 1 (not at all familiar)
 - 2
 - 3
 - 4
 - 5 (very familiar)

Antibiotic Stewardship to Combat Antibiotic Resistance: a National and Global Priority

Initiatives from the White House, Centers for Disease

Control, and the United Nations



Catheter-Associated UTI (CAUTI) and Asymptomatic Bacteriuria (ASB): Where Policy and Clinical Practice Collide

"Getting to Zero"

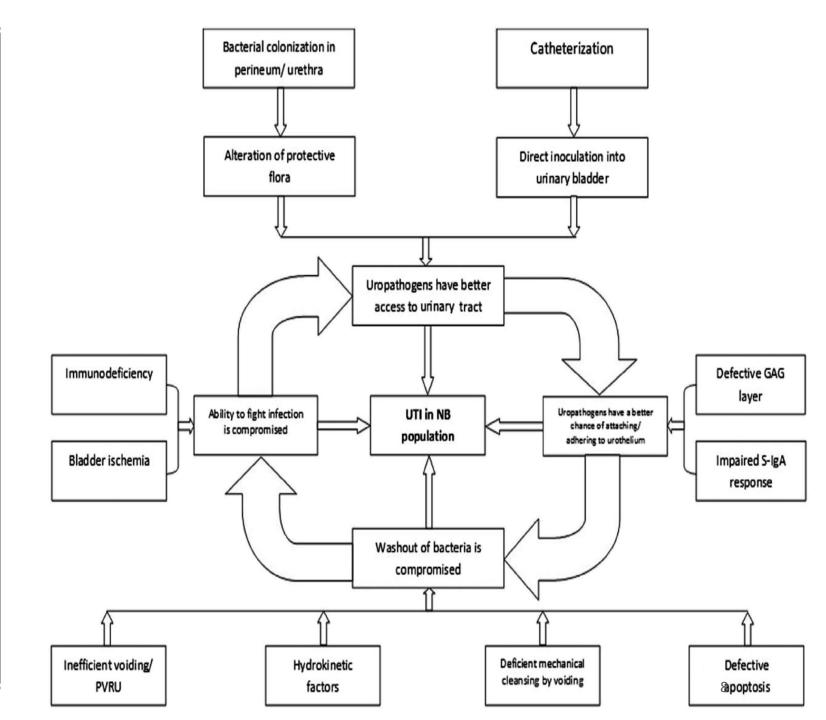
Clinical Practice
Guidelines

Cabana: Why physicians don't follow guidelines

Clinical Bacteriuria Management

Bacteriuria Management in SCI/D Presents Unique Challenges

McKibben, et al, *Urol Clin N Am*, 2015.



CAUTI in people with SCI/D is



Common



Costly



Confusing

Diseases of the genitourinary tract amongst the most common reasons persons with SCI/D access health care

Skelton, et al, *Arch Phys Med Rehabil*. 2019 Sep;100(9):1614-1621.

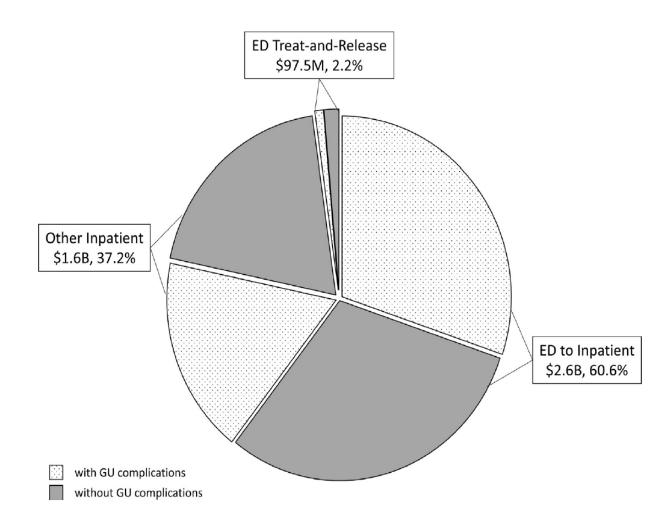
Retrospective cross-sectional and cost analysis of the 2006-2015 National Inpatient Sample and National Emergency Department Sample from the Healthcare Cost and Utilization Project

SCI/D-related encounters identified using International Classification of Disease, Ninth Edition, Clinical Modification (ICD-9-CM) diagnosis codes

- Inpatient sample included 1,796,624 hospitalizations. Top three reasons for admission:
 - -septicemia (13.4%)
 - -rehabilitation care (6.8%)
 - -urinary tract infections (6.7%)
- Emergency department sample included 618,118 treat-and-release visits Top three reasons for presentation:
 - -urinary tract infections (16.7%)
 - -genitourinary symptoms and ill-defined conditions (4.7%)
 - -complication of a medical device, implant or graft (4.7%)

Total costs for encounters associated with genitourinary conditions exceed \$2 billion per year

 Skelton, F, et al. Arch Phys Med Rehabil. 2019.



