



**VA**

U.S. Department  
of Veterans Affairs

# Clinical Decision Support Menu for Reducing Unnecessary Urine Cultures

National VA Antimicrobial Stewardship Taskforce  
2023 Antimicrobial Stewardship Strong Award Recipient

Minneapolis Veterans Affairs Health Care System – VISN23

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# Outline

- Background Review
  - Asymptomatic Bacteriuria
  - Diagnostic Stewardship
- Clinical Decision Support Urine Culture Menu Study
  - Intervention
  - Design
  - Results
  - Conclusion
- Discussion

# Asymptomatic Bacteriuria (ASB)

- Bacteria present in the urine without symptoms of urinary tract infection (UTI):
  - Dysuria
  - Increased urinary frequency
  - Urgency
- Benign
- Requires positive urine culture (UC) for diagnosis

# ASB Treatment

- Treatment indicated in only a few cases:
  - Pregnancy
  - Invasive urologic procedures
- Positive urine culture results may lead to inappropriate treatment in some patients

# Diagnostic Stewardship

- Modifying the ordering, performing and reporting of diagnostic tests to improve treatment
- Relatively new
- Increasingly important with syndromic tests, increasing sensitivity of testing, etc.

The screenshot shows a PubMed search interface. At the top, the NIH National Library of Medicine logo is visible. The search bar contains the text 'diagnostic stewardship'. Below the search bar, there are options for 'Advanced', 'Create alert', and 'Create RSS'. The search results are displayed in a list format. The first result is titled 'Antimicrobial Resistance: An Antimicrobial/Diagnostic Stewardship and Infection Prevention Approach.' and is cited as 'Septimus EJ. Med Clin North Am. 2018 Sep;102(5):819-829. doi: 10.1016/j.mcna.2018.04.005. Epub 2018 Jun 27. PMID: 30126573 Review.' The second result is titled 'Diagnostic stewardship in infectious diseases: a continuum of antimicrobial stewardship in the fight against antimicrobial resistance.' and is cited as 'Zakhour J, Haddad SF, Kerbage A, Wertheim H, Tattevin P, Voss A, Unal S, Ouedraogo AS, Kanj SS; International Society of Antimicrobial Chemotherapy (ISAC) and the Alliance for the Prudent Use of Antibiotics (APUA). Int J Antimicrob Agents. 2023 Jul;62(1):106816. doi: 10.1016/j.ijantimicag.2023.106816. Epub 2023 Apr 13. PMID: 37061101 Free article. Review.' The search results are sorted by 'Best match' and there are 5,242 results. A 'RESULTS BY YEAR' bar chart shows a significant increase in publications starting around 2015, peaking in 2024. The 'TEXT AVAILABILITY' section shows options for 'Abstract', 'Free full text', and 'Full text'. The 'ARTICLE ATTRIBUTE' section shows an option for 'Associated data'. The 'ARTICLE TYPE' section shows an option for 'Books and Documents'.

# Diagnostic Stewardship for UCs

- Urinalysis with reflex to UC
  - Reduces UCs
  - UCs may be collected in patients with ASB
- Clinical decision support (CDS)
  - Reduces UCs and antimicrobial days of therapy
  - Provider education
  - Collection of UC for patients with ASB unlikely

# Previous UC Education study

- Veterans Affairs (VA) Health Systems Research study
- 8 VAs; 4 intervention, 4 control
- 2-year period: intense inpatient provider education on appropriate indications for UC ordering
- Showed that this led to fewer UCs, fewer antimicrobials

# UC CDS Menu Study

- Quality Improvement Intervention
- Goals:
  - Reduce unnecessary urine cultures to reduce overdiagnosis and inappropriate treatment of ASB
  - Sustainable
  - Reproduceable
  - Minimal provider workflow disruption

# Intervention

- CDS menu within the electronic health record
- UC orders routed through this menu
- 10 selectable indications
- Clinical Application Coordinator build (~6hrs)

Urine Culture

**URINE CULTURE MAIN ORDER MENU**

02 Minneapolis Clinical On-Call Schedule (Infectious Disease)

**Urine Culture is NOT indicated for the following conditions alone:**

- Cloudy urine
- Malodorous urine
- Discolored urine
- When a urinary catheter is placed
- Automatic on admission
- End of therapy re-testing

**Urine cultures should be ordered in patients with symptoms of a urinary tract infection, during pregnancy at appropriate screening intervals, and prior to an invasive urologic procedure.**

