Assessment and Implementation of Antimicrobial Stewardship Programs in Small and Critical Access Hospitals

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Disclosures

- I have no relevant disclosure
- The presentation does not discuss off-label use of FDA-approved medications

Background

- 104 hospitals are currently licensed in Nebraska[1] serving ~1.9 million
  - Vast majority (93%) are licensed for <200 beds
  - 64 (61.5%) are critical access hospitals (CAH)

- Small/critical access hospitals (SCAH) often lack resources for antimicrobial stewardship program (ASP) implementation[2]

- Of 36 CAH interviewed by Nebraska Infection Control Assessment and Promotion Program (NE ICAP)[3] on ASP activities
  - Only 5 (14%) implemented all 7 CDC antimicrobial stewardship (AS) core elements

1. Nebraska DHHS. State of Nebraska Roster-Hospitals. Available at: http://dhhs.ne.gov/publichealth/Documents/Hospital%20Roster.pdf. Accessed 3/5/18.
2. Stenehjem E, *et al*. Clin Infect Dis 2017;65:691-6.
3. Chung P, *et al.* Abstract 701. Open Forum Infect Dis 2017:4 (Suppl 1);S256.

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Nebraska Antimicrobial Stewardship Assessment & Promotion Program (NE ASAP)

- Collaboration between
  - Nebraska (NE) Department of Health and Human Services (DHHS)
  - University of Nebraska Medical Center
  - Nebraska Medicine

- Provides centralized subject matter expertise to serve as a statewide resource for promotion of AS efforts
  - Team composed of
    - ID-trained physicians (MD)
    - Infection preventionist (IP)
    - ID-trained pharmacists (PharmD)
    - Data analyst

- Rationale
  - CDC recommends using experts in ID to develop and implement AS efforts
  - NE is heavily rural with shortage of ID-trained MD and PharmD
  - Provide support to NE facilities in AS implementation

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Objectives

- Assess current AS and antibiotic prescribing practices in 5 long-term (poster 325) and 5 acute care (this presentation) facilities

- Provide facility-specific recommendations to establish or augment AS activities

- Perform periodic follow-up to
  - Evaluate progress of implementation
  - Provide support for barriers encountered during implementation
  - Answer general questions on AS and antimicrobial prescribing practices
  - Obtain antimicrobial use and resistance data

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Methods

- Facility recruitment
  - NE hospitals interested in implementing/improving ASP

- Requirements for participation
  - Employed local pharmacist(s) for facility
  - Designated project leadership
  - Consented to 1 to 2 onsite visits
  - Agreed to collect and share antimicrobial use and resistance data
  - Signed commitment letter by facility leadership

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Methods

- Prior to onsite assessment
  - Facility demographic data
  - Self-assessment of ASP activities
  - Antibiogram
  - Antimicrobial use data
  - *Clostridium difficile* infection rate

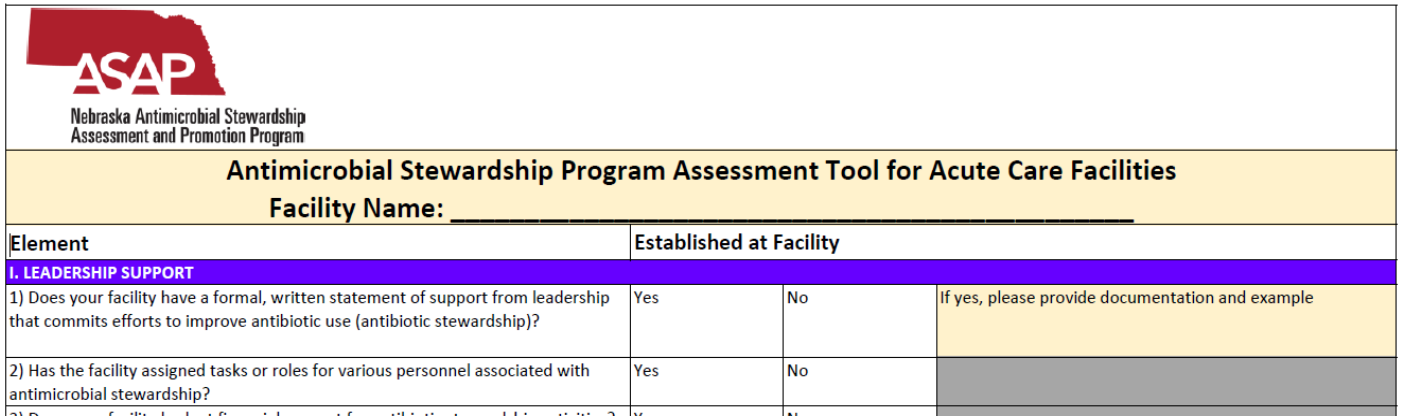
- Onsite assessment
  - Conducted by NE ASAP ID-trained MD and PharmD +/- IP
  - Assessed AS activities and prescribing practices via interviews with