Inpatient and Emergency Department visits for persons with SCI/D Costs expressed as millions (M) or billions (B) of 2015 US dollars

Diagnosing CAUTI after SCI/D is challenging!

- High rates of CAUTI, but also high rates of ASB that does not require treatment
- Presenting signs and symptoms of infection are challenging to interpret
- High rates of multi-drug resistant organisms isolated from the urine and antibiotic complications, such as *C.* difficile infection

- Nicolle LE, et al. Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019, Clin Infect Dis, 2019.
- Fitzpatrick MA, et al, *J Spinal Cord Med*, 2017.
- Ramanathan S, et al, Am J Infect Control, 2014.

Bacteriuria Management in SCI/D Presents Unique Opportunities



Patient Engagement



Unique Model of Care

-VHA SCI/D guidelines



SCI/D-specific Interventions and Implementation

Overall experience of life

Natural and living environment

Governance and basic rights

Economic and physical safety

Social relations & leisure

what does

QUALITY of LIFE

mean to you?

Material living conditions

Productive or main activity

Health

Education

The Importance of Patient Engagement in Bacteriuria Management with SCI/D



Medication adherence



How patients like to receive information

Seattle Minneapolis Syracuse Boston Milwaukee **Eleveland** East Orange Palo Alto St. Louis Richmond Denver Long Beach Hampton Albuquerque Memphis Augusta San Diego Dallas Hub Houston Tampa, San Antonio Miami Spoke San Juan

https://www.sci.va.gov/index.asp

VHA SCI/D System of Care

- 25 centers nationally
- Physiatrists as primary care physicians
- VHA 1176







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SCI/D-Specific Interventions and Implementation

Skelton-Dudley, F, et al. Topics in Spinal Cord Injury Rehabilitation, in press.

Acute care hospitalization



Current recommendations proposed recommendations

Daily assessment of presence and need of indwelling catheter

Admission assessment of bladder function and current bladder management strategy

SCI-specific

Avoid use of indwelling urinary catheter by considering alternative strategies

Discuss with SCI physician optimal strategy based on holistic review of patient

Emphasize importance of aseptic technique during catheter insertion, and proper maintenance

Same as current recommendations for indwelling catheters; focus on clean method for ICP

Provide feedback to units regarding urinary catheter use/CAUTI rates

Same as current recommendations, but include additional catheter types (i.e. ICP, external, and suprapubic)

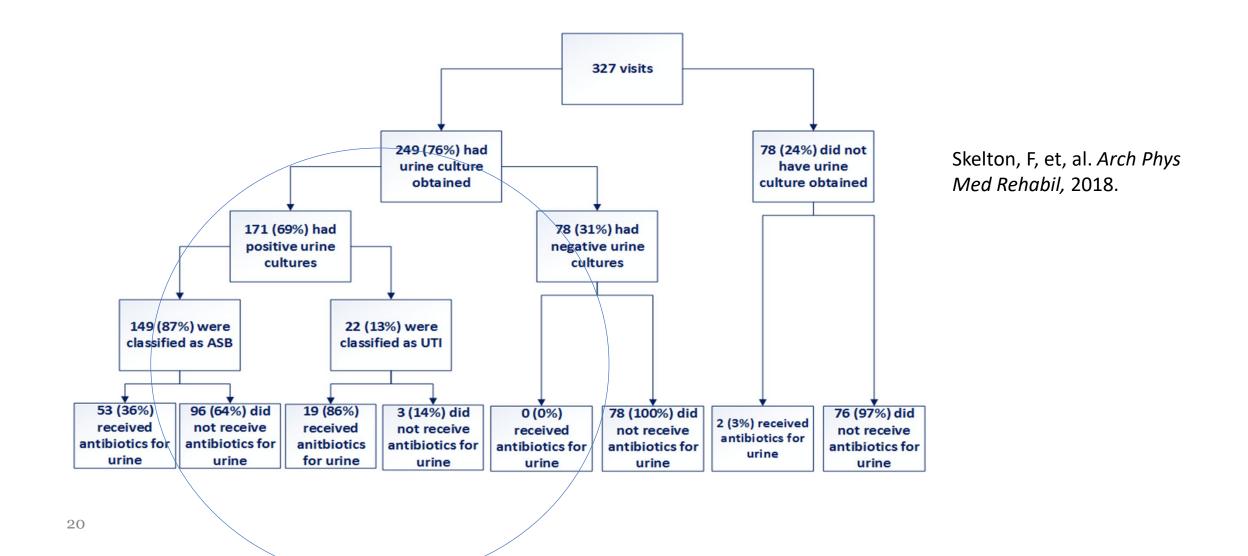
Identify and address patient and provider gaps in knowledge

