

A scanning electron micrograph (SEM) of various bacteria, each rendered in a different color. The bacteria are rod-shaped and vary in size and orientation. The background is dark, making the colorful bacteria stand out. The colors include shades of brown, blue, green, red, purple, and cyan.

The Role of an Infection Preventionist in Antimicrobial Stewardship

Emily Perry PharmD

Antimicrobial Stewardship Pharmacist

Center for Collaboration and Advancement in Pharmacy

Disclosures

The presenter does not have any relevant financial relationships with ineligible companies to disclose.

The off-label use of medications will not be discussed during this presentation.

**Support for all or part of these activities has been provided by the Department of Health and Human Services through the CDC Epidemiology and Laboratory Capacity Program.*

Learning Objectives

- Define how infection preventionists (IP) are a valued member of the antimicrobial stewardship team
- Describe ways IP's can track and report data to support stewardship efforts
- Identify antimicrobial stewardship initiatives IP's can facilitate

The Threat of Antibiotic Resistance in the United States

Antibiotic resistance—when germs (bacteria, fungi) develop the ability to defeat the antibiotics designed to kill them—is one of the greatest global health challenges of modern time.



New National Estimate*

Each year, antibiotic-resistant bacteria and fungi cause at least an estimated:



2,868,700
infections



35,900 deaths



*Clostridioides difficile*** is related to antibiotic use and antibiotic resistance:



223,900
cases



12,800 deaths



To stop antibiotic resistance

- Referring to a coming post-antibiotic era
- Blaming others
- Relying only on new antibiotics
- Believing antibiotic resistance is a problem elsewhere

CDC strategies that work in healthcare:



Preventing device- and procedure-related infections, such as from urinary catheters or central lines



Stopping the spread of resistant germs within and between healthcare facilities



Containing emerging threats through early detection and aggressive response



Tracking and improving appropriate antibiotic use



Infection prevention and control in non-hospital settings, such as long-term care facilities

**Infection
Preventionists!!!**

Infrastructure of:

Antimicrobial Stewardship Committee

- Pharmacists
- Infectious Disease Physicians
- Laboratorians
- Quality Improvement Specialists
- Analysts/Epi's
- Program Managers

Infection Prevention Committee

- Infection Preventionists
- Infectious Disease Physicians
- Laboratorians
- Quality Improvement Specialists
- Analysts/Epi's
- Program Managers

Core Elements of Antimicrobial Stewardship

Core Elements of Hospital Antibiotic Stewardship Programs



Hospital Leadership Commitment

Dedicate necessary human, financial, and information technology resources.



Accountability

Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.



Pharmacy Expertise (previously "Drug Expertise"):

Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.



Action

Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.



Tracking

Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.



Reporting

Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.



Education

Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.

Infection Preventionist Core Elements

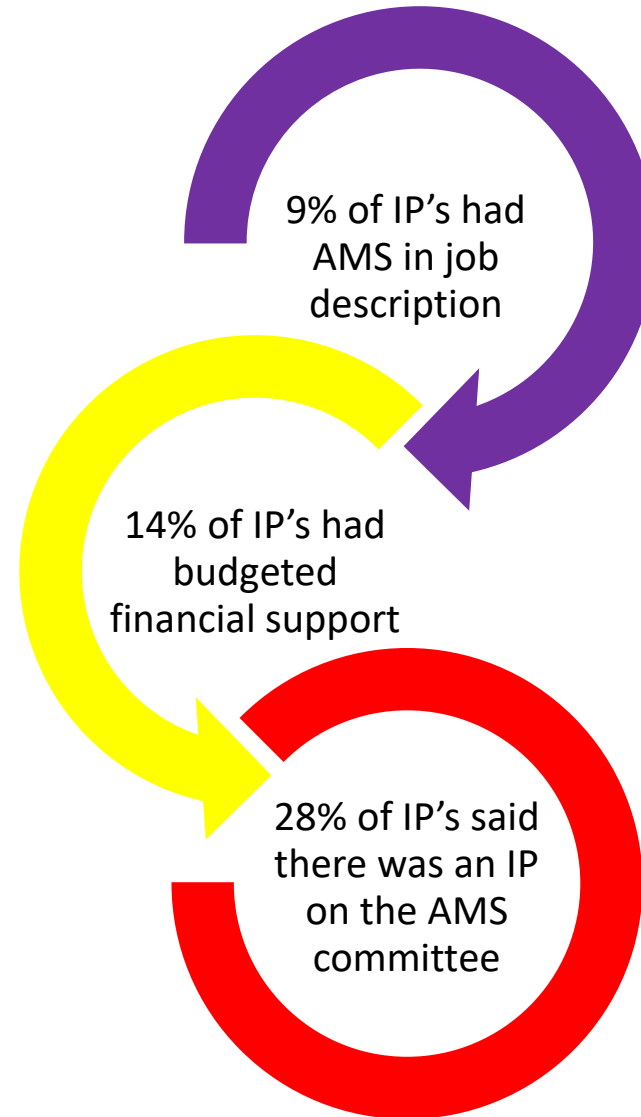
- **Mission**

- To promote a safe and healthy environment through the prevention of healthcare - associated infections in patients and the transmission of infectious diseases among patients, personnel, and visitors, and to contribute to infection prevention research to guide evidence-based practices

