Igniting Antimicrobial Stewardship Actions in North Dakota

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Disclosures

None of the presenters 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.*

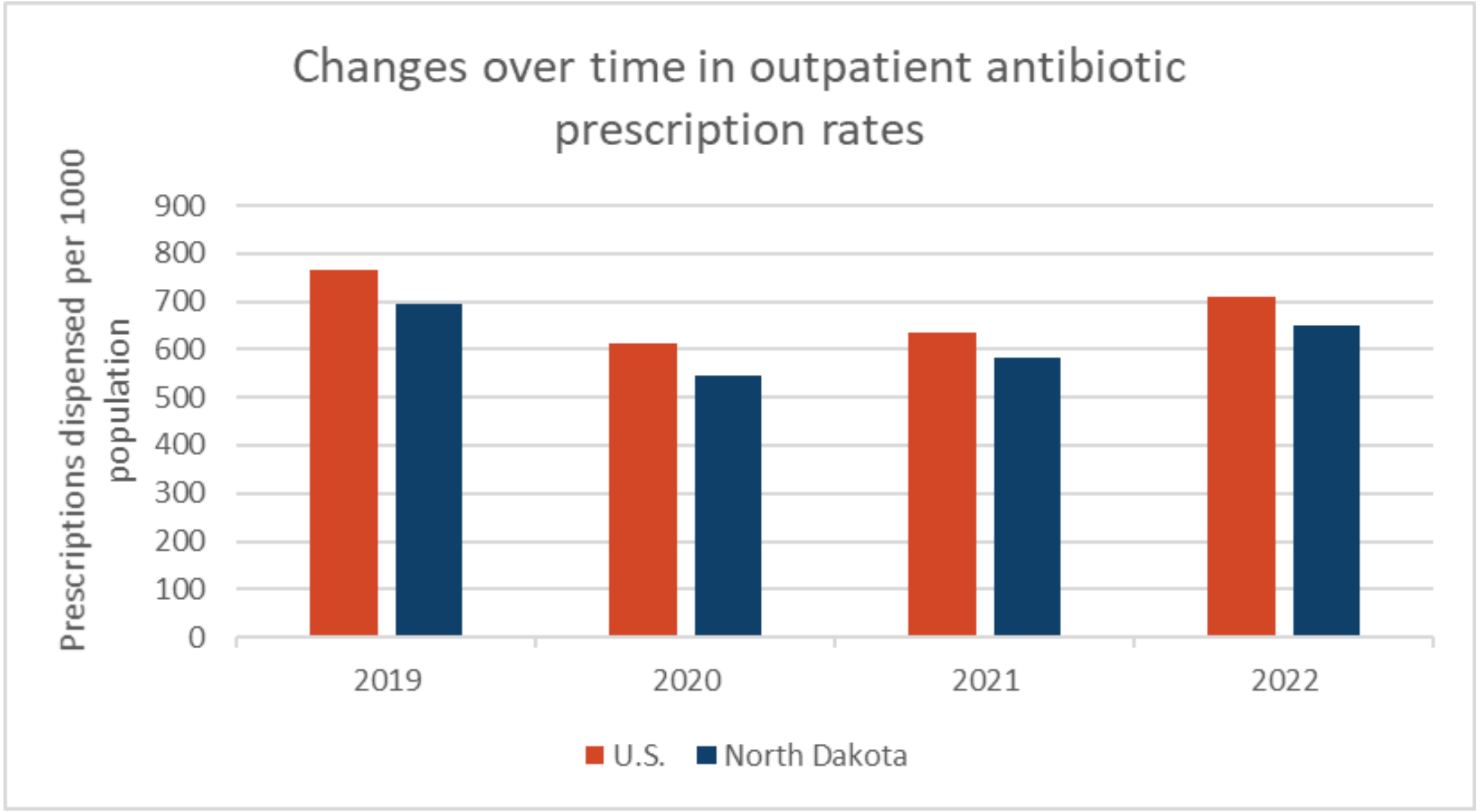
Learning Objectives

At the competition of this activity, participants will be able to:

1. Recite the CDC's Core Elements of Antimicrobial Stewardship.
2. Identify the priority elements of the CDC's Core Elements of Antimicrobial Stewardship.
3. Discuss antimicrobial prescribing in North Dakota.
4. Describe antimicrobial stewardship interventions completed at healthcare facilities in North Dakota.
5. Define and overcome barriers to Antimicrobial Stewardship interventions.

“Even when there isn’t a fire, you’re using a fire extinguisher. You bought it, you stored it, and you know it will work. Antibiotics are to infections as fire extinguishers are to fires.”

-John Rex, MD, Chief Medical Officer, F2G Ltd



https://arpsp.cdc.gov/profile/geography/north-dakota?tabsection-182=1

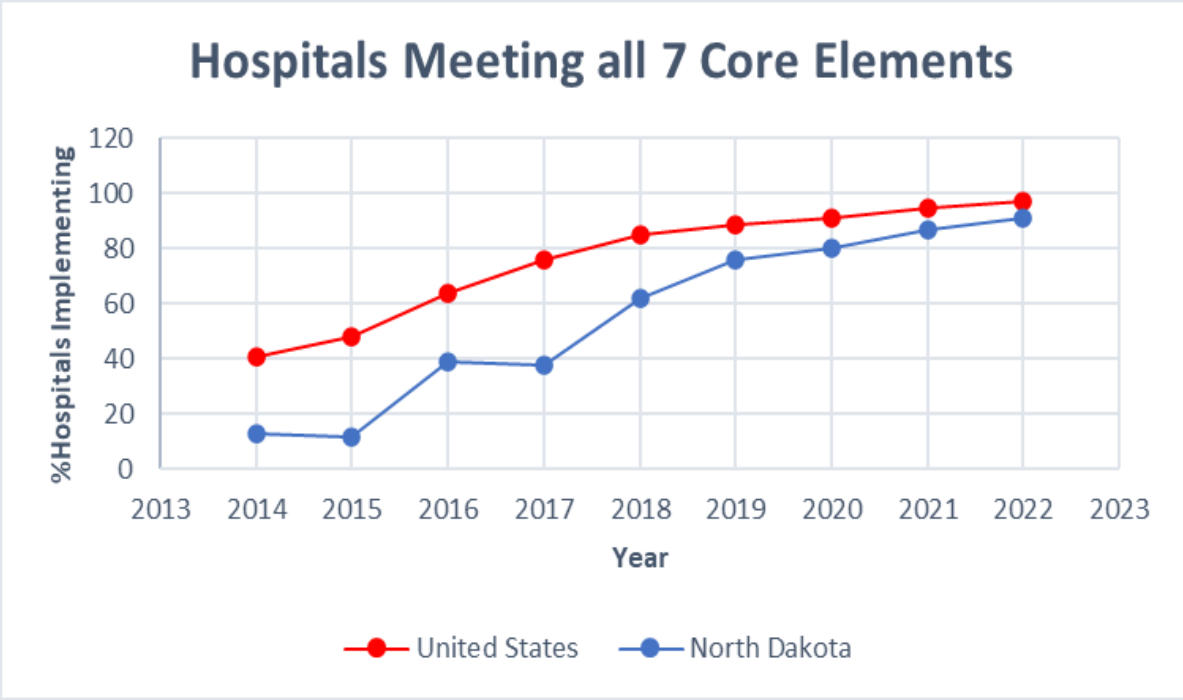
Core Elements of Antimicrobial Stewardship