**Select indication for urine culture your patient has to place lab order:**

- ← 10 Fever or sepsis with no other identifiable cause
- ← 12 Dysuria, frequency, or urgency
- ← 14 Flank, suprapubic, or pelvic pain
- ← 16 CVA tenderness
- ← 18 Acute hematuria
- ← 20 Pre-operative screening for urologic procedure
- ← 22 Pregnant and due for screening
- ← 24 Increased bladder spasticity or autonomic dysreflexia in patients with spinal cord injury or neurologic deficit
- ← 25 Altered mental status with no other identifiable cause (note that UC not usually indicated, call ID with questions)
- 28 OR/IR Sterile Aspirate Collection Only

# UC Quick Orders

- Prepopulated laboratory “Quick Orders” for UC
- Clicking on indication prompts UC Quick Order
- Quick Orders can be tracked to provide detailed order information

Select indication for urine culture your patient has to place lab order:

- 10 Fever or sepsis with no other identifiable cause
- 12 [Dysuria, frequency, or urgency](#)
- 14 Flank, supra
- 16 CVA tender
- 18 Acute hema
- 20 PRE-OPER
- 22 Pregnant at
- 24 Increased b  
spinal cord
- 26 Altered men  
(note that U
- 28 OR/IR Ster

### Order a Lab Test

Available Lab Tests

- CULTURE & SUSCEPTIBILITY
- CUTANEOUS IMMFLUOR. AB, S (IGG;
- CXR4 <CXLP>
- CXLP
- CYANIDE
- CYCLIC CITRULLINATED PEPTIDE
- CYCLOSPORINE
- CYCLOSPORINE A <CYCLOSPORINE>
- CYSTATIN C WITH EGFR
- CYSTICERCUS IGG ANTIBODY, SERL

CULTURE & SUSCEPTIBILITY

Collect Sample: URINE

Specimen: URINE

Urgency: ROUTINE

Enter order comment:

Collection Type: Ward Collect

Collection Date/Time: NOW

How Often?: ONCE

How Long?:

CULTURE & SUSCEPTIBILITY URINE WC ONCE

**SEND IMMEDIATELY TO THE LAB**  
Site MUST be specified in the Enter order comment box to ensure proper testing. If a specific request (MRSA, VRE, GNR...) is needed, enter that in Enter order comment box.

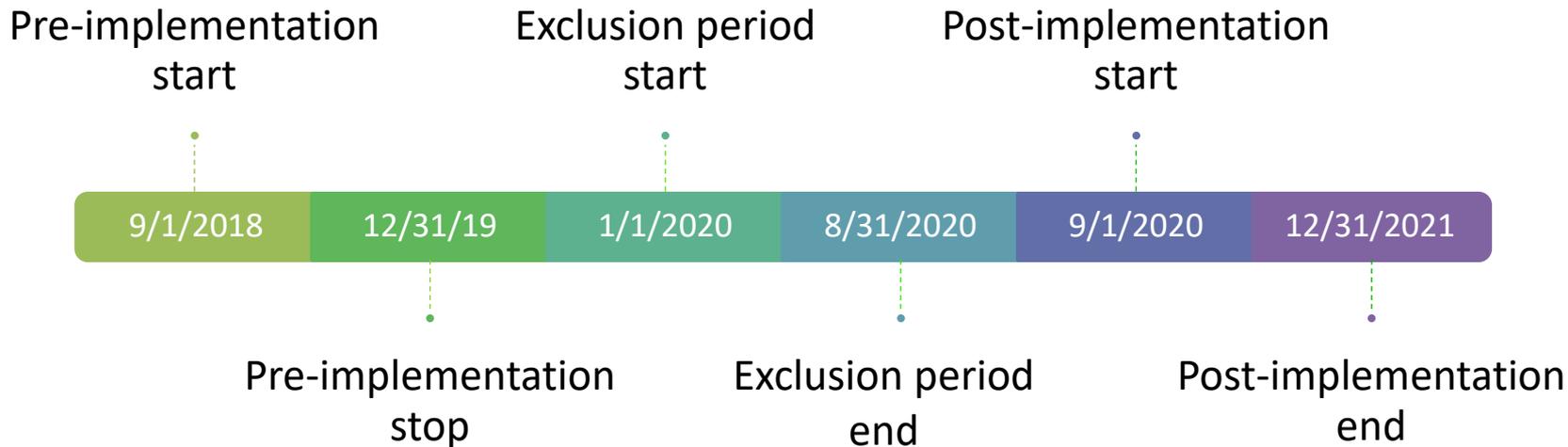
Accept Order

Quit

# Study Design

- Before-after comparison
- Minneapolis Veterans Affairs Health Care System:
  - 200 bed medical center
  - 13 community-based outpatient clinics
  - 88,466 patient population
- Time period
  - September 2018 to December 2021
  - COVID-19 exclusion period