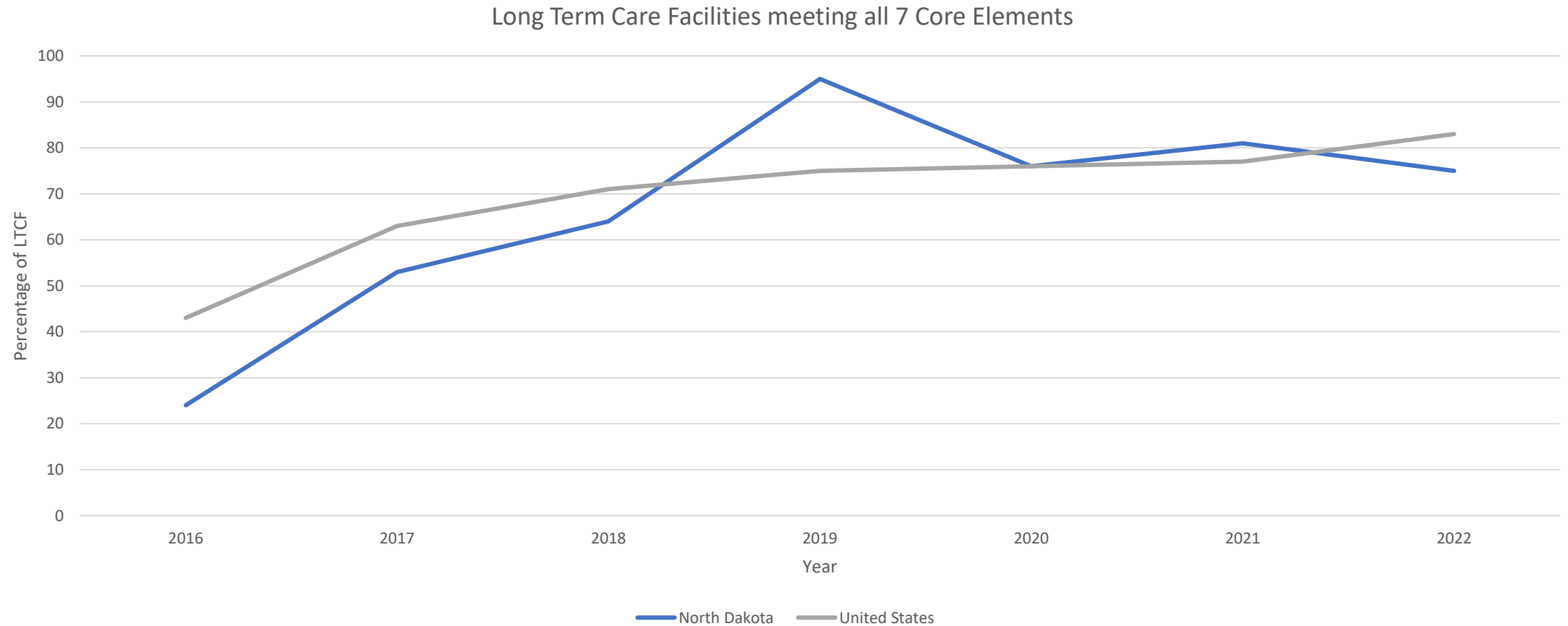
- **Strategies**

- **Evidence-based infection prevention policies and protocols**
- Monitor and disseminate **infection-related data**
- **Multidisciplinary workgroups**
- Provide **education** to empower the HCP workforce and patients
- Conduct routine **infection prevention compliance rounding**
- Conduct communicable disease exposure and outbreak **investigations**
- Provide **consultation** to external departments

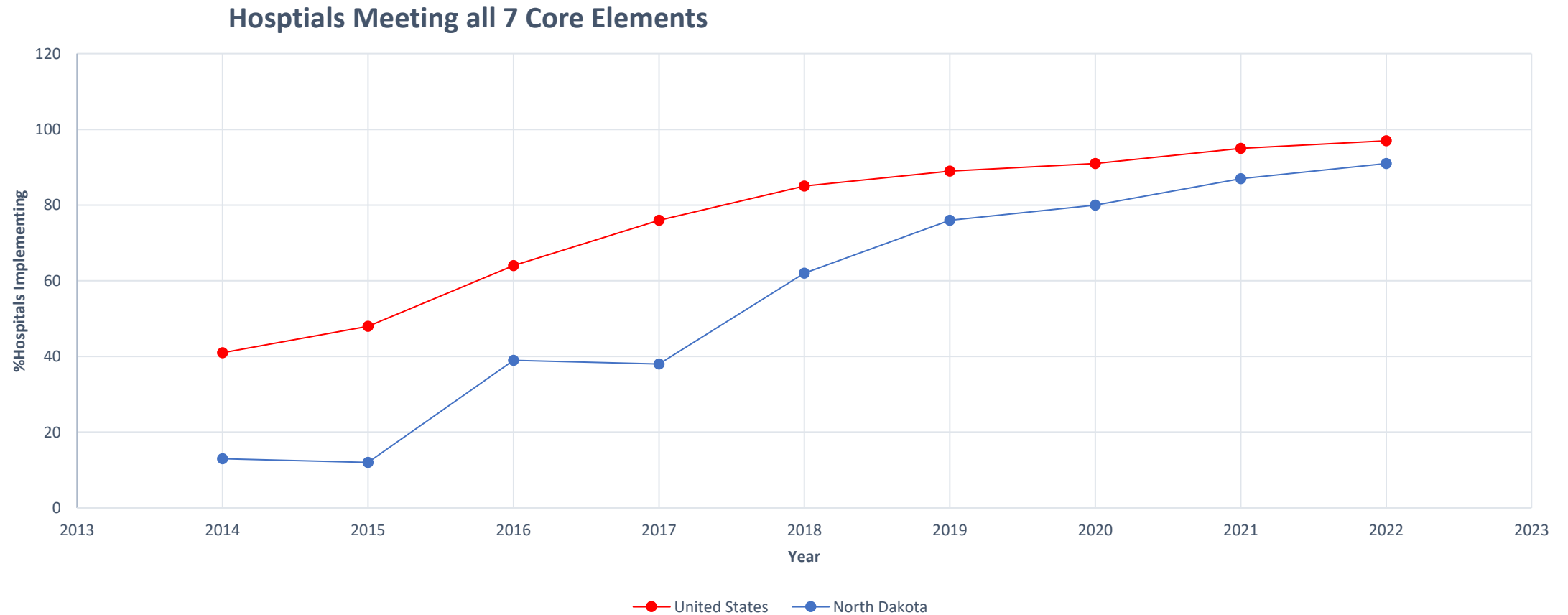
What is the role of an IP in AMS?



Long Term Care Facilities



Hospitals (CAH & ACH)



Checklist for Core Elements of Antibiotic Stewardship

- Hospital
 - <https://www.cdc.gov/antibiotic-use/healthcare/pdfs/checklist.pdf>
- Long Term Care Facilities
 - <https://www.cdc.gov/antibiotic-use/core-elements/pdfs/core-elements-antibiotic-stewardship-checklist-508.pdf>



Checklist for Core Elements of Antibiotic Stewardship in Nursing Homes

The following checklist is a companion to the Core Elements of Antibiotic Stewardship in Nursing Homes. The CDC recommends that all nursing homes take steps to implement antibiotic stewardship activities. Before getting started, use this checklist as a baseline assessment of policies and practices which are in place. Then use the checklist to review progress in expanding stewardship activities on a regular basis (e.g., annually). Over time, implement activities for each element in a step-wise fashion.