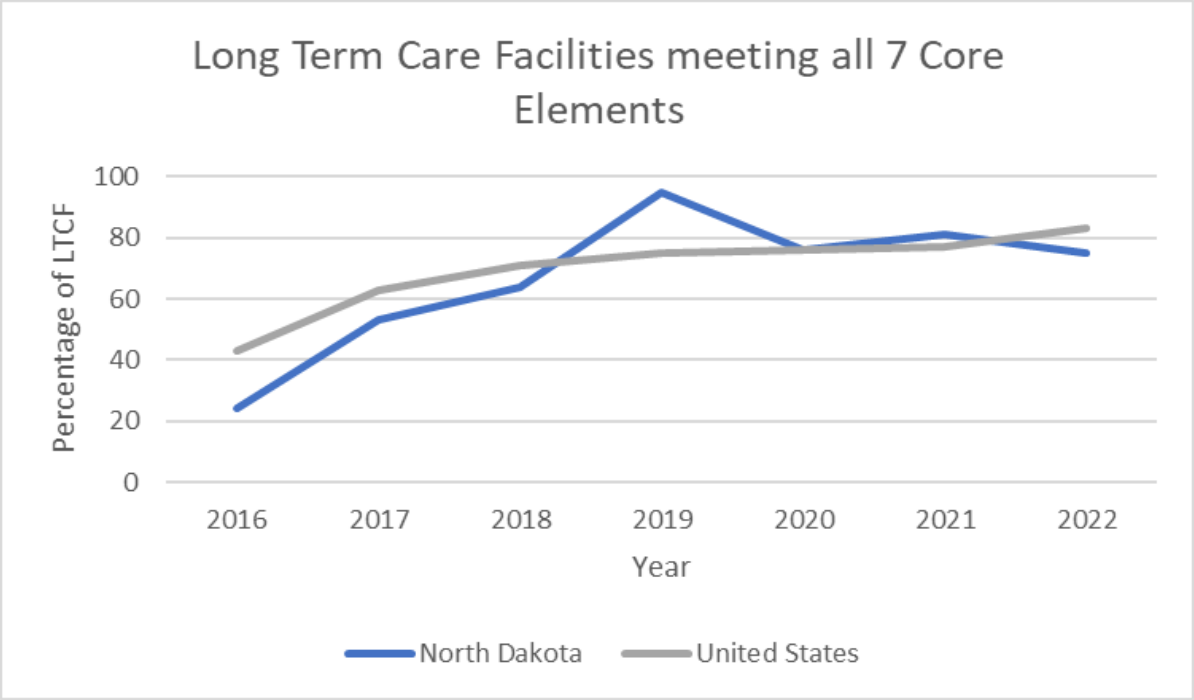
[The Core Elements of Outpatient Antibiotic Stewardship (cdc.gov)]

[The Core Elements of Antibiotic Stewardship for Nursing Homes (cdc.gov)]

https://www.cdc.gov/antibiotic-use/core-elements/health-departments.html

Core Element Uptake in North Dakota





Data from NHSN's annual facilities surveys

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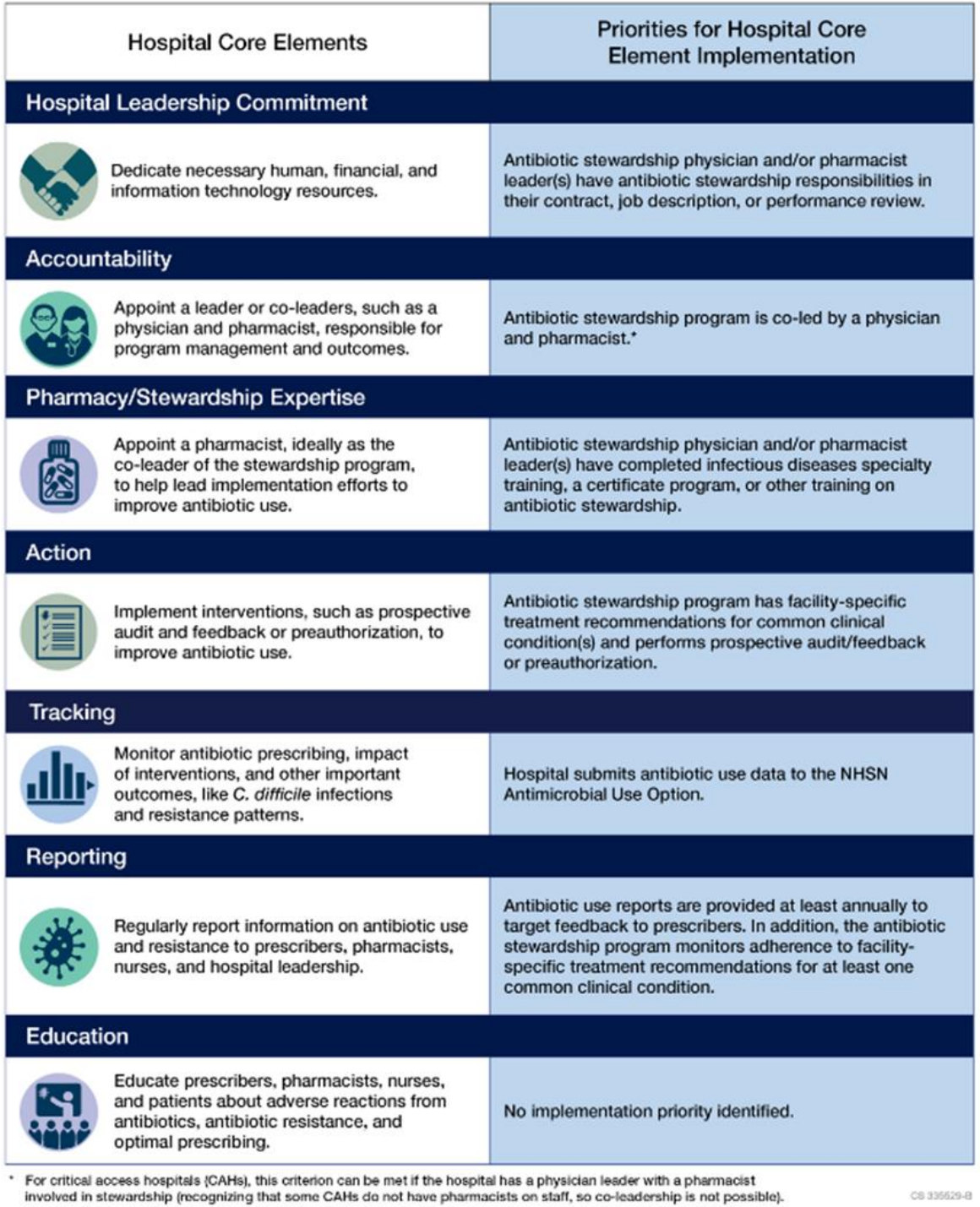