# Timeline



# Outcomes

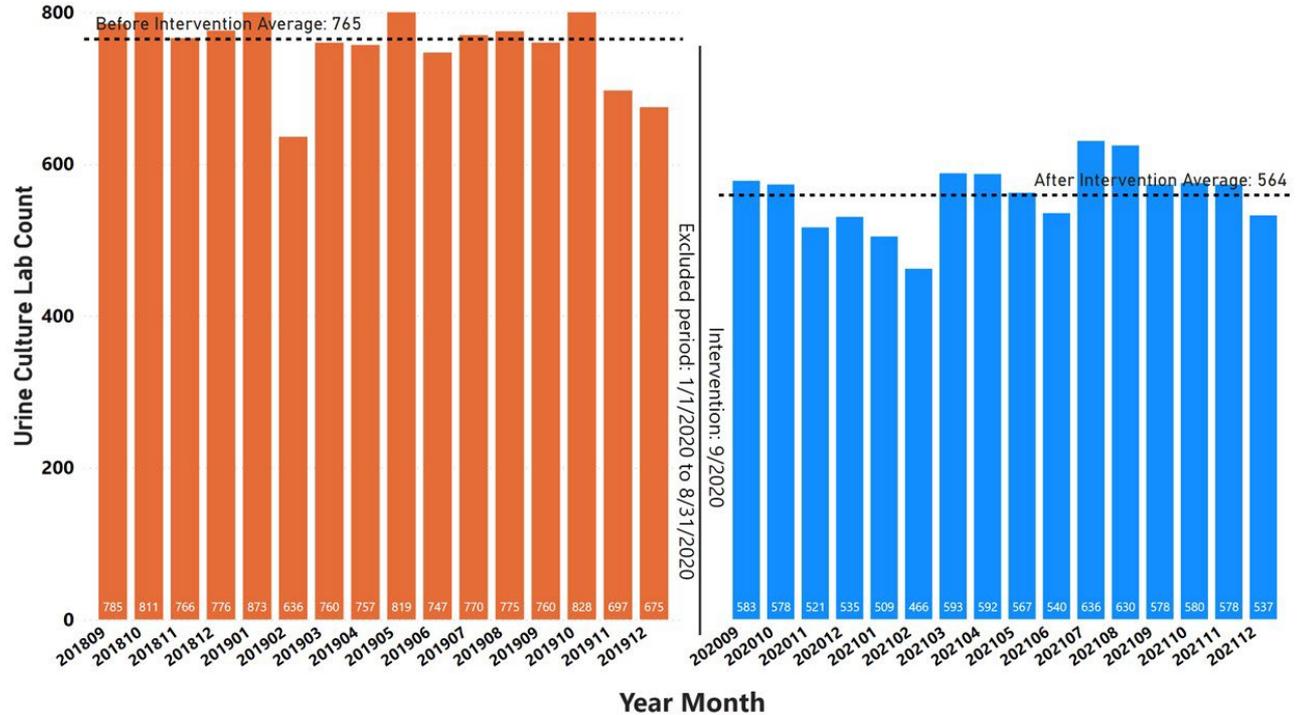
- Pre- and post-intervention outcomes:
  - Total UC sample collections (inpatient and outpatient)
  - Outpatient UC sample collections (e.g. clinic, emergency department)
  - Inpatient UC sample collections (e.g. hospital, nursing home)
  - Clinic visits
  - Patient bed days
- Post-intervention only: UC order indication patient chart review

# Methods

- Two-sample t-test pre- versus post-intervention
  - Monthly total UC sample collection count mean
- Interrupted time series (ITS) analyses
  - Difference between intercept and slopes pre- vs post-intervention
  - Inpatient UC sample collections/1000 patient bed days
  - Outpatient UC sample collections/1000 clinic visits
- Chart review of 50 random UCs post-intervention