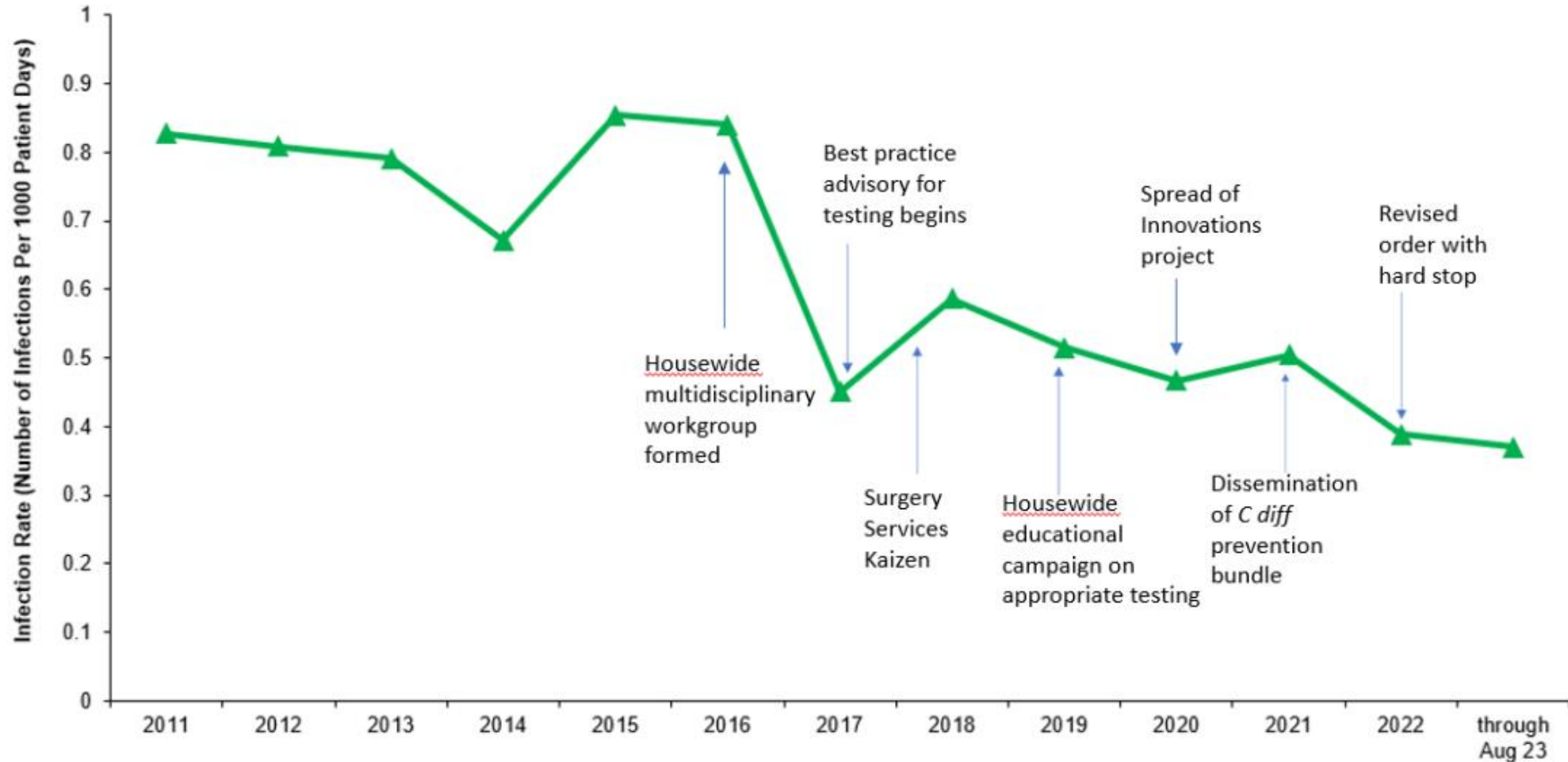
LEADERSHIP SUPPORT	ESTABLISHED AT FACILITY
1. Can your facility demonstrate leadership support for antibiotic stewardship through one or more of the following actions? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, indicate which of the following are in place (select all that apply)	
<input type="checkbox"/> Written statement of leadership support to improve antibiotic use	
<input type="checkbox"/> Antibiotic stewardship duties included in medical director position description	
<input type="checkbox"/> Antibiotic stewardship duties included in director of nursing position description	
<input type="checkbox"/> Leadership monitors whether antibiotic stewardship policies are followed	
<input type="checkbox"/> Antibiotic use and resistance data is reviewed in quality assurance meetings	
ACCOUNTABILITY	
2. Has your facility identified a lead(s) for antibiotic stewardship activities? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, indicate who is accountable for stewardship activities (select all that apply)	
<input type="checkbox"/> Medical director	
<input type="checkbox"/> Director or assistant director of nursing services	
<input type="checkbox"/> Consultant pharmacist	
<input type="checkbox"/> Other: _____	
DRUG EXPERTISE	
3. Does your facility have access to individual(s) with antibiotic stewardship expertise? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, indicate who is accountable for stewardship activities (select all that apply)	
<input type="checkbox"/> Consultant pharmacy has staff trained/is experienced in antibiotic stewardship	
<input type="checkbox"/> Partnering with stewardship team at referral hospital	
<input type="checkbox"/> External infectious disease/stewardship consultant	
<input type="checkbox"/> Other: _____	
ACTIONS TO IMPROVE USE	
4. Does your facility have policies to improve antibiotic prescribing/use? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, indicate which policies are in place (select all that apply)	
<input type="checkbox"/> Requires prescribers to document a dose, duration, and indication for all antibiotic prescriptions	
<input type="checkbox"/> Developed facility-specific algorithm for assessing residents	
<input type="checkbox"/> Developed facility-specific algorithms for appropriate diagnostic testing (e.g., obtaining cultures) for specific infections	
<input type="checkbox"/> Developed facility-specific treatment recommendations for infections	
<input type="checkbox"/> Reviews antibiotic agents listed on the medication formulary	
<input type="checkbox"/> Other: _____	