Hospital Core Elements	Priorities for Hospital Core Element Implementation
Hospital Leadership Commitment	
Dedicate necessary human, financial, and information technology resources.	Antibiotic stewardship physician and/or pharmacist leader(s) have antibiotic stewardship responsibilities in their contract, job description, or performance review.
Accountability	
Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.	Antibiotic stewardship program is co-led by a physician and pharmacist.*
Pharmacy/Stewardship Expertise	
Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.	Antibiotic stewardship physician and/or pharmacist leader(s) have completed infectious diseases specialty training, a certificate program, or other training on antibiotic stewardship.
Action	
Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.	Antibiotic stewardship program has facility-specific treatment recommendations for common clinical condition(s) and performs prospective audit/feedback or preauthorization.
Tracking	
Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.	Hospital submits antibiotic use data to the NHSN Antimicrobial Use Option.
Reporting	
Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.	Antibiotic use reports are provided at least annually to target feedback to prescribers. In addition, the antibiotic stewardship program monitors adherence to facility-specific treatment recommendations for at least one common clinical condition.
Education	
Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.	No implementation priority identified.

* For critical access hospitals (CAHs), this criterion can be met if the hospital has a physician leader with a pharmacist involved in stewardship (recognizing that some CAHs do not have pharmacists on staff, so co-leadership is not possible).

CS 335629-B

Hospital Core Elements

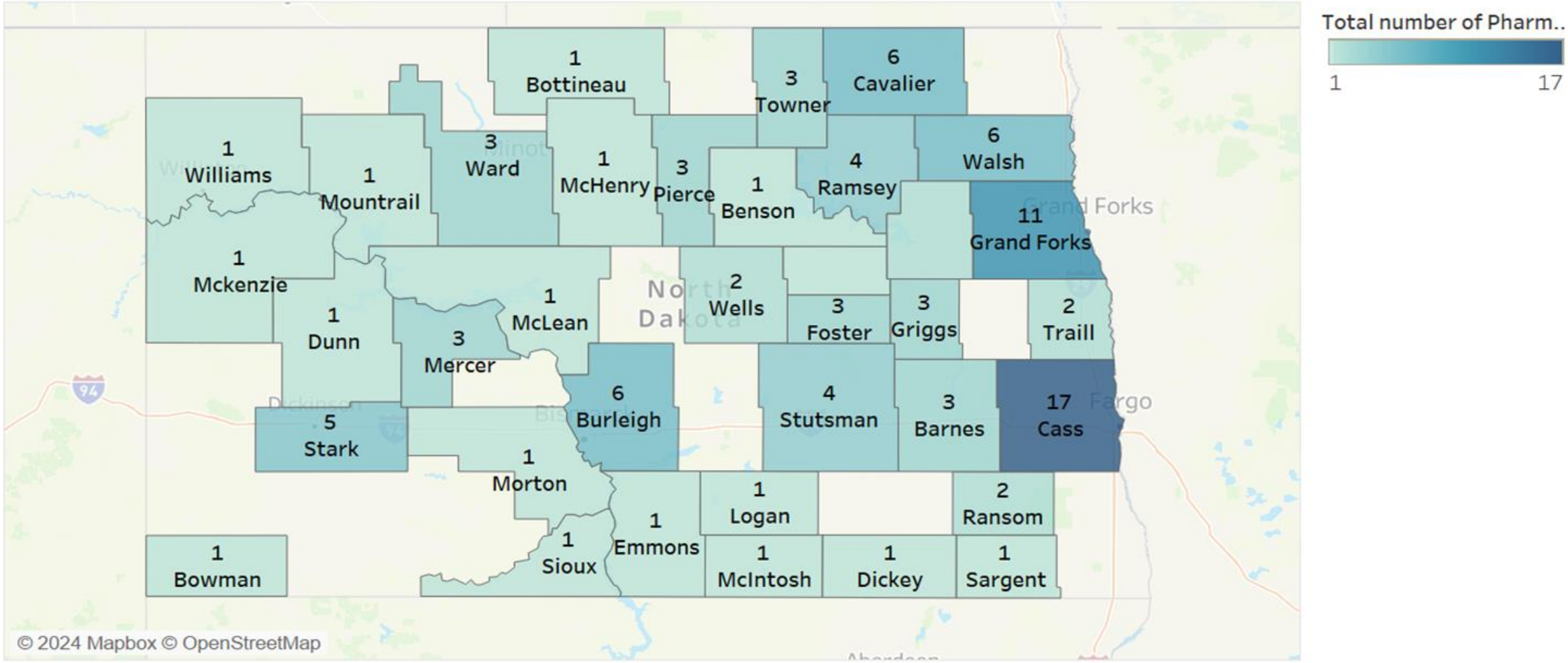
Priority Elements:

1. Leadership Commitment
2. Accountability
3. Pharmacy expertise
4. Action
5. Tracking
6. Reporting

According to NHSN data, only 2 facilities in North Dakota are meeting all 6 Priority Elements

https://www.cdc.gov/antibiotic-use/images/CoreElements-Hospital-Priorities-Table.jpg

Work Counties of Pharmacists Trained in the SIDP Antimicrobial Stewardship Project in North Dakota



Map based on Longitude (generated) and Latitude (generated). Color shows sum of Total number of Pharmacists. The marks are labeled by sum of Total number of Pharmacists and County. Details are shown for County.

