Improving Antimicrobial Stewardship Programs in Small Community Hospitals Through an Assessment and Feedback Model

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BACKGROUND

- Small community hospitals (SCH) often lack expertise and resources for antimicrobial stewardship program (ASP) implementation
- The CDC recommends collaboration with ASP experts in these situations
- The Nebraska Antimicrobial Stewardship Assessment and Promotion Program (ASAP) is a statewide initiative supported by the NE Department of Health and Human Services, Healthcare-Associated Infection/Antimicrobial Resistance Team through a CDC grant
- The mission of the program is to assist healthcare facilities in acute, long-term and ambulatory care settings implement ASP and other initiatives to improve antimicrobial use

METHODS

- ASAP performed onsite evaluation of antimicrobial stewardship efforts in 5 SCH in April to June 2017 using a 54-item survey based on CDC ASP core elements (CE) via in-person interview of ASP committee members
- Following onsite assessments, ASAP provided facility-specific recommendations for ASP implementation, and periodically contacted these SCH to support and follow progress for 12 months
- The following ASP metrics obtained 6 to 12 months before and after onsite visits were compared:
  - Number of ASP core elements met
  - Extent of ASAP recommendations implemented
  - Levofloxacin usage in days of therapy (DOT) / 1000 patient-days (PD)
  - Susceptibilities of *E coli* to commonly tested antimicrobials
  - Incidence of hospital-onset *Clostridioides difficile* infection (HO-CDI)

RESULTS

Table 1. Baseline Characteristics of Small Community Hospital Assessed (N = 5)

Baseline Characteristics*	No. of Facilities
Bed size – median (range)	25 (10-161) beds
Average census – median (range)	7 (3-77) beds
Availability of infectious diseases/antimicrobial stewardship-trained physician	1
Availability of infectious diseases/antimicrobial stewardship-trained pharmacist	0
Formed multidisciplinary antimicrobial stewardship team	5
Team member responsible for daily antimicrobial stewardship activities	
Pharmacist	3
Infection Preventionist	2

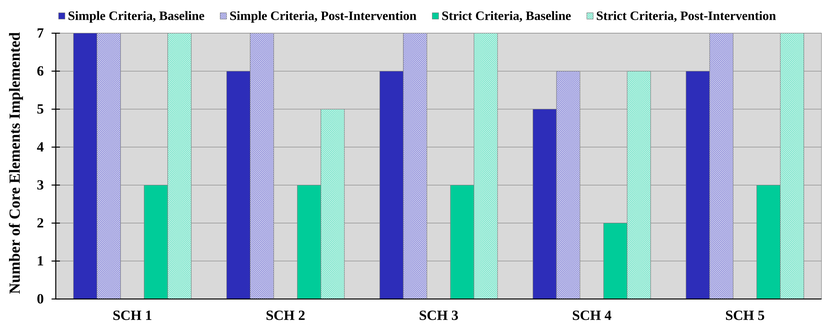
* Data are presented as number of facilities except bed size and average census

Table 2. Comparison of Baseline and Post-Intervention Antimicrobial Stewardship Metrics

Parameters	Baseline	Post-Intervention
Number of facilities meeting all core elements based on simple criteria*	1	4
ASAP recommendations provided at baseline and implemented post-intervention	48	38
Levofloxacin days of therapy/1000 patient-days—mean (SD)†	114.7 (39.6)	71.1 (44.3)
Number of facilities with hospital-onset *Clostridioides difficile* infections	1	1
C. difficile infection/10,000 patient-days—median (range)‡	6.6 (0.0-32.8)	0.0 (0.0-19.7)

* Using the simple criteria, a multi-component core element (Action, Tracking, Reporting, Education) is met if any subcomponent is implemented
† The 37% reduction observed was statistically significant (p = 0.04)
‡ Based on 11 months of data before and after onsite visit from the single facility with hospital-onset *C. difficile* infections

Figure 1. Comparison of Pre- and Post-Intervention Core Element Implementation Using Different Criteria