ASP medical director	ASP pharmacist	IP
Microbiology lab	Information technology	Quality Committee

  - Provided brief verbal feedback at end of assessment

- After onsite assessment
  - Sent detailed written report with findings and recommendations
  - Scheduled phone follow-up to discuss recommendations

Assessment Tool



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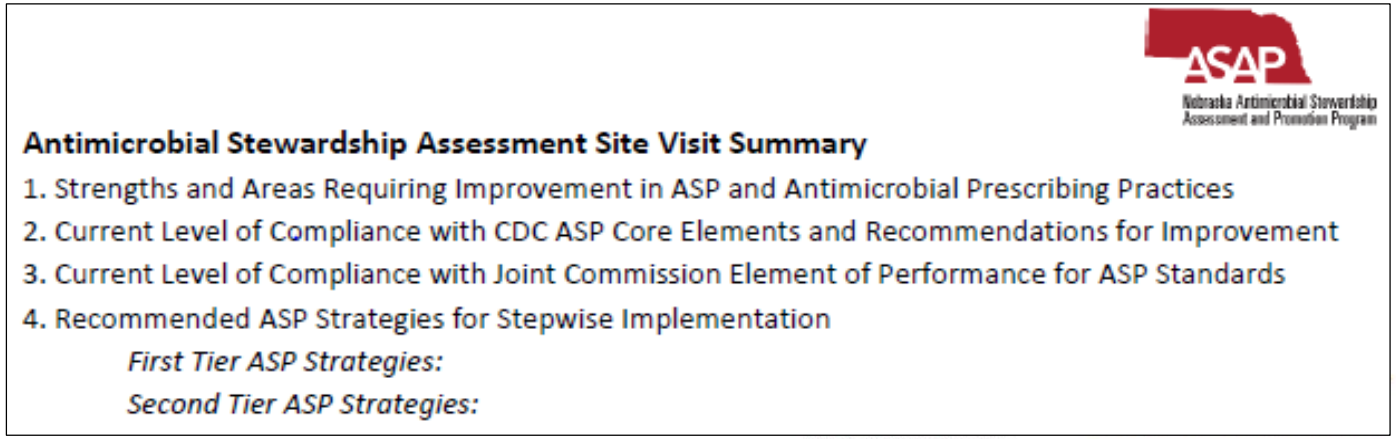
Antimicrobial Stewardship Program Assessment Tool for Acute Care Facilities

Facility Name: _____

Element	Established at Facility		
I. LEADERSHIP SUPPORT			
1) Does your facility have a formal, written statement of support from leadership that commits efforts to improve antibiotic use (antibiotic stewardship)?	Yes	No	If yes, please provide documentation and example
2) Has the facility assigned tasks or roles for various personnel associated with antimicrobial stewardship?	Yes	No	

- 54-item survey structured around checklist for hospital ASP core elements[1]
- Expanded on section related to core element of Action
- Queried about perceived barriers to ASP implementation and areas of antimicrobial misuse

Post-Assessment Report



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Antimicrobial Stewardship Assessment Site Visit Summary

1. Strengths and Areas Requiring Improvement in ASP and Antimicrobial Prescribing Practices
2. Current Level of Compliance with CDC ASP Core Elements and Recommendations for Improvement
3. Current Level of Compliance with Joint Commission Element of Performance for ASP Standards
4. Recommended ASP Strategies for Stepwise Implementation

First Tier ASP Strategies:

Second Tier ASP Strategies:

1. CDC. The Core Elements of Hospital Antibiotic Stewardship Programs. Available at https://www.cdc.gov/antibiotic-use/healthcare/pdfs/checklist.pdf. Accessed 3/5/2018.