Tracking and Reporting

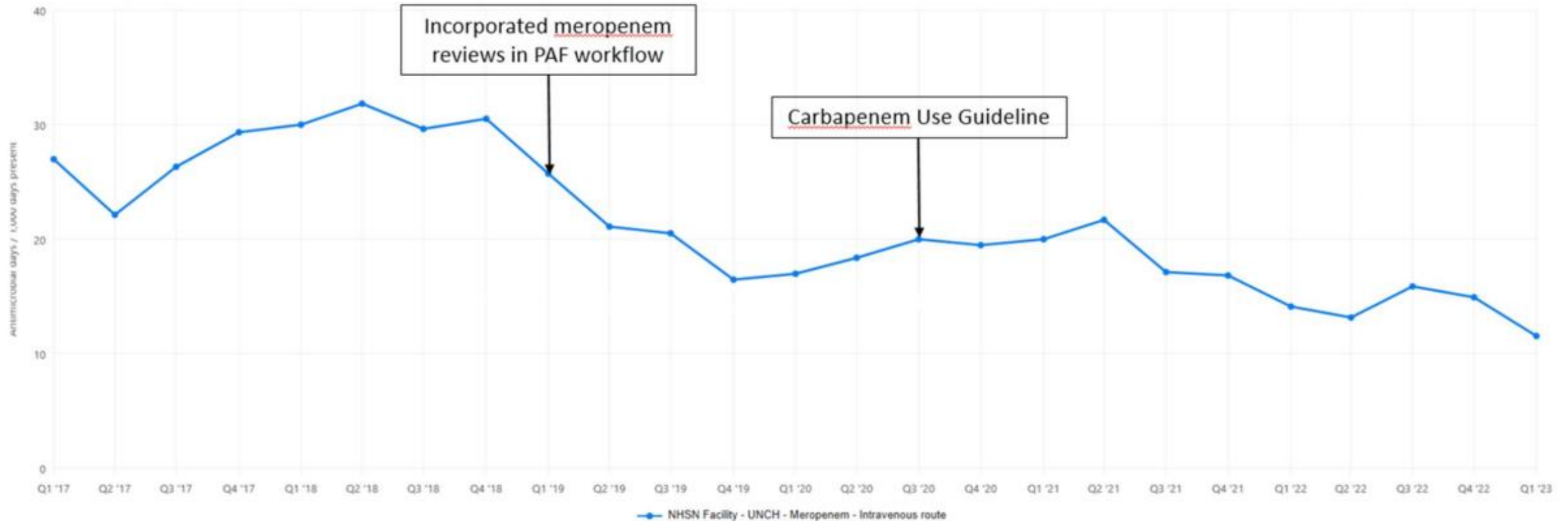
Healthcare-associated infections

Trending antimicrobial use

Core Element: Tracking and Reporting



Core Element: Tracking and Reporting



What data should we be tracking?

- New antibiotic starts
- MDROs
- *C.diff* cases
- Antibiotic days of therapy per 1000 residents/patient days
- Provider prescribing
 - Number of scripts by antibiotic or infection type
 - Provide feedback to providers
 - Share antibiogram with them



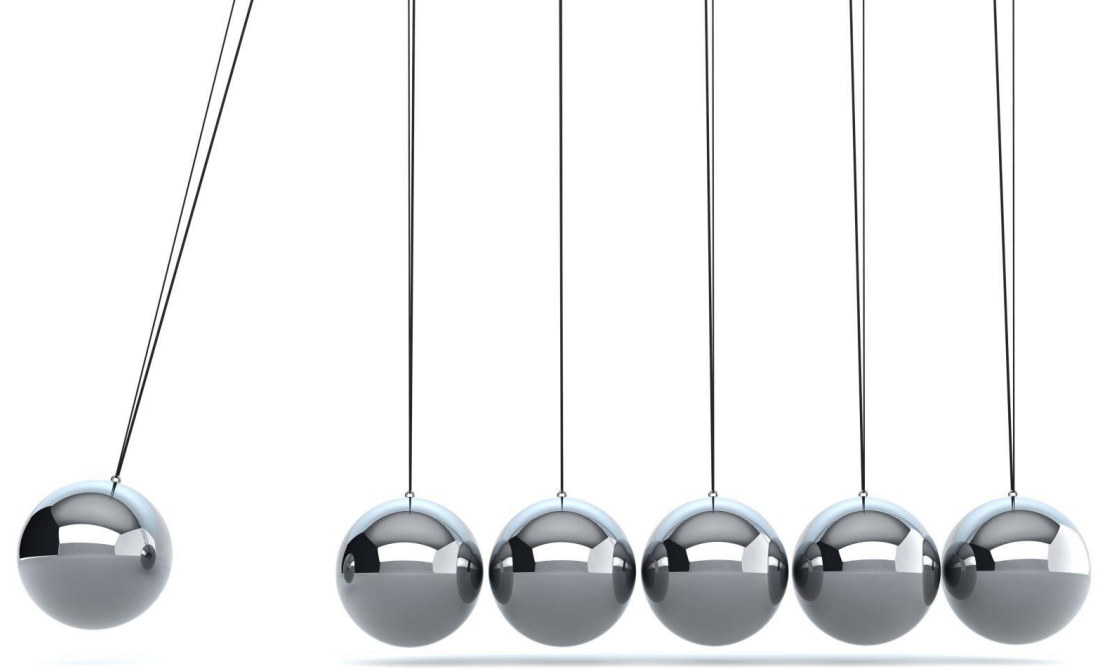
Who should we be reporting to?

- NHSN
 - Required for CAH/ACH who participate in CMS's Promoting Interoperability Program
 - Antibiotic Use
 - Antibiotic Resistance
 - May see antibiotic use being required for long term care facilities in the future
- Antimicrobial Stewardship Committee
- Leadership group

What resources are available to help with tracking?

- Data mining software
 - Does your current EMR have a program that can track data for you?
 - Talk to IT
 - Free's up staff to do other tasks
 - Check for available grants to help fund this