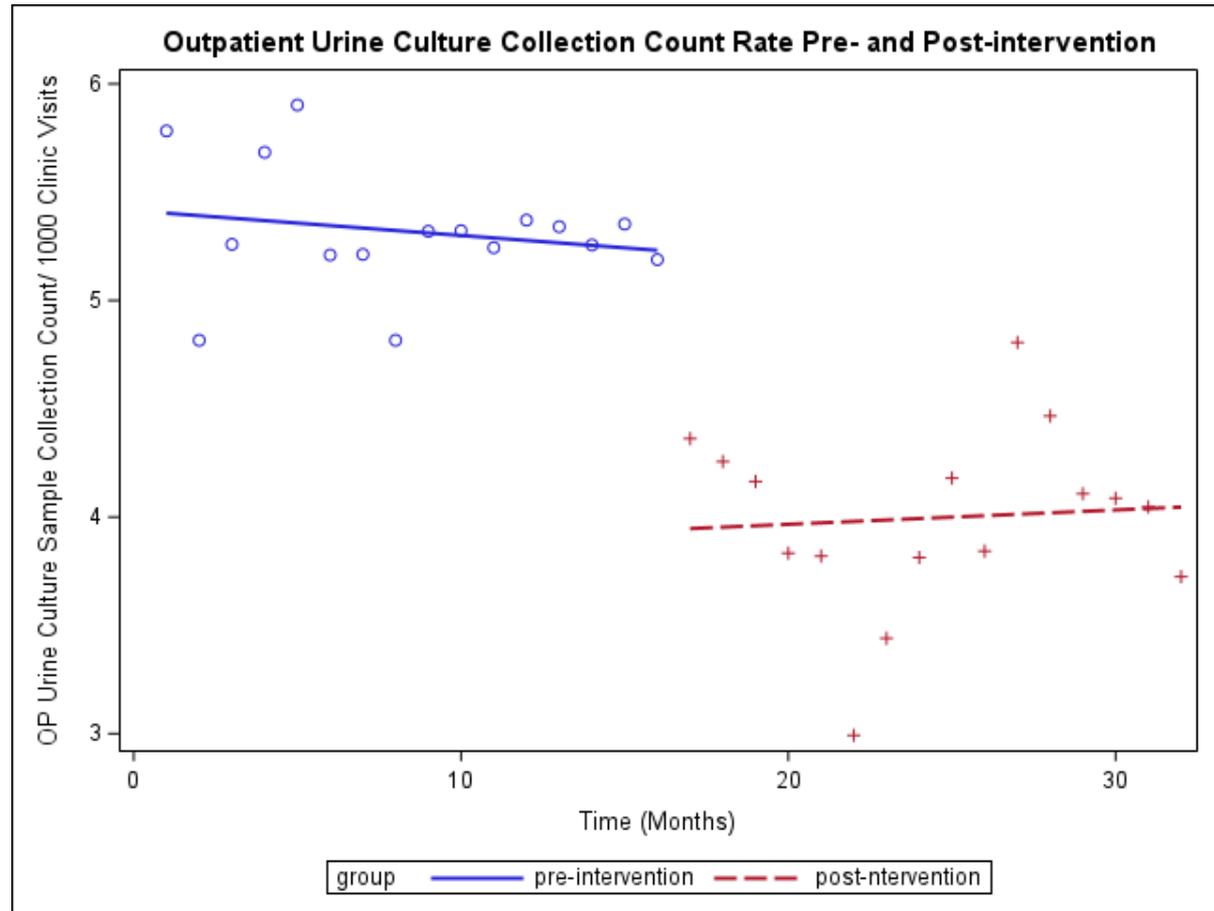
# Total UC Orders

- 12,190 pre-intervention UC total
- 8,996 post-intervention UC total
- Significant reduction (26.3%,  $P < .001$ ; 2-sided t-test)