Results – Facility Demographics

Parameters*	No. of Hospitals (N = 5)
Bed size – median (range)	25 (10 – 161) beds
Critical access hospital	4
Availability of electronic medical record	4
Use of computerized prescriber order entry	4
Presence of multidisciplinary ASP team	5
ASP team members	
ID/ASP-trained physician leader	1
Non-ID trained physician leader	4
Non-ID/ASP-trained pharmacist	5
Infection preventionist	5
Microbiology lab representative	5
Information technology representative	3
Quality committee representative	1

* Data presented as number of facilities except bed size

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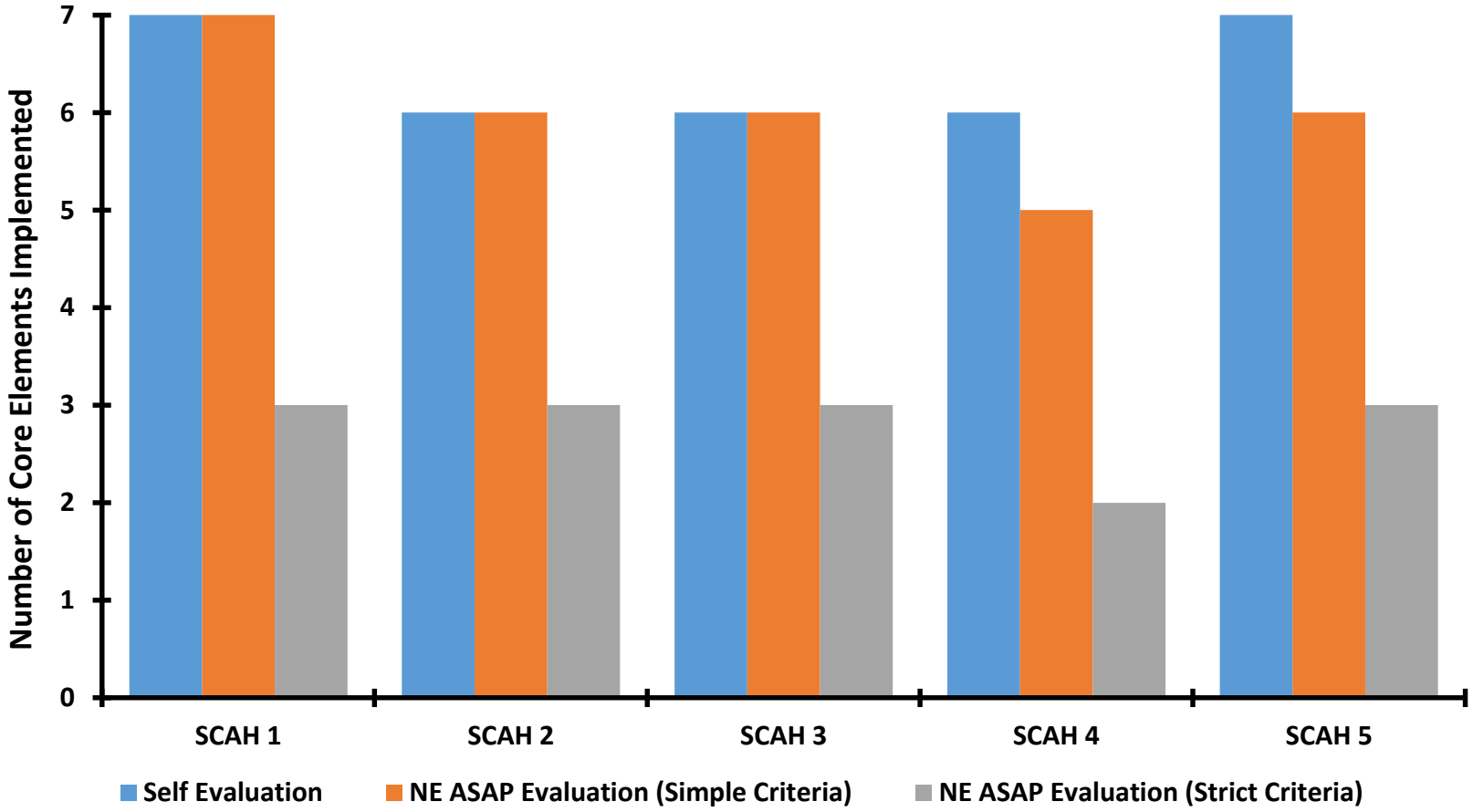
Number of Core Elements Implemented Based on Different Evaluators and Criteria