Data from SIDP Applications 2018-2023

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Igniting Antimicrobial Stewardship Action in ND

Implementation of an MRSA nasal PCR Antibiotic Protocol

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Rationale

- Broad spectrum antibiotics often initiated for Pneumonia
- Literature supported use of MRSA PCR protocol to help de-escalate antibiotic regimens
- De-escalation of antibiotics anticipated to result in reduced medications costs, laboratory monitoring costs, and potential adverse effects
- In addition, studies of protocol use have not shown any difference in inpatient mortality, clinical improvement, or length of stay
- A decrease in the incidence of acute kidney injury has also been observed

Implementation Plan

- Conducted literature search and drafted a policy
- Shared at multi-disciplinary meetings to gather input
- Presented at the Antimicrobial Stewardship Committee meeting
- Finalized protocol and sought P&T Committee approval
- House-wide education performed through department huddles (~10 hours)

Protocol Procedure

- Pharmacy to order nasal MRSA PCR when consulted to dose vancomycin or when linezolid is ordered for the indication of pneumonia.
- Patient must be on either medication for less than 48 hours at the time of the order

Exclusion criteria for ordering MRSA nasal PCR

- Concurrent use of intranasal mupirocin or decolonization therapy
- Diagnosis of Cystic Fibrosis
- Extra-pulmonary indication for anti-MRSA therapy
- > 48 hours of being on anti-MRSA medication

MRSA PCR Test Interpretation

Positive result

- Poor positive predictive value of 28.6%-35.4%
- If rapid improvement of clinical status with nonproductive sputum, the vancomycin or linezolid can probably be discontinued after 48 hours per provider discretion; the positive result likely represents colonization

Negative result

- Strong positive predictive value of 95.2% to 99.2%.
- If the only indication is for pneumonia, the pharmacist will discuss with the provider about discontinuing either vancomycin or linezolid

Baby N, Faust AC, Smith T et al., 2017

House-wide Clinical Education

1 Pane

Process Name:	Antimicrobial Stewardship MRSA PCR Antibiotic protocol	**PCA Author:**	Carrie Sorenson, PharmD	**Revision #:**	1
Data PCA Issued:	07/01/19	**Keep Posted for 14 Days**		**Posted on:**	07/01/19

PROCESS CHANGE ALERT!!!

Problem Description

Broad spectrum antibiotic coverage is started for many patients that present with pneumonia. Current literature supports the use of MRSA PCR protocols to narrow therapy in pneumonia based on the negative results. Patients that are not actively colonized with MRSA are unlikely to have a MRSA lower respiratory tract infection.[1] This screening provides an additional antimicrobial stewardship tool for avoiding unnecessary empiric MRSA therapy for pneumonia. MRSA nasal PCR protocols have shown to reduce the use of MRSA active antibiotics by two days without increasing adverse effects.[3,4] This will result in decreased medication and laboratory monitoring costs, as well as potential adverse effects, including acute kidney injury. In addition, studies have indicated that the protocols have shown no difference in inpatient mortality, clinical improvement, and length of stay [2,3,4]

What the Standard or Correct Process Should Be

A. Pharmacy will order nasal MRSA PCR when consulted to dose vancomycin or when linezolid is ordered for the indication of **pneumonia**. Pharmacy can order nasal MRSA PCR if patient has been on either medication for less than 48 hours, and is not on topical decolonization therapy.
B. Nursing should collect the nasal MRSA PCR via nares swab as soon as possible, but antibiotic therapy should not be delayed.
C. MRSA PCR result interpretation
    1. Positive result (Poor positive predictive value of 37.3%-48.1%)
        a. Pneumonia due to MRSA is uncommon. If the patient improves quickly with nonproductive sputum, the provider can consider discontinuation of vancomycin or linezolid after 48 hours. The positive result most likely represents colonization.
    2. Negative result (Negative predictive value ranges from 95.2% to 99.2%[4)])
        a. If pneumonia is the only indication for vancomycin or linezolid, the pharmacist will ask the provider if it can be discontinued.
        b. Per nursing policy NSHW0597, a negative PCR test while on MRSA active antibiotics will not be used as a marker to discontinue isolation.

References listed in policy #0178

Initials of staff indicates understanding and agreement of the changes (sign on back if space is limited):

____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____
____	____	____	____	____	____	____	____

Barriers | Solutions

Nursing policy regarding MRSA nasal PCR testing while on antibiotics was different than the pharmacy policy	Worked with IP Director to revise the nursing policies and avoid discrepancies/ potential confusion
Inconsistent communication among pharmacy staff on which patients had lab test ordered, timely follow up of result, and intervention with provider	Kinetics monitoring form updated to include lab result information, and check box for follow-up with provider
Lack of awareness of new protocol and understanding the importance of collecting specimen in a timely fashion	Further education provided department wide as well as one-on-one

Post-implementation Evaluation

- Retrospective Residency project
  - Primary objective: determine if the duration of IV vancomycin or linezolid therapy was shortened following protocol implementation
  - Secondary objective: to assess protocol compliance
  - Specific data not available to share
- Delay in collecting nasal specimen was observed
- Time from test result to provider intervention varied amongst pharmacists, prolonging time to de-escalation
- Provider habits changed to ordering test prior to initiation of anti-MRSA antibiotic in the non-severely ill

Summary

- MRSA nasal PCR protocols have allowed for de-escalation of MRSA active antibiotics by two days without increasing adverse effects·
- This results in lower medications costs, and costs associated with vancomycin serum levels, as well as potential adverse effects
- Patients and staff satisfaction may also improve as an indirect benefit
- This Antimicrobial Stewardship initiative should be considered if onsite PCR testing is available