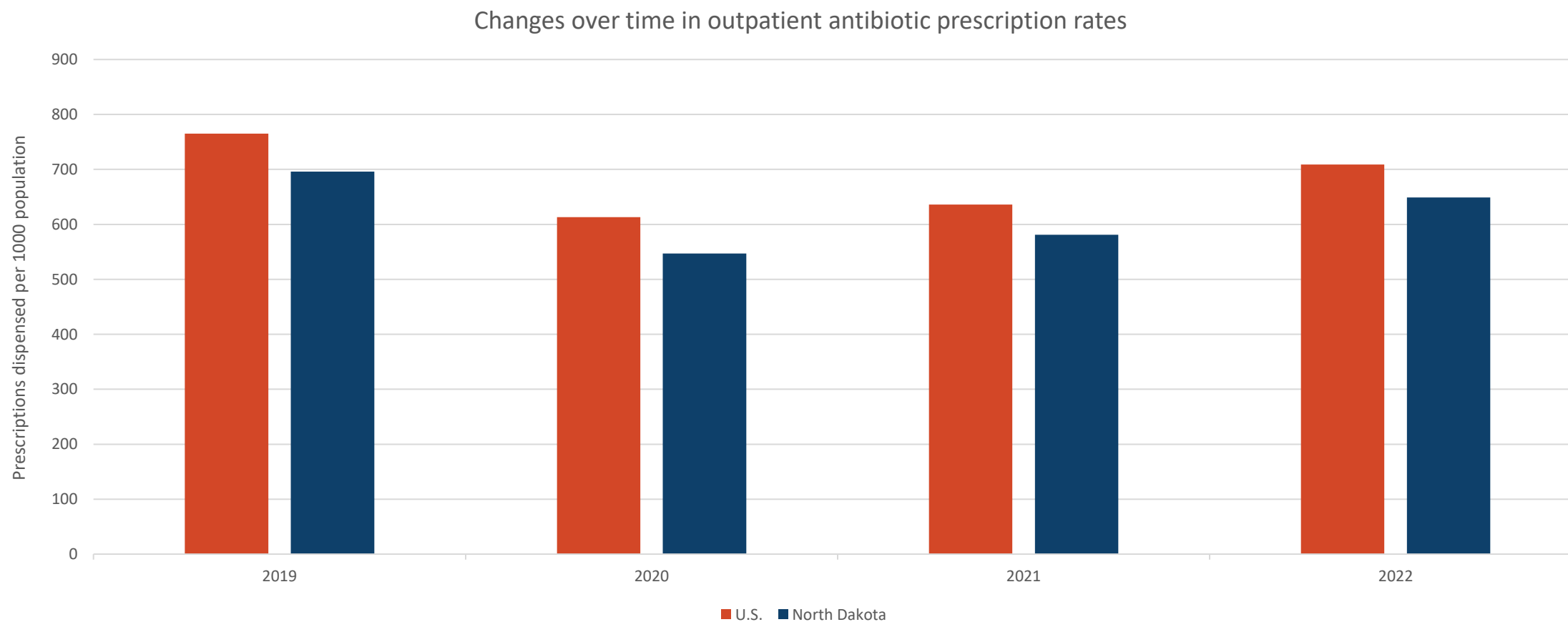




Action

Diagnostic Stewardship

Why is action important?



Diagnostic Stewardship



"WE'VE RUN THE WHOLE GAMUT OF TESTS ON YOU, AND YOU NOW APPEAR TO BE SUFFERING FROM OVERTESTING."

Examples of Inappropriate Tests

 = Infection Preventionists Opportunity to intervene

Inappropriate Test Use	Potential Consequences of Inappropriate Testing
 Routine ordering of microbiologic tests when specimens are obtained for non-infectious indications	<i>Overdiagnosis.</i> Treatment of contaminant or colonizing organisms, Excess cost. Increased length of stay. Increased test utilization to confirm negative.
 Unnecessary pre-operative urine cultures	<i>Overdiagnosis.</i> Unnecessary antibiotic prescribing
 Urine and respiratory cultures for test of cure or asymptomatic patients	<i>Overdiagnosis.</i> Unnecessary antibiotic prescribing
 Urine cultures for change in mental status or nonspecific symptoms	<i>Missed diagnosis.</i> Missing true reason for presenting symptom
	<i>Overdiagnosis.</i> Unnecessary antibiotic prescribing, additional catheter-associated urinary tract infection (CAUTI) events
 <i>C. difficile</i> testing in patients on laxatives or previously positive	<i>Overdiagnosis.</i> Unnecessary antibiotic prescribing, additional <i>C. difficile</i> lab ID events
 β -D-glucan to exclude mucormycosis	<i>Missed diagnosis.</i> Inadequate antimicrobial management
Recurring blood cultures in patient with known cause of fever	<i>Overdiagnosis.</i> Unnecessary antibiotics.
	<i>Patient comfort.</i> Unnecessary procedures. Healthcare-associated anemia
Single blood cultures in adults	<i>Missed diagnosis.</i> Inadequate antimicrobial management.
	<i>Overdiagnosis.</i> Treatment of contaminants.
Superficial wound swabs for culture	<i>Missed diagnosis.</i> Missing the true pathogen
	<i>Overdiagnosis.</i> Unnecessary antibiotic prescribing
Routine use of SARS-CoV-2 PCR to determine duration of isolation	<i>Overdiagnosis.</i> Unnecessary prolonged isolation

Infection Control & Hospital Epidemiology (2023), 44, 178–185
doi:10.1017/ice.2023.5



SHEA Position Paper

Principles of diagnostic stewardship: A practical guide from the Society for Healthcare Epidemiology of America Diagnostic Stewardship Task Force

Valeria Fabre MD¹, Angelina Davis PharmD², Daniel J. Diekema MD³, Bruno Granwehr MD⁴, Mary K. Hayden MD⁵, Christopher F. Lowe MD⁶, Christopher D. Pfeiffer MD⁷, Anna C. Sick-Samuels MD⁸, Kaede V. Sullivan MD⁹, Trevor C. Van Schooneveld MD¹⁰ and Daniel J. Morgan MD¹¹

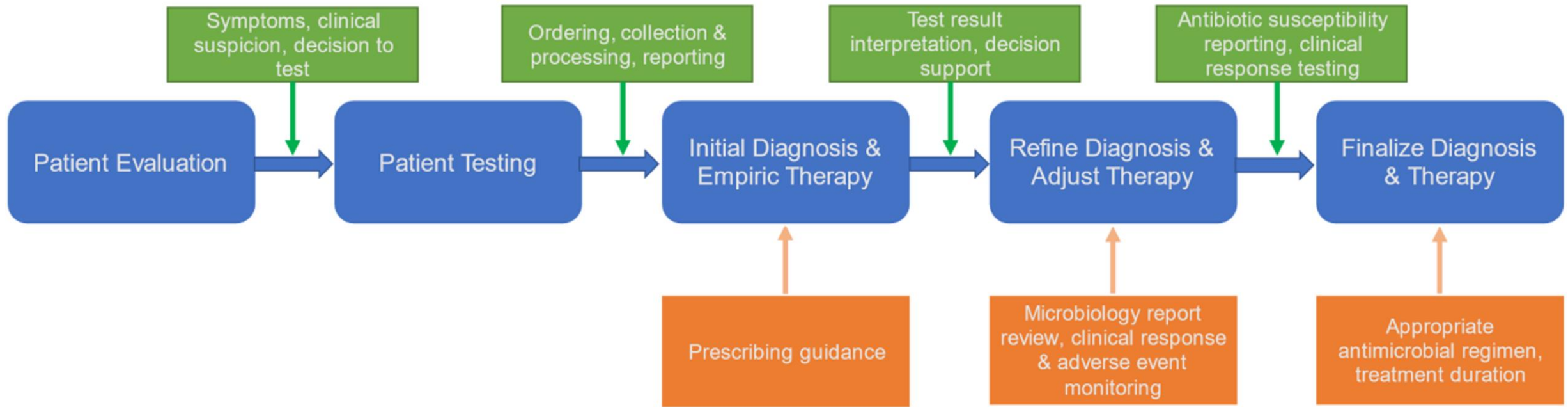
¹Division of Infectious Diseases, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland, United States, ²Duke University, Durham, North Carolina, ³Department of Medicine, University of Iowa, Iowa City, Iowa, United States, ⁴Department of Infectious Diseases, University of Texas MD Anderson Cancer Center, Houston, Texas, United States, ⁵Division of Infectious Diseases, Department of Internal Medicine, Rush University Medical Center, Chicago, Illinois, United States, ⁶Division of Medical Microbiology and Virology, Providence Health Care, Vancouver, Canada, ⁷VA Portland Health Care System, Oregon Health & Science University, Portland, Oregon, United States, ⁸Division of Infectious Diseases, Department of Pediatrics, Johns Hopkins University School of Medicine, Baltimore, Maryland, United States, ⁹Department of Pathology and Laboratory Medicine, Lewis Katz School of Medicine at Temple University, Philadelphia, Pennsylvania, United States, ¹⁰Department of Internal Medicine, University of Nebraska Medical Center, Omaha, Nebraska, United States and ¹¹Department of Epidemiology and Public Health, University of Maryland School of Medicine and VA Maryland Healthcare System, Baltimore, Maryland, United States