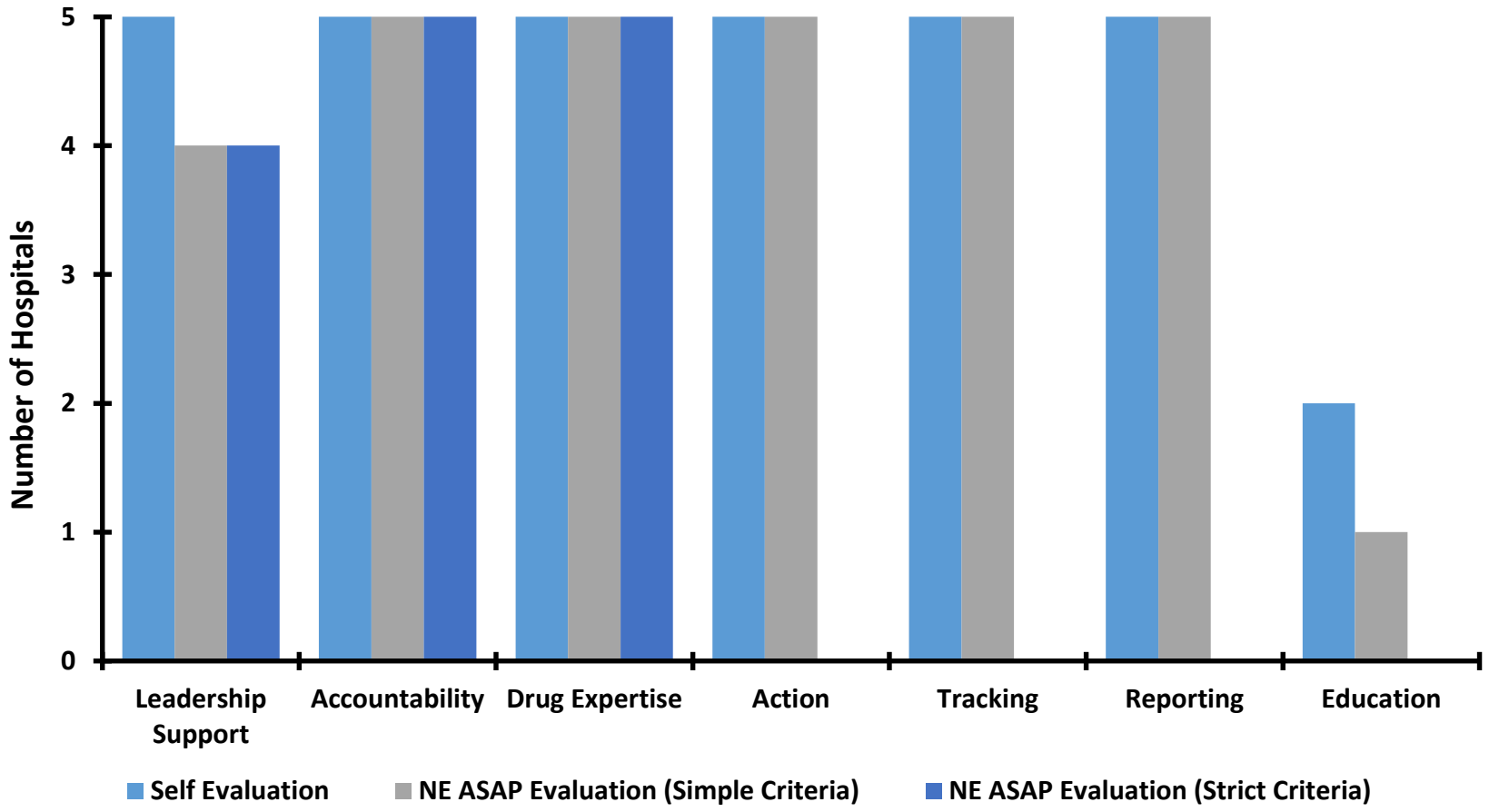
SCAH = small/critical access hospitals

NE ASAP = Nebraska Antimicrobial Stewardship Assessment and Promotion Program

Simple criteria = core elements with multiple components (Action, Tracking, Reporting, Education) are met if any components are satisfied

Strict criteria = must satisfy 1) time-out OR prospective audit-feedback for Action; 2) track antibiotic use AND resistance for Tracking; 3) report antibiotic use AND resistance data for Reporting; 4) educate prescribers AND staff for Education