Stewardship Intervention: Facility-Specific Guidelines

Jessica Erickson, PharmD, BCPS

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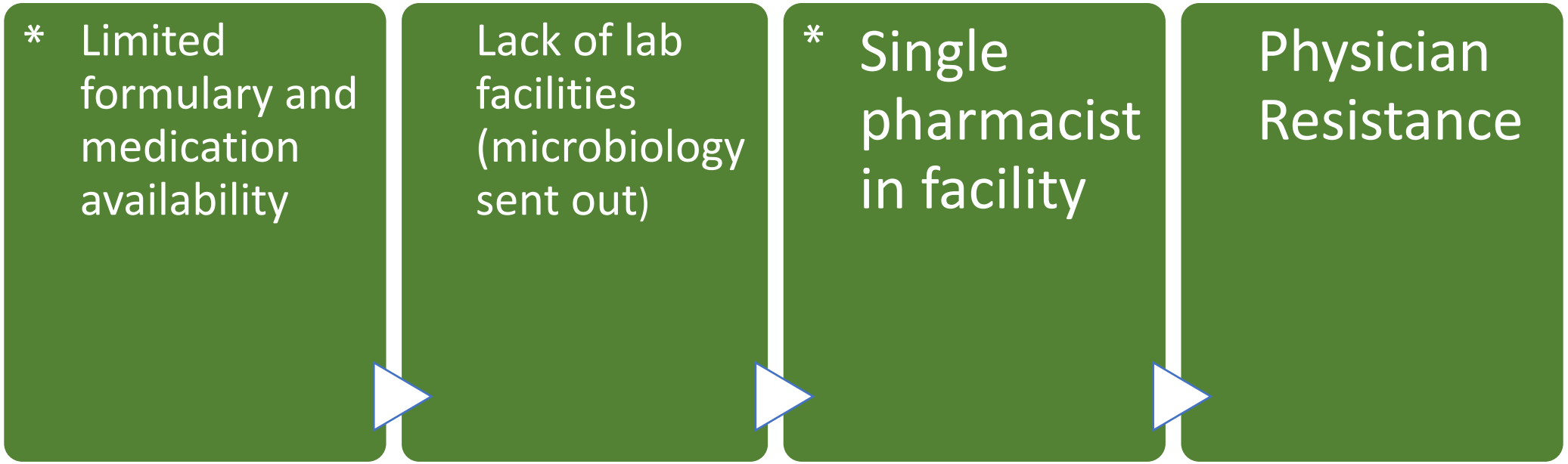
Guidelines Prepared

- Diabetic Foot Infection
- COVID-19
- Community-Acquired Pneumonia
  - Outpatient and inpatient management included
- Healthcare-Acquired Pneumonia
- Urinary Tract Infection/Pyelonephritis
- Skin and Soft Tissue Infections
  - Impetigo/Ecthyma, Purulent SSTIs, Erysipelas/Cellulitis, Necrotizing Fasciitis
- Sepsis (added later)

Guideline Implementation Barriers



Strategies for Overcoming

- **Limited formulary:** Review national guidelines to identify treatments per disease state, harmonize with formulary to include only locally available medications

- **No in-house microbiology:** Use current antibiograms from outside microbiology lab to determine most effective medications per local susceptibility

- **Single pharmacist:** Improve pharmacist effectiveness via dedicated time and education

Overcoming Provider Resistance

- Meet with Chief Medical Officer for guideline approval and provider perspective
- Widely disseminate copies of guidelines for easy access
- One-on-one meetings with providers
- Medical Staff Meeting education to emphasize facets of guidelines that are easier for providers
- Ongoing education emphasizing improvements

Effects of Guidelines on Susceptibility

	2021 (Baseline)	2022 (Intervention started)	2023
E. Coli levofloxacin	80%	97%	96%
S. aureus levofloxacin	50%	80%	100%
S. aureus oxacillin	58%	80%	100%

Facility-Specific Guideline Summary

- Considered local formulary and susceptibilities when reviewing national guidelines
- Discussed extensively with providers
- Utilized initial and ongoing education for providers
  - Emphasized ease of use
- Ensured information easily available
- Tracked susceptibilities over time and changed guideline as necessary

Expanding Antimicrobial Stewardship in a Community Hospital

Sydney Armbrust, PharmD, BCPS
Assistant Professor of Practice, NDSU
Essentia Health

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Stewardship
in Community
Hospitals

Expanding Stewardship

Resources

Personnel, current workflow, time available

Vision

What is currently being done and where would you like to go?

Create team

Upskill, shared responsibility

Quick Win

Is there a known area of improvement?

Essentia Health Fargo

- 133-bed medical center
- Level II Trauma Center
- Comprehensive Stroke Center

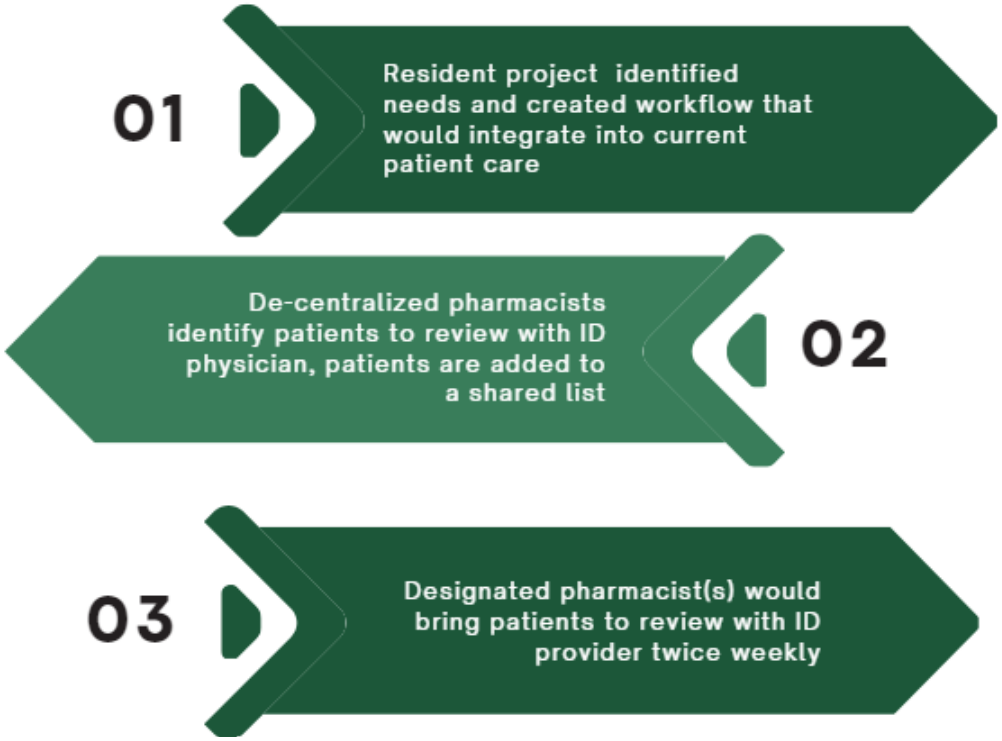
- 33 pharmacists
- 2 pharmacy residents
- 2 infectious disease providers