Diagnostic stewardship

- Blood Cultures
 - Up to half of all positive blood cultures represent contaminants
- Urine Cultures
- Respiratory Cultures
- *C. difficile* testing



Diagnostic Stewardship



Antimicrobial Stewardship

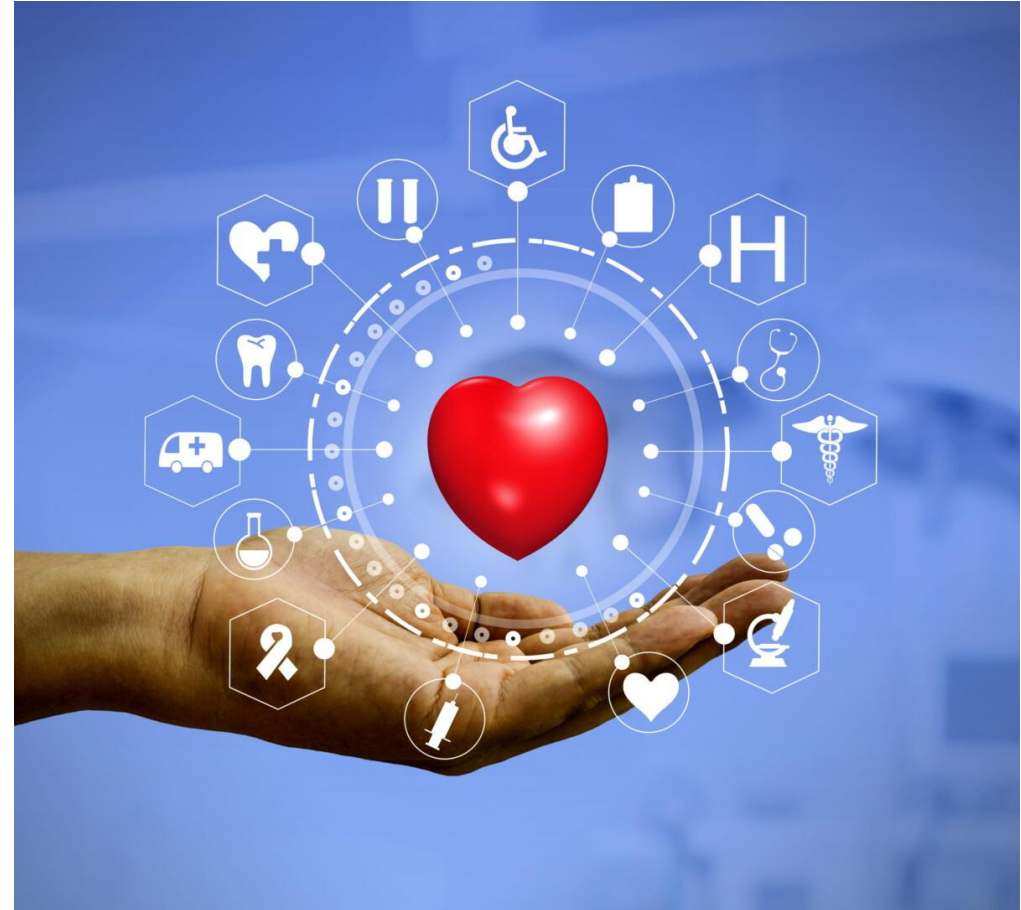
Ku TSN, Al Mohajer M, Newton JA, et al. Improving antimicrobial use through better diagnosis: The relationship between diagnostic stewardship and antimicrobial stewardship. *Infection Control & Hospital Epidemiology*. 2023;44(12):1901-1908. doi:10.1017/ice.2023.156

Education

Urine cultures

Blood cultures

Groups to educate



[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)

Education on how to use diagnostics judiciously



- Urinalysis
 - No Pyuria = no UTI
- Urine Culture
 - Bacteriuria does **NOT** need to be treated if **NO** urinary symptoms
- Respiratory Culture
 - Send for patients with severe community-associated pneumonia/inpatients treated empirically for MRSA or Pseudomonas, ventilator-associated pneumonia
 - Positive respiratory culture
 - Decide if presence of pneumonia based on symptoms/clinical picture
- *C.difficile* testing
 - Send *C. difficile* testing only if pretest probability is moderate/high
- Wound culture
 - Often represent colonization

UNC examples of education

DO I REALLY NEED TO TREAT MY PATIENT FOR A UTI?

TREATING ASYMPTOMATIC BACTERIURIA HAS NO BENEFITS AND CAUSES HARM.

IN FACT, IT LEADS TO AN INCREASE IN...

Healthcare costs Length of stay *C. diff* infections Antibiotic resistance Misclassification of CAUTI

MY PATIENT IS SICK AND I SUSPECT A UTI SHOULD I TEST?

UA is only helpful for predicting UTI among patients with appropriate urinary symptoms

No UA Needed	Send UA
<ul style="list-style-type: none"> Odor Color Altered mental status alone Fever or leukocytosis <p>without urinary symptoms</p>	<ul style="list-style-type: none"> Frequency Burning Pain

WHAT IS THE BEST WAY TO TEST?