Frequency of Implementation of Individual Antimicrobial Stewardship Core Elements



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Perceived Barriers to ASP Implementation

Perceived Barriers to Implementation	No. of Hospitals (N = 5)
Lack of Support	4
Finance / cost	3
Personnel shortage	2
Resistance from administration	0
Competing clinical initiatives	3
Lack of expertise	3
Lack of ID MD	3
Lack of pharmacist expert	1

Perceived Areas of Antimicrobial Misuse

Perceived Areas of Misuse	No. of Hospitals (N = 5)
Inappropriate regimen	5
Excessive duration of therapy	3
Questionable indications	2
Use of agent with broader spectrum than necessary	2
Inappropriate treatment of asymptomatic bacteriuria	2
ED regimen continued inpatient	1
Overuse of specific antimicrobial agents	3
Fluoroquinolones	2
Piperacillin-tazobactam	1
Others	5
Missed opportunities for IV-to-PO switch	2
Lack of treatment protocols	1
Protocols with too many antimicrobial choices	1
Unclear allergy documentation	1
Lack of de-escalation efforts from prescribers	1

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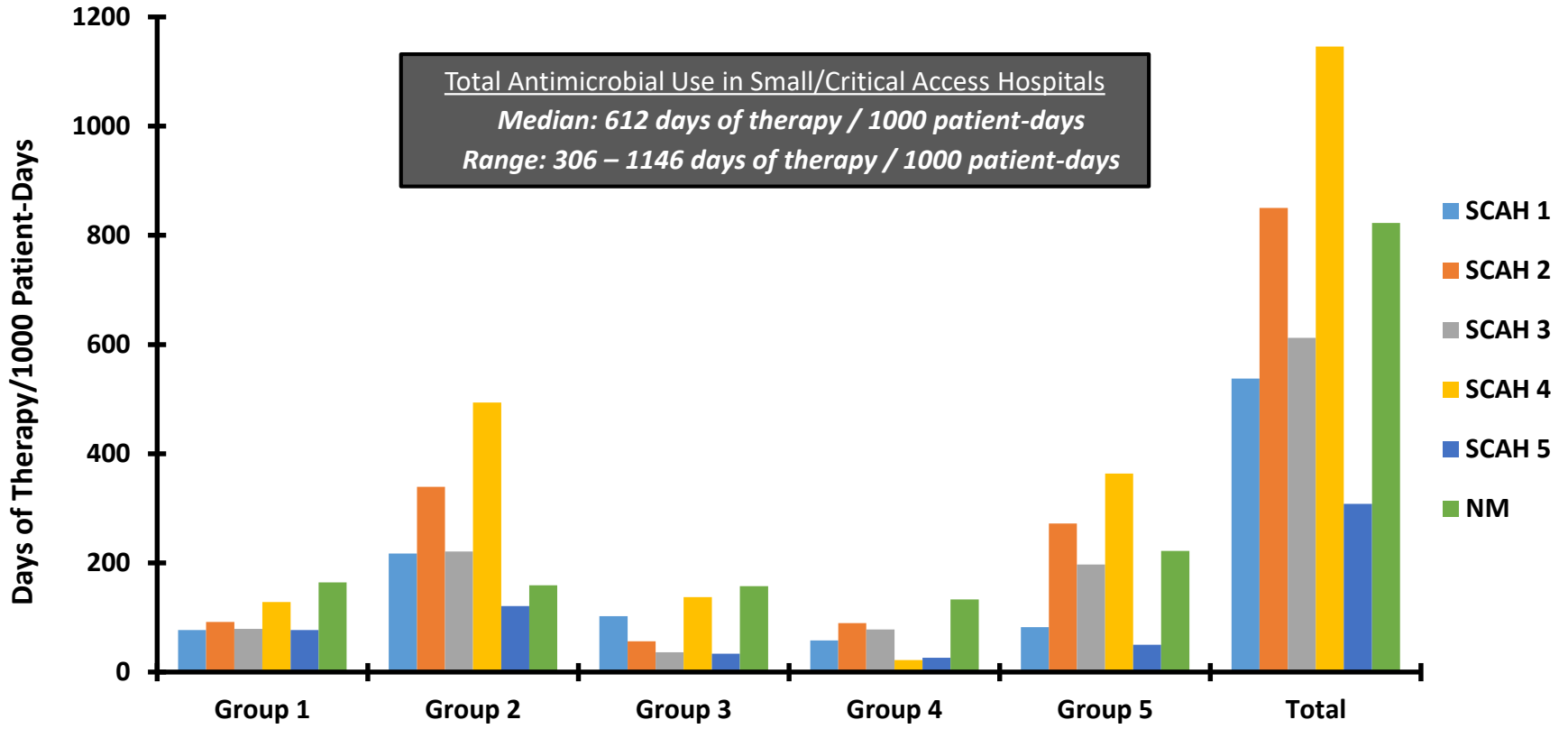
Comparison of Baseline Antimicrobial Use