Promote appreciation of asymptomatic bacteriuria vs CAÚTI

Figure 1. Catheter-associated urinary tract infection (CAUTI) bundle tailored to spinal cord injury (SCI) population. ICP = intermittent catheterization program.

Preliminary Studies

Positive Urine Cultures Drive Antibiotic Use



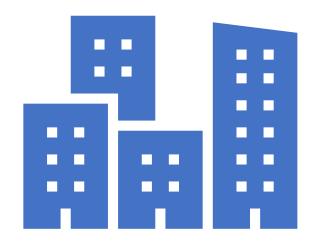
Bacteriuria Management and Outcomes at a Single VHA SCI/D Clinic

Predictors of Antibiotic Use for ASB							
	Univariate		Multivariate				
	OR (95% CI)	p-value	OR (95% CI)	p-value			
Age	1.06 (1.02-1.09)	<0.01*	1.05 (1.01-1.09)	<0.01**			
LE +	8.71 (1.11-68.22)	0.04*	4.88 (0.57-41.83)	0.15			
Nitrite +	2.44 (1.22-4.88)	0.01*	2.78 (1.31-5.90)	<0.01**			
UPO on culture	3.42 (1.69-6.89)	<0.01*	2.92 (1.38-6.18)	<0.01**			
OR=odds ratio; CI=confidence interval, LE=leukocyte esterase, UPO=urease-positive organism							

Healthcare
Utilization 60
Days after the
Annual
Evaluation
Encounter

	Received antibiotics for ASB	Did not receive antibiotics for ASB	p-value
ER visit, n (%)	2 (3.8%)	6 (6.3%)	0.512
Hospitalization, n (%)	6 (11.3%)	5 (5.3%)	0.178
Had another urine culture collected, n (%)	9 (17%)	13 (14%)	0.589
Diagnosed with UTI, n (%)	4 (7.5%)	5 (5.2%)	0.648
Diagnosed with urologic complication, n (%)	2 (3.8%)	5 (5.3%)	0.682

SCI/D-Specific Results
of a National
Veterans Health
Administration
Survey on Antibiotic
Stewardship



- 2012 web-based surveys administered to 130 facilities with inpatient and outpatient facilities
 - 23 facilities with SCI/D centers
 - 107 facilities without SCI/D centers

Skelton, F, et, al. J Spinal Cord Med. 2018.

Domain Antibiotic stowardship toom	Facility factor	Centers with SCI units N=23 (%)	Centers without SCI units N=107) (%)	P value			
Antibiotic stewardship team	ID physician was part of AS team	15 (65%)	32 (30%)	<0.01*			
	Clinical pharmacist/clinical pharmacy specialist was part of AS team	15 (65%)	36 (34%)	<0.04*			
	Clinical pharmacist/clinical pharmacy specialists had ID training	13 (57%)	21 (20%)	<0.01*			
Training programs	Pharmacy residency program	23 (100%)	79 (74%)	<0.01*			
	ID pharmacy residency program	6 (26%)	6 (6%)	<0.01*			
	ID fellowship program	22 (96%)	46 (43%)	<0.01*			
	Internal medicine residency program	23 (100%)	72 (67%)	<0.01*			
	Surgical residency program	22 (96%)	62 (58%)	<0.01*			
	Emergency medicine residency program	7(30%)	10 (9%)	<0.01*			
Antibiotic restrictions and policies	Policy to promote substitution of oral for parenteral antibiotics	23 (100%)	13 (12%)	<0.01*			
	Policy for de-escalation of antibiotics	21 (91%)	17 (16%)	<0.01*			
Antibiotics guidelines	Written clinical pathways/guidelines for specific conditions	21 (91%)	75 (70%)	0.01*			
SCI=spinal cord injury; AS=antibiotic stewardship; ID=Infectious Diseases							

Gaps In Current Knowledge

We need to understand what SCI/D patients believe, want, and expect in regards to having their urine tested annually, and being prescribed and adhering to antibiotics.