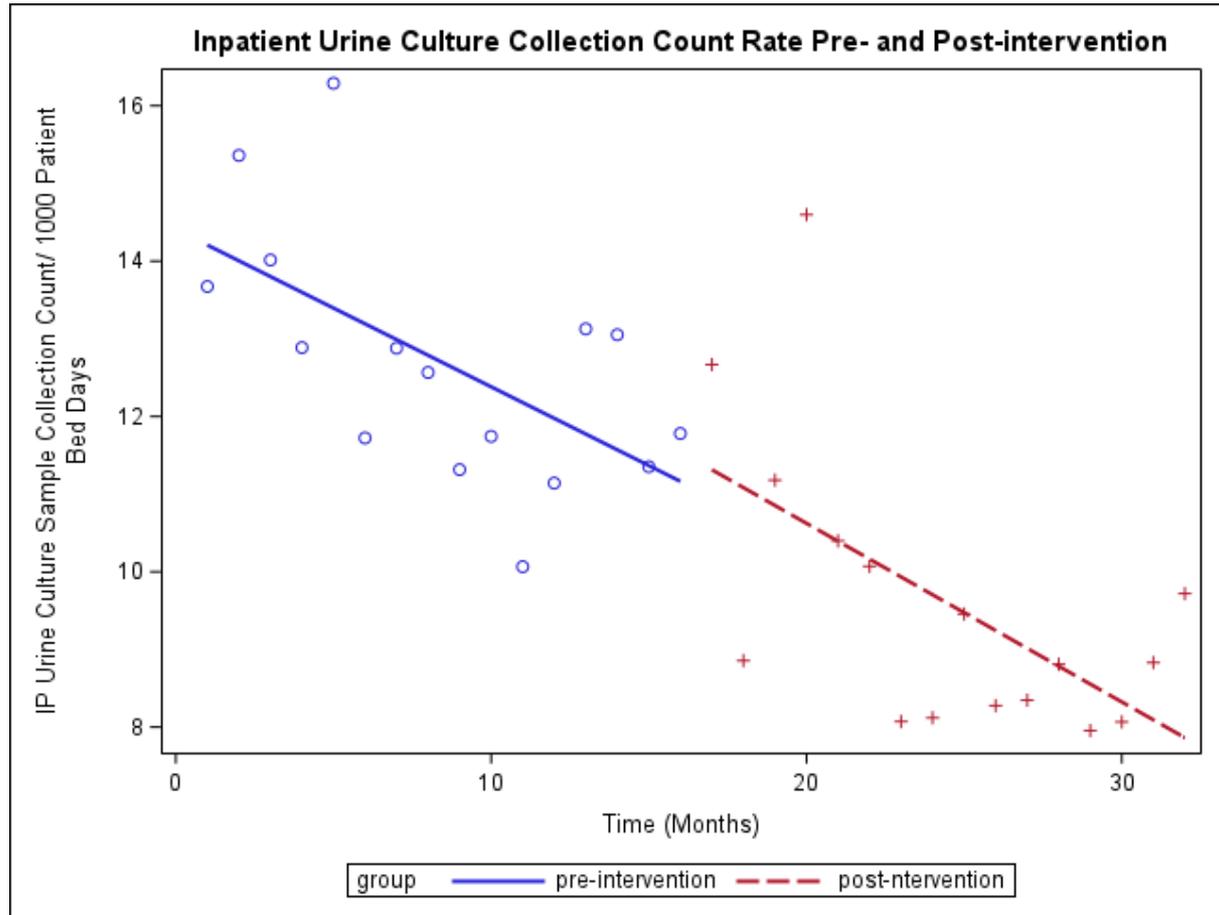
# Outpatient UC ITS

- Significant reduction ( $p < .0001$ )
  - 5.22 outpatient UCs/1000 clinic visits pre-intervention
  - 3.94 outpatient UCs/1000 clinic visits post-intervention
- Temporal trends (slopes) not significantly different ( $p = .53$ )