SCAH = Small/critical access hospitals
NM = Nebraska Medicine, 738-bed tertiary academic medical center
Group 1 = for hospital-onset/multi-drug resistant infections
Group 2 = for community-acquired infections
Group 3 = for methicillin-resistant *Staphylococcus aureus* infections
Group 4 = for surgical site infection prophylaxis
Group 5 = antimicrobials not in Groups 1 to 4
Total = sum of Groups 1 to 5

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Comparison of *E coli* Antimicrobial Susceptibilities

Hospital	No. Tested	Percent Susceptible if ≥30 Isolates or (Number Susceptible / Number Tested) if <30 Isolates													
		Ampicillin	Ampicillin/ Sulbactam	Piperacillin/ Tazobactam	Cefazolin	Ceftazidime	Ceftriaxone	Cefepime	Aztreonam	Imipenem or Meropenem	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin or Levofloxacin	TMP/SMX
1	761	56	63	98	93*	99	95	99	--	100	--	95	94	80	77
2	137	52	82	99	93	--	94	94	94	100	--	93	--	68	78
3	320	50	79	95	86	--	93	93	--	100	100	91	84	70	71
4	62	69	69	89	92*	--	(2/2)	--	--	(2/2)	--	(1/2)	(1/2)	73	79
5	133	47	55	97	95	--	98	--	--	100	--	--	--	72	80
NM	1940	57	61	98	90*	95	95	96	95	100	100	91	92	83	75

NM = Nebraska Medicine, a 738-bed tertiary academic medical center
* Only reported for urine isolates

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Recommendations Provided by NE ASAP

	Category and Type of Recommendations	Small/Critical Access Hospitals				
		1	2	3	4	5
Administrative Elements	**Leadership Support**					
	Provide time/incentive for ASP team		X	X		X
	Draft leadership support statement				X	
	Accountability					
	Form ASP committee	X			X	
	Drug Expertise					
	Educate ASP leaders		X	X	X	X
Interventional Elements	**Action**					
	Implement antibiotic time-out/review	X	X	X	X	X
	Determine/review antibiotic target for intervention	X	X	X	X	X
	Use CPOE* to drive ASP intervention	X	X	X	X	X
	Improve allergy assessment	X				
	Implement IV-to-PO switch/dose adjustment			X		
	Use rapid diagnostic results to drive prescribing			X		
	Tracking/Reporting					
	Track/report ASP metrics to show ASP efforts	X	X	X	X	X
	Document ASP interventions	X	X	X		X
	Enhance/disseminate antibiogram	X	X	X	X	
	Education					
	Provide ASP education to providers and staff	X	X	X	X	X