- 1 Order a UA if symptomatic
- 2 Interpret UA
- 3 Order urine culture only if UA+
- 4 Treat based on culture results

Learn more at <https://www.redukc.com/articles/unc-healthcare.org/2017/Epidemiology/Pages/CAUTI-Prevention-Initiative.aspx>

Adult UTI Guideline Update

4 New Algorithms

Diagnosis Altered Mental Status Treatment Urine Culture Interpretation

Reserve UTI diagnostic workup for those with UTI symptoms:

- Painful urination
- New or worsening urinary frequency or urgency
- Suprapubic pain
- Flank pain or tenderness

Inappropriate urine cultures pose harm to patients

Unnecessary antibiotics Misdiagnosis

Bladder Infection or Cystitis

UNC 1st line options:

- Nitrofurantoin
- Bactrim (SMX-TMP)

! Ciprofloxacin does NOT cover 1 in 3 *E. coli* isolates at UNCMC

Pyelonephritis

UNC 1st line empiric options:

- Ceftriaxone
- Gentamicin

! Target therapy to cultures & use shortest effective duration



BLOOD CULTURE BEST PRACTICES IN ADULTS

2023 Update | UNC Hospitals



Indications for Blood Cultures

- Suspected sepsis
- New fever in ICU patient
- Suspected endocarditis
- Fever in a neutropenic patient
- Suspected bacteremia/fungemia
- "Test of cure" >48 hours after the initiation of appropriate antimicrobial therapy is routinely recommended for patients with the following pathogens:
 - Carbapenem-resistant Enterobacteriaceae
 - Enterococcus species
 - Candida species
 - Staphylococcus aureus (MRSA or MSSA)
 - Staphylococcus lugdunensis
- For patients with other pathogens who are clinically improving, evidence is weak that a test of cure improves outcomes.

Think Twice

Blood cultures may not be needed in conditions with low probability for bacteremia (such as post-op fever within 48 hours in clinically stable patients; isolated fever; patients with non-severe cellulitis, or non-severe pneumonia). Cultures in these cases are generally negative.

In a neutropenic patient, routine serial blood cultures in a stable patient with persistent fevers is not evidence-based and therefore not recommended.

DO

- Use two peripheral venipunctures for the lowest rate of false positive cultures.
- Use strict aseptic technique.
- Always obtain at least 2 sets of blood cultures, filling each bottle to the recommended 8-10 ml for accurate results.
- Obtain blood cultures PRIOR to initiating antibiotic therapy.

DO NOT

- Obtain blood cultures via a peripheral intravenous catheter (PIV) or arterial catheter, even when the catheter is newly placed. This is associated with false positives.
- Obtain a single blood sample and then split the blood among multiple blood culture sets.
- Obtain blood cultures in an asymptomatic patient unless the cultures are being obtained as a "test of cure" for an indicated pathogen as listed above.
- Obtain blood cultures via central venous catheter if possible (higher risk for contamination). If not feasible to obtain two sets of blood cultures by separate peripheral venipunctures or if trying to salvage the line, obtain one set from the peripheral venipuncture and one from the central line.

Blood Culture Best Practices



Educating Residents, Families, and Frontline Staff

- Attend resident council meetings
- Written communication to families on signs/symptoms of infections
- Educate frontline staff on symptoms of infections
 - Urinary symptoms
 - Respiratory symptoms
 - Skin and soft tissue infections

Collaboration

C.diff project
Opportunities



[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)

C. Difficile Assay ✔ Accept ✖ Cancel

C. Diff Information

Laxatives

Medication	Ordered Dose/Rate, Route, Frequency	Last Action
bisacodyl (DULCOLAX) EC tablet 5 mg	5 mg, Oral, Daily PRN	Given, 5 mg at 02/24 0905
docusate sodium (COLACE) capsule 100 mg	100 mg, Oral, Daily	Given, 100 mg at 07/24 1531

C. Diff Results (Last 14 days)
No procedures found

Frequency: Once STAT Tomorrow AM Daily

At: Today Tomorrow

ⓘ Has the patient had >=3 liquid stools in the past 24 hour period?

ⓘ Is the patient on treatment for C. difficile?

ⓘ You MUST request Infectious Diseases approval before signing this order. Did Infectious Diseases approve this order?

Specimen Type:

Specimen Source:

Add-on: No add-on specimen found

Comments: [+ Add Comments](#)

Process Instructions: "Testing for C. difficile infection is appropriate in patients >= 2 years of age with >= 3 liquid stools in a 24 hour period. Do NOT test if patient: has received laxatives in the past 48 hours"; had a negative C. difficile test in the past 7 days with no NEW symptoms"; had a positive test in the past 14 days; is still on treatment for C. difficile; has finished treatment for C. difficile, in order to demonstrate a "cure".

Phase of Care:

ⓘ You cannot sign these orders because information is missing or requires your attention:

C. Diff testing is not currently indicated for this patient. If after review of the C Diff ordering guidelines, you still need to place the order, contact your designated approval point person and document the name and the date of contact in the C Diff order

“Longitudinal genomic surveillance of carriage and transmission of *Clostridioides difficile* in an intensive care unit”

- Longitudinal, observational, single-center study
 - Collected 3952 rectal swabs and stool sample
 - 425 *C.difficile* isolates were whole-genome sequenced
- Findings:
 - Only 1% (6 of 584) of eligible patients had genomically supported acquisition of toxigenic *C.difficile* via cross-transmission
 - Among patients colonized with *C.difficile* on admission they had 24-times increased risk of developing CDI during hospitalization

Opportunities for Collaboration

Low-hanging fruit	Moderate-hanging fruit	High-hanging fruit
Solidify plans for regular senior leadership access by ASPs in collaboration with IPPs	Refine and enhance data tracking and reporting by ASPs, including NHSN reporting	Consider enhanced models for ID physician recruitment, training and certification in Hospital Epidemiology/Infection Prevention and Antimicrobial Stewardship
Utilize infrastructure for telecommunication that was enhanced during the pandemic for future ASP-IPP collaborations	Create collaborative ASP-IPP business plans (e.g. adoption of third party software platforms, enhancing access to IT support)	Consider new combined ASP-IPP program models incorporating streamlined command and reporting structures
Utilize infrastructure that was created for data access, reporting and collaboration during the pandemic for future ASP-IPP collaborations	Collaborate on enhancing access to IT, microbiology, nursing staff	Collaborate on providing bundled ASP-IPP telehealth services to other hospitals
	Collaborate on patient and staff education	

From: [Infection Prevention and Antimicrobial Stewardship Program Collaboration During the COVID-19 Pandemic: a Window of Opportunity](#)