# Inpatient UC ITS

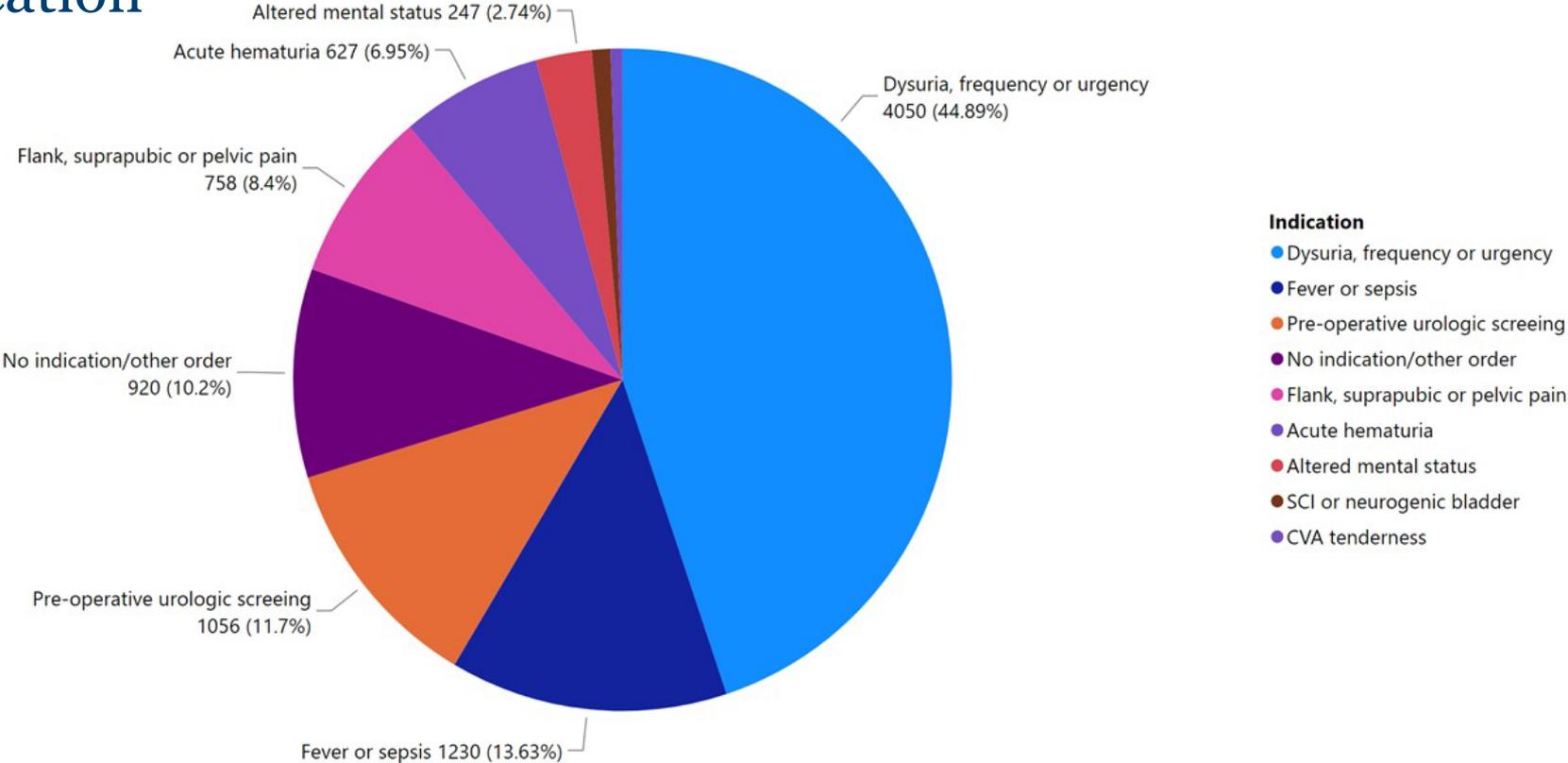
- Intervention was not associated with a significant overall change ( $p = .59$ )
  - 10.96 inpatient UCs/1000 patient bed days pre-intervention
  - 11.54 inpatient UCs/1000 patient bed days post-intervention
- The temporal trend in UCs was not significantly different pre- and post-intervention ( $p = .80$ )
- Clear trend of decreasing UCs before and after the intervention