De-centralized pharmacists located:

- Med-Surg
- Critical Care
- NICU/Pediatrics
- Cardiac Intensive Care
- Infusion Center

Have utilized two different workflows for Antimicrobial Stewardship

Original Workflow



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- Utilized current staff and workflow
- Global responsibility
- Strengthened provider-pharmacist relationship

−

- Patient care priorities
- Scheduling conflicts
- Consistency

Expanding Stewardship at Essentia

Resources

- In October 2022, additional FTE provided the opportunity to expand stewardship to devoted Monday, Wednesday, Friday coverage

Vision

- ASP work started with global responsibility
- Creation of Infectious Disease Pharmacist role

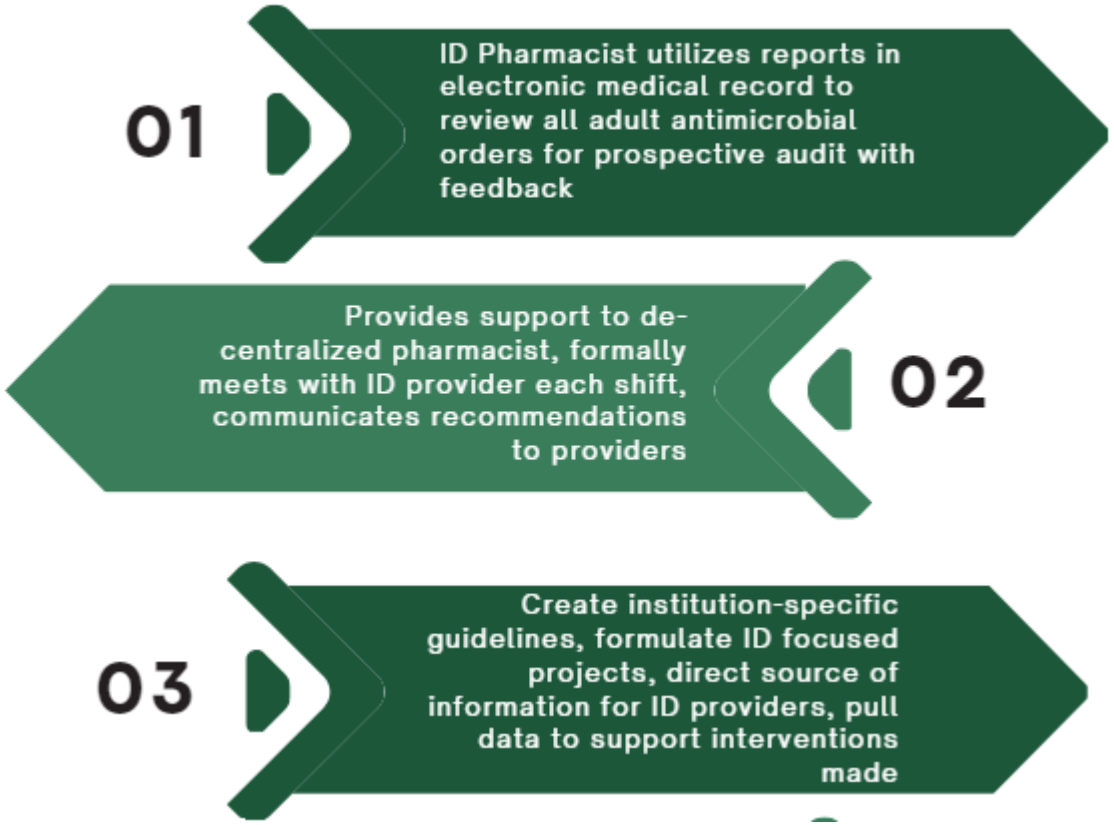
Create team

- Internal interviews conducted
- Four pharmacist team that rotates weekly
- To be board certified in critical care or infectious disease