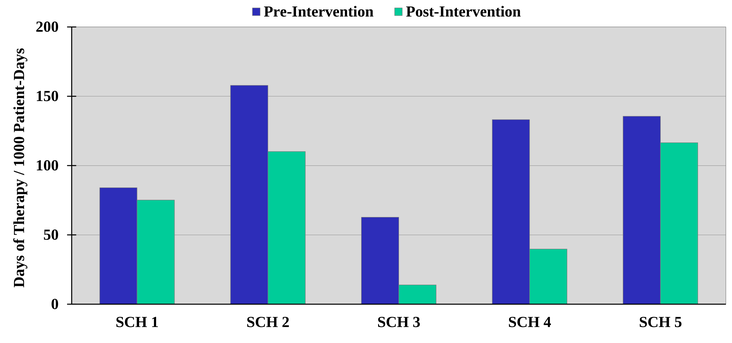
Abbreviation: SCH = small community hospital
Simple criteria = core elements with multiple components (Action, Tracking, Reporting, Education) are met if any components are satisfied
Strict criteria = must satisfy 1) time-out OR prospective audit-feedback for Action; 2) track antibiotic use AND resistance for Tracking; 3) report antibiotic use AND resistance data for Reporting; 4) educate prescribers AND staff for Education

Table 3. Pre- and Post-Intervention Antimicrobial Susceptibilities for *E coli*

Small Community Hospitals	No. Tested		Percent Susceptible if ≥30 Isolates or (Number Susceptible / Number Tested) if <30 isolates													
			Ampicillin		Piperacillin/ Tazobactam		Cefazolin		Cefotaxime or Ceftriaxone		Ertapenem, Imipenem or Meropenem		Ciprofloxacin or Levofloxacin		TMP/SMX	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	761	913	56	56	98	99	93	90	99	93	100	100	80	68	77	73
2	137	127	52	54	99	94*	93	87	94	91	100	99	68	67	78	80
3	320	316	50*	56	95*	96*	86	89	93	94*	100	100	70	81*	71	79
4	62	86	69	57	89	88	92	85	(2/2)	(2/3)	100	99	73	87	79	81
5	133	183	47	55	97	98	95	95	98	98	100	100	72	74	80	81

Abbreviation: TMP/SMX = trimethoprim/sulfamethoxazole
* Percents susceptible are based on the indicated number tested +/- 2 isolates for these antimicrobials

Figure 2. Comparison of Pre- and Post-Intervention Levofloxacin Usage



Abbreviation: SCH = small community hospital
Pre- and post-intervention data are based on usage from July to December 2016 and July to December 2017, respectively

DISCUSSIONS

- The assessment and feedback model employed to facilitate ASP implementation resulted in an increase in the median number of CE met from 6 to 7 (p=0.13)
- All but one facility met all 7 CE at the end of one year; the single deficient hospital only lacked ASP education to providers
- Of the 48 recommendations provided by ASAP, 79% were either partially or fully implemented by the end of one year
- Mean levofloxacin use in the 5 SCH reduced from 114.7 DOT/1000 PD in July to December 2016 to 71.1 DOT/1000 PD in July to December 2017 (p=0.04)
- The median incidence of CDI decreased from 6.6 to 0.0 cases/10,000 PD (p=0.74) in the single SCH with any HO-CDI
- Overall antimicrobial susceptibilities for *E coli* were unchanged before and after site visits for ceftriaxone/cefotaxime (93% vs. 94%), sulfamethoxazole/trimethoprim (76% vs. 75%) and ciprofloxacin/levofloxacin (67% vs. 68%)

CONCLUSIONS

- **Assessment and feedback by experts with infectious diseases/antimicrobial stewardship experience resulted in an increased number of SCH with ASP meeting all 7 CDC antimicrobial stewardship core elements**
- **Favorable outcomes in antimicrobial use and CDI rates were also observed**
- **Antimicrobial susceptibilities remained unchanged but the follow-up period was brief**

DISCLOSURE

The authors of this study have nothing to disclose pertaining to the content of this poster.