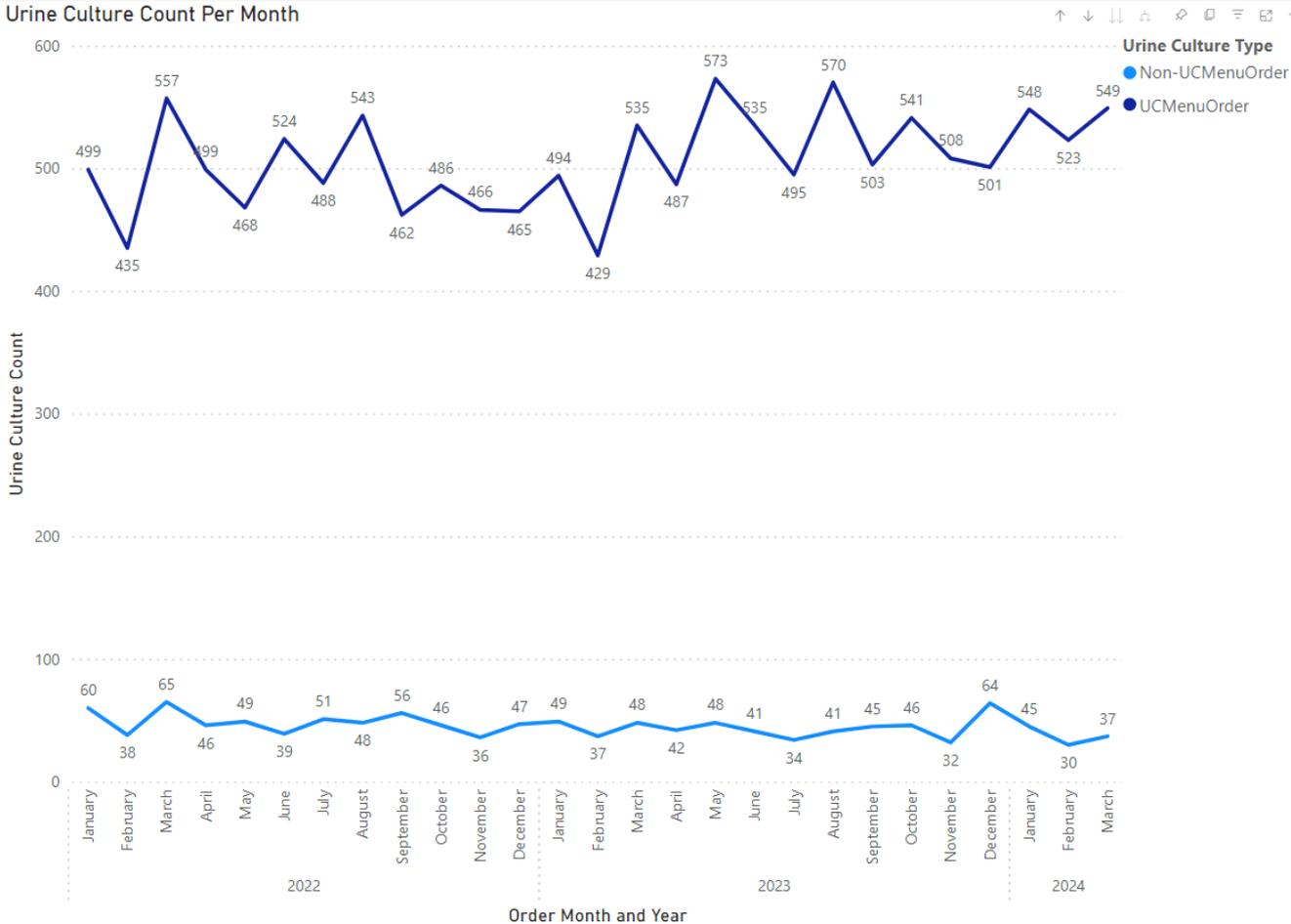
# UC Indication Documentation

- Post-intervention Indication documentation
- Chart review of randomized cases
- Performed by health systems specialist under direction of infectious diseases specialist
- 70% (35/50) had clear documentation for selected indication in electronic medical record