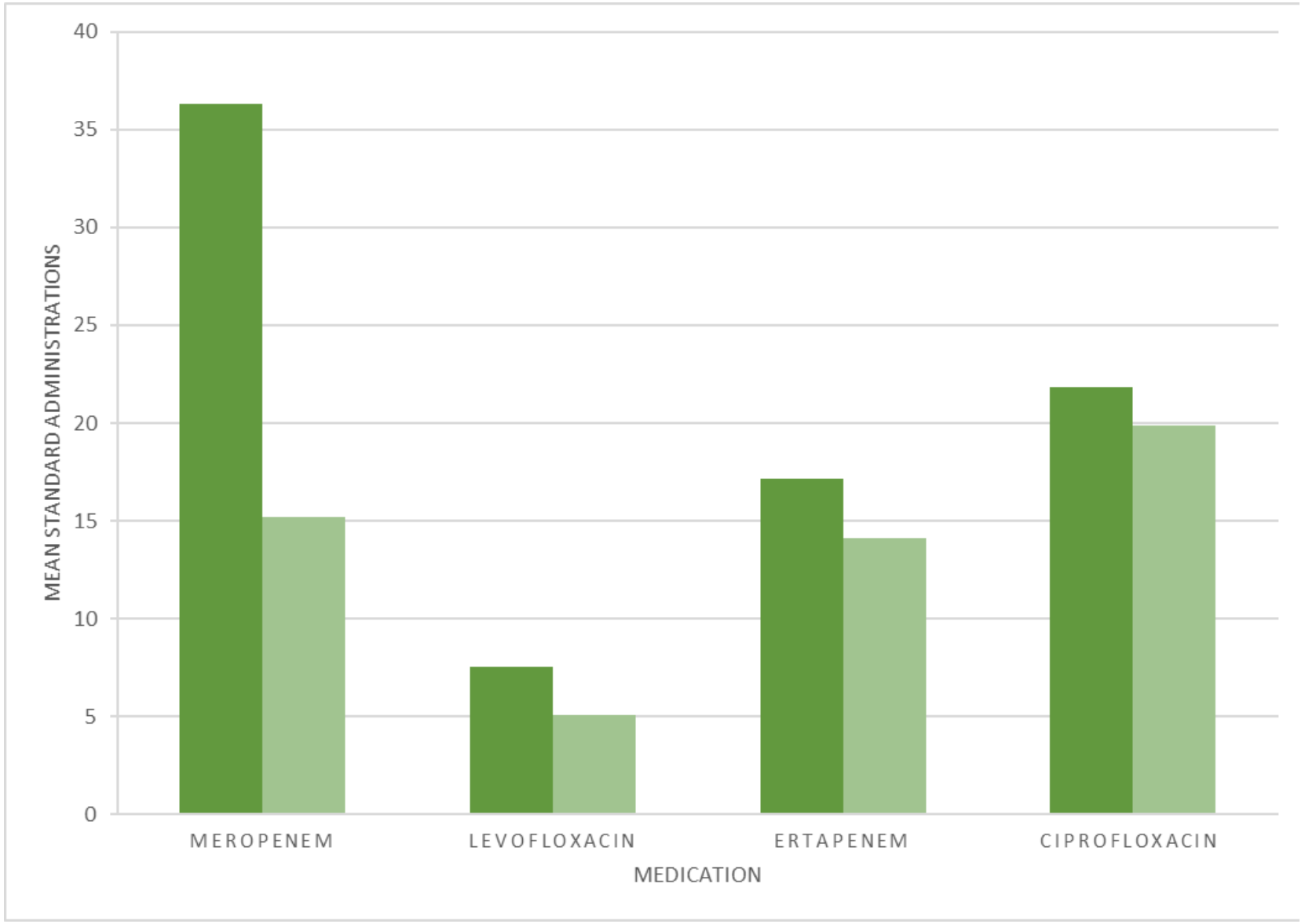
Quick Win

- Identified primary goal of reducing fluoroquinolone and carbapenem use

New Workflow



- ASP remains a global responsibility
- ID pharmacist can provide a "bird's-eye view" of antimicrobial use inpatient



Data from Essentia Health Fargo Oct 2021-June 2022 and October 2022-June 2023

Barriers and Future Goals

- Barriers identified:
  - Compliance with recommendations vary
  - Lag in ID pharmacist follow-up with Monday, Wednesday, Friday coverage
- Goals:
  - Work towards Monday-Friday coverage
  - Remotely assist critical access hospitals

“ASP steers the ship but we need all hands on deck to complete the journey.”

-Debra Goff, Pharm.D., Professor of Clinical Pharmacy Practice and Science at The Ohio State University College of Pharmacy

Community Pharmacy Antibiotic Call-back Program

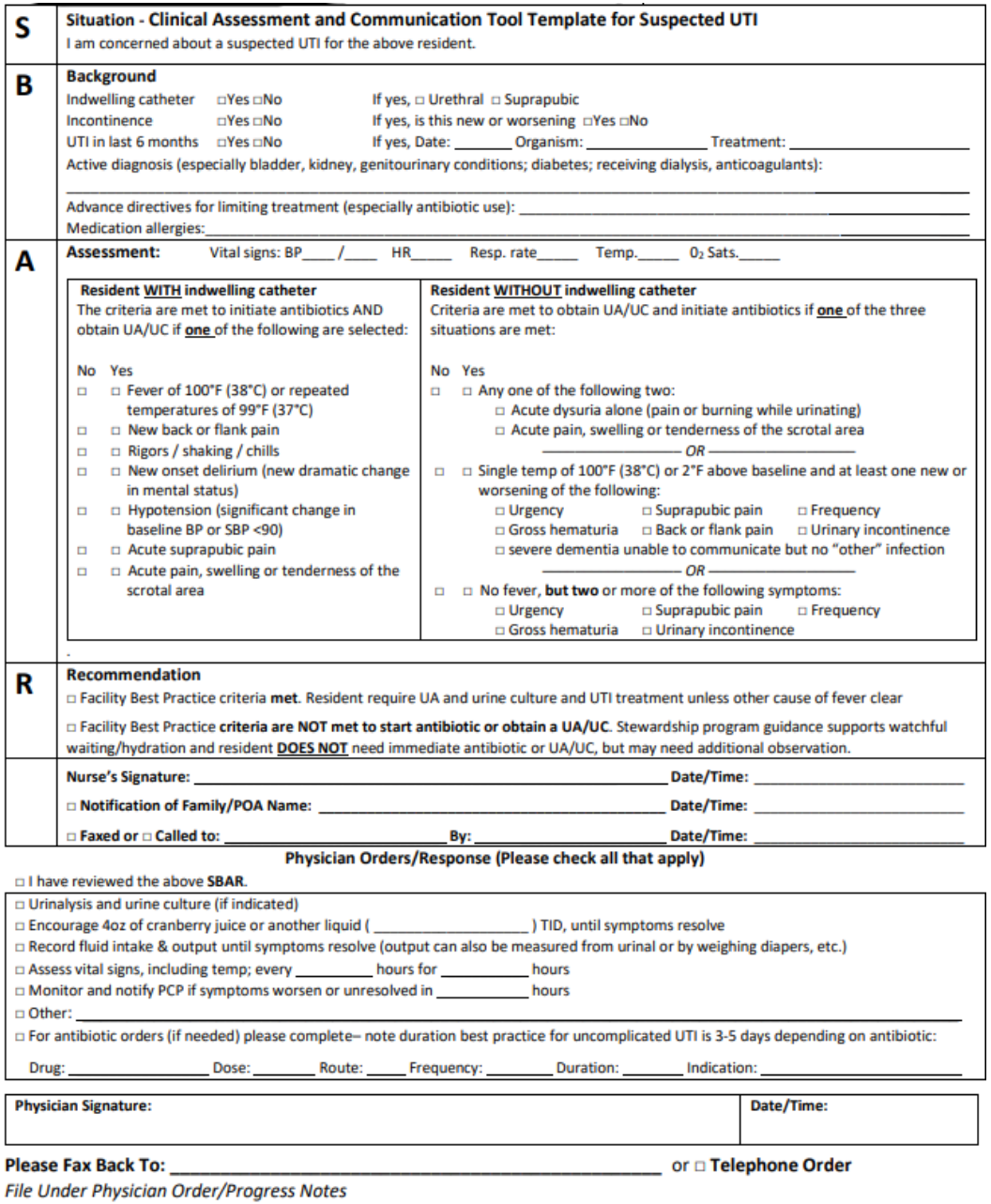
Created list that printed daily of patient with antibiotic recently filled.