We need to understand SCI/D providers' concerns and rationale behind urine testing in the absence of symptoms.

We need to understand the outcome of these testing and treatment decisions on a national scale to disprove or prove our hypotheses.

Optimizing Bacteriuria Management in Veterans with SCI/D

- Facility culture (local and national)
- Provider knowledge and attitudes towards guidelines and bacteruria management
- Patient attitudes and behaviors on antibiotic use for bacteruria

Aim 1: Context

Aim 2: Evidence

- Predictor Models of Urine Testing and Antbiotic Prescription
- Clinical Outcomes

•Test Smart, Treat Smart Intervention: patient and provider education and resources, developed iterally.

> Aim 3: Intervene

Skelton F, et al. JMIR Res Protoc. 2019.

SCI/D Provider Knowledge and Attitudes Towards Antibiotic Stewardship for Bacteriuria

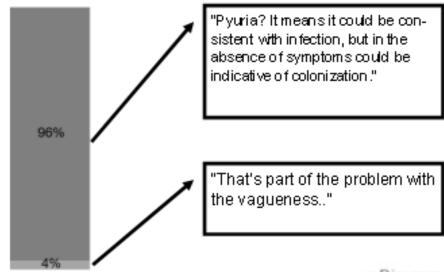
A. Testing

I usually order a urine culture on catheterized patients when there is a change in urine color, cloudiness or odor.

"Looking for discomfort, worsened spasticity, cloudy, foul-smelling urine, generally not feeling well."

"And when I say symptomatic, it's just not foul-smelling urine. I'm having fever. I'm having more spasms. It's not getting any better. My blood pressure is dropping. I'm having AD. Those sorts."

I feel confident that I know when to order a urine culture on a catheterized patient.



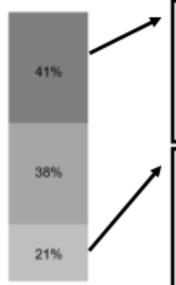
SCI/D Provider Knowledge and Attitudes Towards Antibiotic Stewardship for Bacteriuria

B. Treatment

ASB requires treatment more often in geriatric patients than younger patients.

"If they're elderly, I would be especially less likely to treat bacteria in the urine because that's pretty common for older people to have bacteriuria, and it really comes down to whether they have symptoms or not."

Gram negative organisms are more harmful if left untreated.



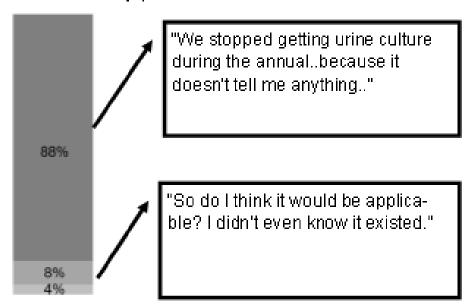
"If they have a history of kidney stones and there's a bacteria such as Proteus present that's known to be a contributor to recurrent stones, then possibly that could be an instance of treating bacteria outside of UTI symptoms."

"So I'm not necessarily going to treat it, but I would take note if it's Proteus just in the bigger picture of the person's history as far as forming stones or anything else they're reporting that would give me some suspicion that they might have stones, but I would elect to treat it just because it's Proteus."

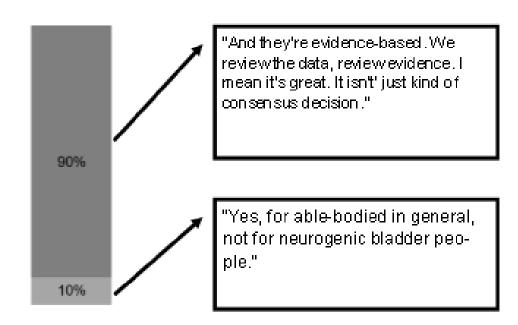
SCI/D Provider Knowledge and Attitudes Towards Antibiotic Stewardship for Bacteriuria

C. Guidelines

I feel confident that I can apply ASB guidelines to my patients.