# Indication

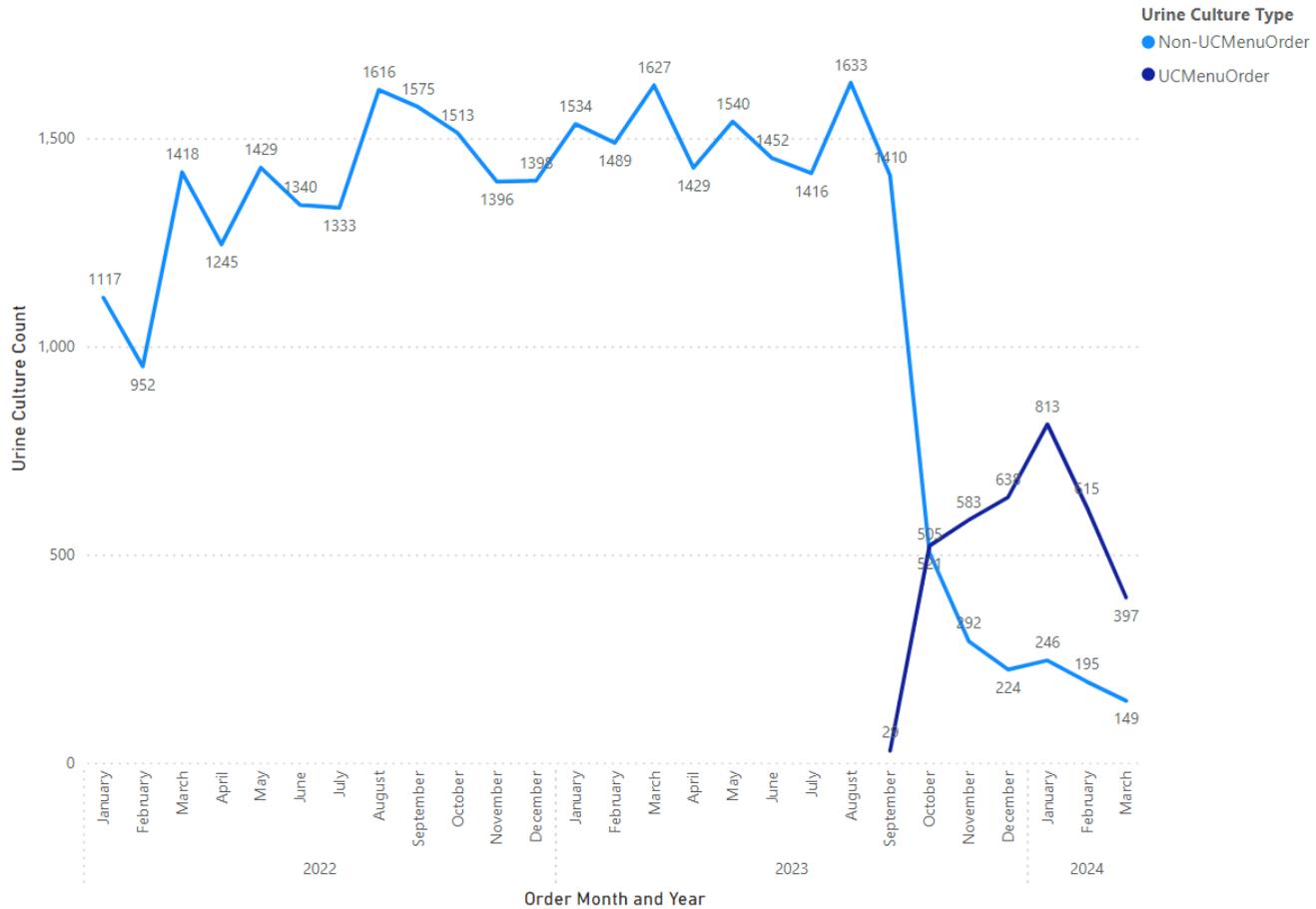


# Usage



# New Site

Urine Culture Count Per Month



# Conclusion

- UC CDS Menu resulted in significantly fewer UC Orders
  - Outpatient UCs/clinic visits significant reduction
  - Inpatient UCs/patient bed days already trending down likely due to preceding UC education intervention
- Most UC orders had an appropriate indication post-intervention
- Decrease in UCs may be due to preventing unnecessary UC orders
- May help reduce inappropriate antimicrobial use and improve patient care

# Portability

- UC CDS Menu was easy to implement with minimal disruption to provider workflow
- Multiple other VA health care systems have implemented or are planning on implementing
  - VISN23( Minneapolis, Fargo, St. Cloud, Sioux Falls, Omaha, Des Moines, Iowa City)
  - Long Beach, Miami, Muskogee, Orlando, Palo Alto, Seattle, Maryland, Lebanon, Kansas City
- This intervention has not been implemented outside of the VA
- Similar interventions have been made in limited settings with similar results

# Questions?

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# Discussion

- Could a UC CDS Menu be utilized within your health care system?
  - Is it possible within your electronic medical record?
  - Would it be useful?
  - How would your providers respond?
- What are the limitations of this intervention?
- Can this intervention be used in addition to other interventions within your health care system to improve UC utilization?



# Clinical Decision Support Menu for Reducing Unnecessary Urine Cultures

## Does clinical decision support (CDS) and selection of an indication reduce inappropriate urine cultures (UC)?

### Design:

Before-after comparison  
Population: Minneapolis Veterans Affairs Health Care System; 200-bed medical center and 13 outpatient clinics; patient population of 88,466

- Outcomes:
- Outpatient and inpatient UCs collected
  - Patient bed days
  - Clinic visits

### Intervention:



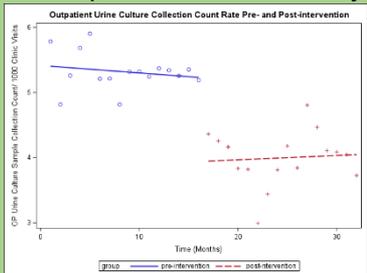
CDS menu within the electronic medical record (EMR) containing appropriate indications and quick orders for ordering a UC

When implementing the intervention, nearly all preexisting UC quick orders within the EMR were routed through this menu

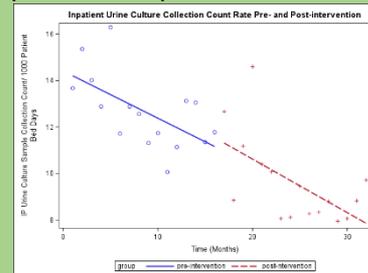
Ordering health care professionals required to select a single UC indication from a list of ten

### Analysis and Results:

Interrupted time series analyses pre- versus post-intervention



Opt UCs collected per 1000 clinic visits significantly reduced ( $p < .0001$ )



Ipt UCs collected per 1000 patient bed days continued trend downwards

Significant reduction (26%) in total UCs, pre- versus post-intervention ( $p < .0001$ )

Documentation of indication within EMR for 70% (35/50) of post-intervention UCs

### Conclusion:

This intervention had a substantial impact on UC collections, decreasing total UCs and Opt UCs significantly. Ipt UCs were already trending downwards pre-intervention and continued to decrease post-intervention. This was likely due to Ipt UC education intervention previously implemented. Appropriate indication was chosen for most post-intervention UCs suggesting decrease in UCs may be due to reducing inappropriate UCs. Since this intervention was made, five more Veterans Affairs Health Care Systems have implemented this intervention with similar results.

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