Called patient to discuss antibiotic directions, side-effects, and duration of treatment

Document interaction and interventions

Other projects

- Urinary tract infection SBAR communication tool
  - Completed at numerous long-term care facilities in North Dakota
  - Created a single page communication tool for staff to communicate with providers
- Partners
  - DON
  - Facility administrator
- Barriers
  - Scheduling time to train staff and meeting with partners to complete project



S — **Situation - Clinical Assessment and Communication Tool Template for Suspected UTI**

I am concerned about a suspected UTI for the above resident.

B — **Background**

Indwelling catheter □Yes □No — If yes, □ Urethral □ Suprapubic

Incontinence □Yes □No — If yes, is this new or worsening □Yes □No

UTI in last 6 months □Yes □No — If yes, Date: _____ Organism: _____ Treatment: _____

Active diagnosis (especially bladder, kidney, genitourinary conditions; diabetes; receiving dialysis, anticoagulants): _____

Advance directives for limiting treatment (especially antibiotic use): _____

Medication allergies: _____

A — **Assessment:** Vital signs: BP____ /____ HR_____ Resp. rate_____ Temp._____ 0_2 Sats._____

Resident WITH indwelling catheter

The criteria are met to initiate antibiotics AND obtain UA/UC if **one** of the following are selected:

No Yes

- □ □ Fever of 100°F (38°C) or repeated temperatures of 99°F (37°C)
- □ □ New back or flank pain
- □ □ Rigors / shaking / chills
- □ □ New onset delirium (new dramatic change in mental status)
- □ □ Hypotension (significant change in baseline BP or SBP <90)
- □ □ Acute suprapubic pain
- □ □ Acute pain, swelling or tenderness of the scrotal area

Resident WITHOUT indwelling catheter

Criteria are met to obtain UA/UC and initiate antibiotics if **one** of the three situations are met:

No Yes

- □ □ Any one of the following two:
  - □ Acute dysuria alone (pain or burning while urinating)
  - □ Acute pain, swelling or tenderness of the scrotal area

OR

- □ □ Single temp of 100°F (38°C) or 2°F above baseline and at least one new or worsening of the following:
  - □ Urgency □ Suprapubic pain □ Frequency
  - □ Gross hematuria □ Back or flank pain □ Urinary incontinence
  - □ severe dementia unable to communicate but no "other" infection

OR

- □ □ No fever, **but two** or more of the following symptoms:
  - □ Urgency □ Suprapubic pain □ Frequency
  - □ Gross hematuria □ Urinary incontinence

R — **Recommendation**

□ Facility Best Practice criteria **met**. Resident require UA and urine culture and UTI treatment unless other cause of fever clear

□ Facility Best Practice **criteria are NOT met to start antibiotic or obtain a UA/UC**. Stewardship program guidance supports watchful waiting/hydration and resident **DOES NOT** need immediate antibiotic or UA/UC, but may need additional observation.

Nurse's Signature: _____ **Date/Time:** _____

□ **Notification of Family/POA Name:** _____ **Date/Time:** _____

□ **Faxed or** □ **Called to:** _____ **By:** _____ **Date/Time:** _____

Physician Orders/Response (Please check all that apply)

□ I have reviewed the above **SBAR**.

- □ Urinalysis and urine culture (if indicated)
- □ Encourage 4oz of cranberry juice or another liquid (_____) TID, until symptoms resolve
- □ Record fluid intake & output until symptoms resolve (output can also be measured from urinal or by weighing diapers, etc.)
- □ Assess vital signs, including temp; every _____ hours for _____ hours
- □ Monitor and notify PCP if symptoms worsen or unresolved in _____ hours
- □ Other: _____
- □ For antibiotic orders (if needed) please complete– note duration best practice for uncomplicated UTI is 3-5 days depending on antibiotic:

Drug: _____ Dose: _____ Route: _____ Frequency: _____ Duration: _____ Indication: _____

Physician Signature: | **Date/Time:**

Please Fax Back To: _____ or □ **Telephone Order**

File Under Physician Order/Progress Notes

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QUESTION
ANSWER
QUESTION
QUESTION
ANSWER

In what ways can technology be leveraged to support antimicrobial stewardship efforts and improve overall patient outcomes?

This Photo by Unknown Author is licensed under CC BY-NC

- What are the key goals of antimicrobial stewardship initiatives, and why are they important in healthcare settings?

What strategies did you employ to overcome the barriers your project faced?

What advise can you give to others who are working on stewardship initiatives?

References

- Smith MN, Erdman MJ, Ferreira JA et al. Clinical utility of methicillin-resistant *Staphylococcus aureus* nasal polymerase chain reaction assay in critically ill patients with nosocomial pneumonia. *Journal of Critical Care.* 2017; 38: 168-171.
- Spray J, Powers B, Coyle L, Brackbill M. Implementation of mrsa pcr testing to decrease vancomycin and linezolid utilization. *Critical Care Med.* 2016; 44(12): 670.
- Baby N, Faust AC, Smith T et al. Nasal methicillin-resistant *Staphylococcus aureus* (MRSA) PCR testing reduces the duration of MRSA-targeted therapy in patients with suspected MRSA pneumonia. *Antimicrobial Agents and Chemotherapy.* 2017; 61:e02432-16. https://doi.org/10.1128/AAC.02432-16.
- Willis C, Allen B, Tucker C et al. Impact of a pharmacist-driven methicillin-resistant *staphylococcus aureus* surveillance protocol. *American Journal of Health Systems Pharmacy.* 2017; 74(21):1765-1773.

Thank you!

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