* CPOE = computerized prescriber order entry

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NE ASAP Website

https://asap.nebraskamed.com

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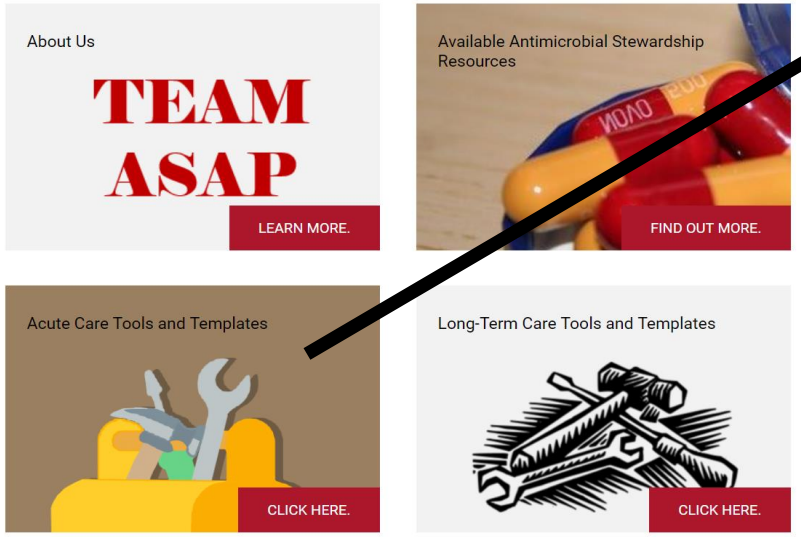
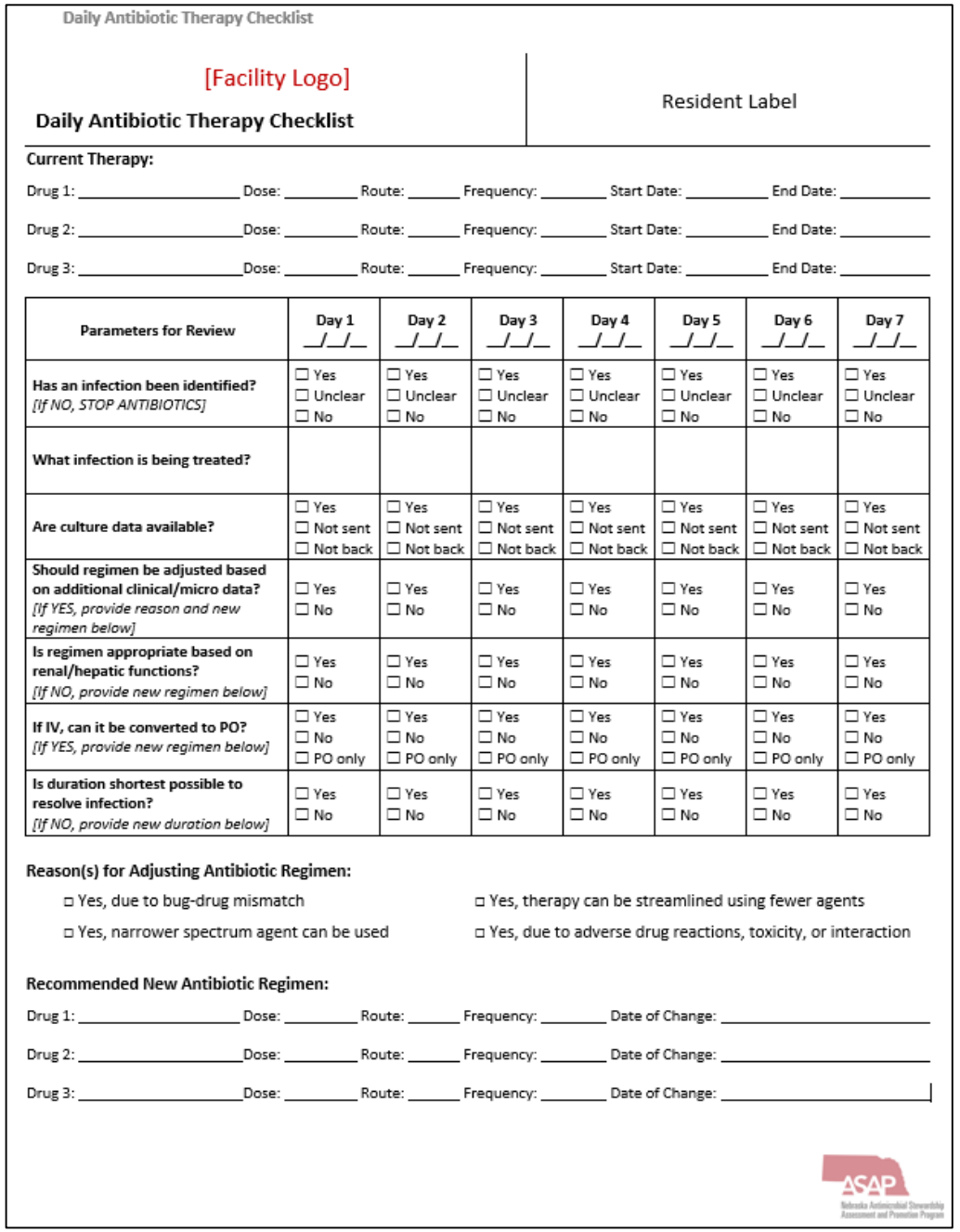
PROVIDING YOU WITH THE RESOURCES TO PROMOTE APPROPRIATE ANTIBIOTIC USE, IMPROVE PATIENT OUTCOMES AND PREVENT ANTIBIOTIC RESISTANCE