Acceptance of Guidelines



Patient Attitudes and Behaviors towards UTI and Antibiotic Use after SCI/D

Qualitative Interviews

Quantitative data: Morisky Medication Adherence Scale-8

Recruitment ending, initial analysis ongoing

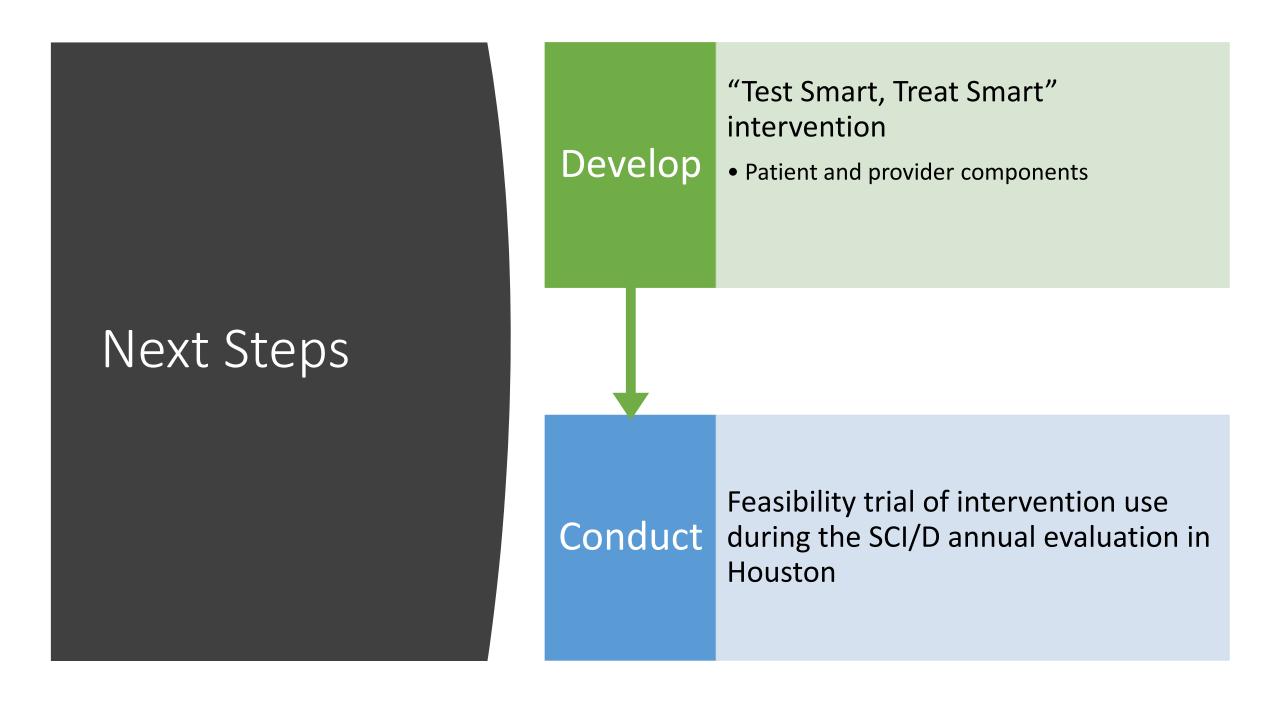
Leveraging Big
Data to Explore
the Consequences
of Urine Testing
and Antibiotic Use
During the SCI/D
Annual Evaluation

Corporate Data Warehouse and the SCI/D Registry Report from VHA Support Service Center Capital Assets (VSSC)

Over 7,000 unique SCI/D annual evaluation encounters in FY 18 and 19

Exposure: antibiotic use within 7 days of the annual evaluation encounter

Outcomes: subsequent urine testing, ER visits, hospitalizations, *C. difficile* infection



Research Directions

 Diagnostic tools or biomarkers to distinguish CAUTI from ASB in people with SCI/D

- SCI/D-specific CAUTI evidence, with the goals of
 - Minimizing catheter-related harm
 - Reducing emergence of antibiotic resistance
 - Improve quality of life for SCI/D patients

Acknowledgements

- Career Development Award Mentors and Advisors
 - Barbara Trautner, MD, PhD
 - Ivy Chui Poon, PharmD
 - Sally Ann Holmes, MD
 - Lindsey Ann Martin, PhD
 - Charlesnika Evans, PhD MPH
 - Anne Robinson, Texas Paralyzed
 Veterans of America President

Other Mentors and Collaborators

- Laura Petersen, MD, MPH
- Mark Kunik, MD, MPH
- Barry Goldstein, MD, PhD
- Stephen Burns, MD
- Larissa Grigoryan, MD, PhD
- Katie Suda, PharmD, MS
- Aanand Naik, MD
- LeChauncey Woodard, MD, PhD
- Jennifer Kramer, PhD, MPH
- Ashok Balasubramanyam, MD
- Jesus Vallejo, MD, PhD
- Fred Pereira, PhD
- Kelly Levitt