Low-hanging fruit

- Recognize similarities in work activities
- Present updates at each other's committee meetings
- Share semi-annual reports with respective senior leaders
- Collaborate on analytics, surveillance and reporting of outcomes and process measures
- Share information technology resources and consultants for preparing data reports
- Develop coordinated patient and staff educational materials (e.g., diagnostic stewardship)
- Provide cross-training opportunities for physician trainees and nurses

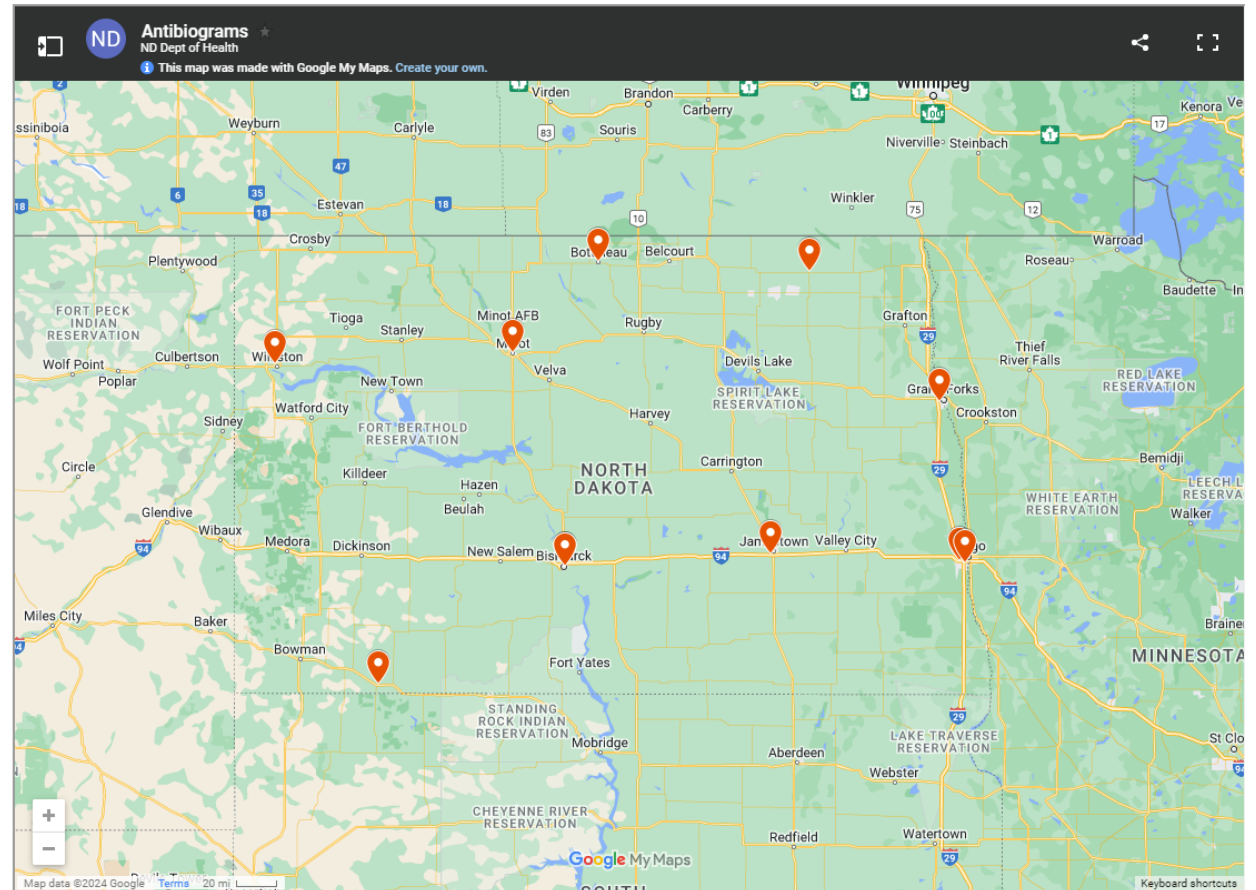


Share NHSN AU/AR data

- Does the AMS committee have access to NHSN?
- Who is reporting the information to the facility?
- How is the information being used?
 - Did you know NHSN AR module has the capability to make an antibiogram from your data?
 - Did you know you can get unit specific data on CAUTIs/CLABSIs and antibiotic usage?

Collaborate with Referral Facilities

- Antibioqram website
- Reach out to IPs at other facilities to get their antibiogram
- Discharge planning
- Create a stewardship project together



Summary

- Infection Preventionists Role:
 - Supportive
 - Tracking/reporting
 - Be a team member (multidiscipline team)
 - Creating education
 - Collaborate
- Infection Preventionists do surveillance and assist in gathering meaningful data that aids in aligning stewardship practices to patient outcomes



- IP's are NOT alone in AMS it is a multidisciplinary team!!!

Thank you!

Emily Perry PharmD

Email: Emily.Perry@ndsu.edu

References

- [Antibiotic Resistance Threats in the United States, 2019 \(cdc.gov\)](https://www.cdc.gov/antibiotic-use/2019-report/)
- Assi M, Abbas S, Nori P, Doll M, Godbout E, Bearman G, Stevens MP. Infection Prevention and Antimicrobial Stewardship Program Collaboration During the COVID-19 Pandemic: a Window of Opportunity. *Curr Infect Dis Rep.* 2021;23(10):15. doi: 10.1007/s11908-021-00759-w. Epub 2021 Aug 18. PMID: 34426728; PMCID: PMC8374122.
- Fabre V, Davis A, Diekema DJ, et al. Principles of diagnostic stewardship: A practical guide from the Society for Healthcare Epidemiology of America Diagnostic Stewardship Task Force. *Infection Control & Hospital Epidemiology.* 2023;44(2):178-185. doi:10.1017/ice.2023.5
- Miles-Jay A, Snitkin ES, Lin MY, Shimasaki T, Schoeny M, Fukuda C, Dangana T, Moore N, Sansom SE, Yelin RD, Bell P, Rao K, Keidan M, Standke A, Bassis C, Hayden MK, Young VB. Longitudinal genomic surveillance of carriage and transmission of *Clostridioides difficile* in an intensive care unit. *Nat Med.* 2023 Sep 18. doi: 10.1038/s41591-023-02549-4. Epub ahead of print. PMID: 37723252.
- Monika Pogorzelska-Maziarz, Eileen J. Carter, Elizabeth Monsees, Mary Lou Manning, Infection preventionists role in antimicrobial stewardship: Survey of APIC members, *American Journal of Infection Control*, Volume 48, Issue 5, 2020, Pages 584-586, ISSN 0196-6553, <https://doi.org/10.1016/j.ajic.2020.02.003>.