Daily Antibiotic Therapy Checklist

[Facility Logo]

Daily Antibiotic Therapy Checklist

Resident Label

Current Therapy:

Drug 1: _____ Dose: _____ Route: _____ Frequency: _____ Start Date: _____ End Date: _____

Drug 2: _____ Dose: _____ Route: _____ Frequency: _____ Start Date: _____ End Date: _____

Drug 3: _____ Dose: _____ Route: _____ Frequency: _____ Start Date: _____ End Date: _____

Parameters for Review	Day 1 __/__/__	Day 2 __/__/__	Day 3 __/__/__	Day 4 __/__/__	Day 5 __/__/__	Day 6 __/__/__	Day 7 __/__/__
Has an infection been identified? *[If NO, STOP ANTIBIOTICS]*	☐ Yes ☐ Unclear ☐ No	☐ Yes ☐ Unclear ☐ No	☐ Yes ☐ Unclear ☐ No	☐ Yes ☐ Unclear ☐ No	☐ Yes ☐ Unclear ☐ No	☐ Yes ☐ Unclear ☐ No	☐ Yes ☐ Unclear ☐ No
What infection is being treated?							
Are culture data available?	☐ Yes ☐ Not sent ☐ Not back	☐ Yes ☐ Not sent ☐ Not back	☐ Yes ☐ Not sent ☐ Not back	☐ Yes ☐ Not sent ☐ Not back	☐ Yes ☐ Not sent ☐ Not back	☐ Yes ☐ Not sent ☐ Not back	☐ Yes ☐ Not sent ☐ Not back
Should regimen be adjusted based on additional clinical/micro data? *[If YES, provide reason and new regimen below]*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Is regimen appropriate based on renal/hepatic functions? *[If NO, provide new regimen below]*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
If IV, can it be converted to PO? *[If YES, provide new regimen below]*	☐ Yes ☐ No ☐ PO only	☐ Yes ☐ No ☐ PO only	☐ Yes ☐ No ☐ PO only	☐ Yes ☐ No ☐ PO only	☐ Yes ☐ No ☐ PO only	☐ Yes ☐ No ☐ PO only	☐ Yes ☐ No ☐ PO only
Is duration shortest possible to resolve infection? *[If NO, provide new duration below]*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Reason(s) for Adjusting Antibiotic Regimen:

- ☐ Yes, due to bug-drug mismatch
- ☐ Yes, therapy can be streamlined using fewer agents
- ☐ Yes, narrower spectrum agent can be used
- ☐ Yes, due to adverse drug reactions, toxicity, or interaction

Recommended New Antibiotic Regimen:

Drug 1: _____ Dose: _____ Route: _____ Frequency: _____ Date of Change: _____

Drug 2: _____ Dose: _____ Route: _____ Frequency: _____ Date of Change: _____

Drug 3: _____ Dose: _____ Route: _____ Frequency: _____ Date of Change: _____

Discussion/Conclusions

- Implementation of CDC core elements is suboptimal in Nebraska small/critical access hospitals
  - 14% from NE ICAP interviews
  - 2 of 5 from NE ASAP facility self-assessment
  - O of 5 based on NE ASAP assessment using strict criteria

- Barriers for AS implementation included
  - Limitations in financial support
    - AS training for program leader
    - Dedicated time for AS activities
  - Competing initiatives with higher priority than AS
  - Lack of MD and pharmacist with ID/AS experience

- Facility administration and prescribers were identified as generally supportive of ASP

Discussion/Conclusions

- AS activities broadly needed in NE ASAP-participating facilities
  - Conduct post-prescription review
    - Prospective audit-feedback at 48-72 hours
    - Antibiotic time-out
  - Systematically track and review antimicrobial use at institution level
  - Report antimicrobial use data to oversight committee(s), prescribers and facility staff
  - Work with information technology to build AS interventions in CPOE
  - AS education for facility prescribers and staff

- Ongoing and long-term follow-up is required to evaluate the full impact of NE ASAP assessments and recommendations on
  - Antimicrobial use
  - Antimicrobial resistance
  - Incidence of *Clostridium difficile* infections

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