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Colorado Hospital Association

Colorado's Statewide Antimicrobial Stewardship Collaborative

Tim Jenkins, MD

Director, Antimicrobial Stewardship Program

Denver Health

Disclosure

- Consultant for Colorado Hospital Association

Objectives

- Describe Colorado's statewide antimicrobial stewardship collaborative
- Describe the initial intervention implemented in Colorado hospitals
- Discuss the effects of the intervention and lessons learned

Background

In 2014,

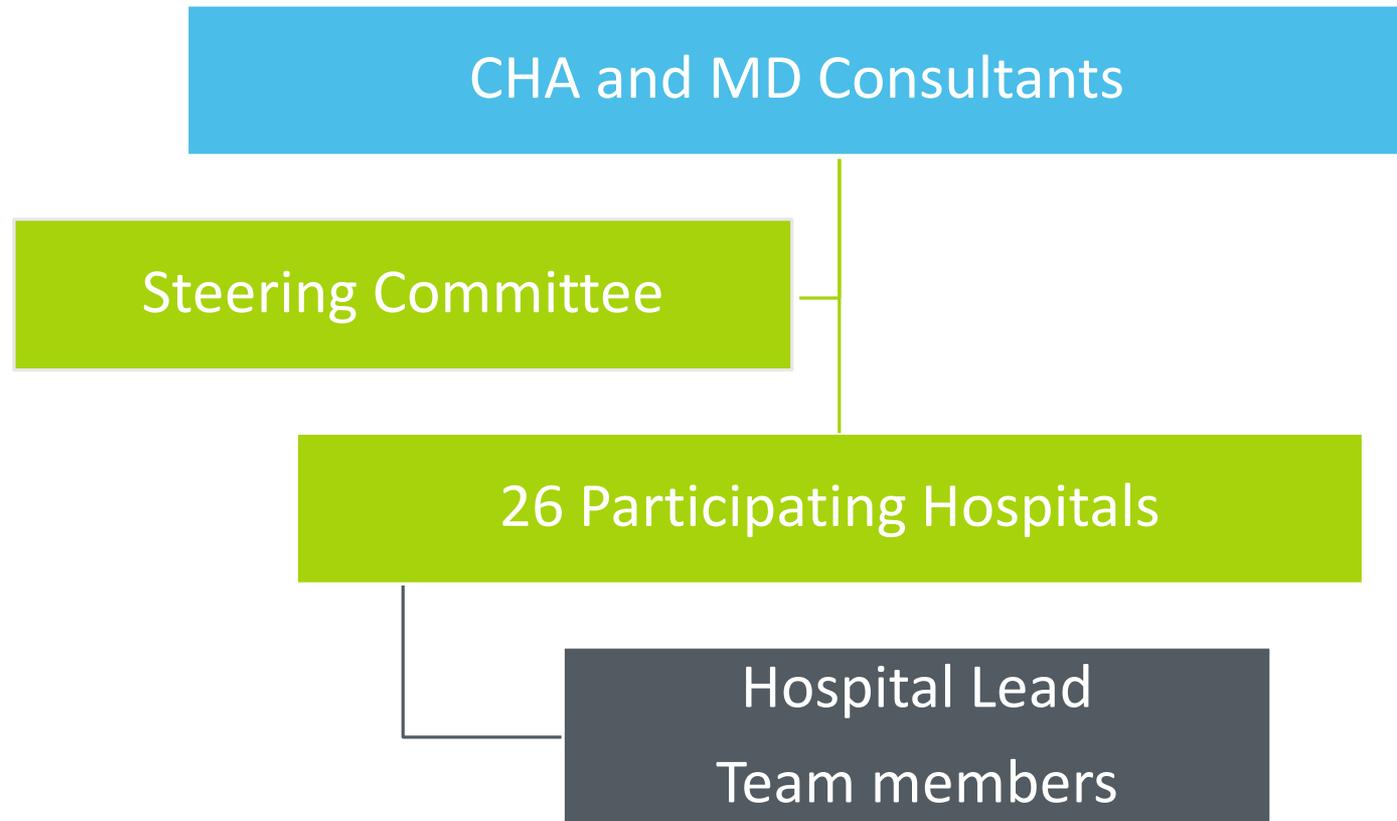
- Impending regulatory requirement for antibiotic stewardship in hospitals
- Implementation expected to challenge Colorado's diverse hospitals
- Colorado Hospital Association (CHA) organized collaborative for hospitals to work on a common stewardship initiative
- Initial syndrome-specific intervention

Collaborative Objectives

- To recruit Colorado hospitals to participate in a statewide antibiotic stewardship collaborative
- To facilitate implementation of syndrome-specific interventions for urinary tract infections (UTI) and skin infections
- To evaluate the effects of the interventions on antibiotic use



Organization



Resources Provided to Hospital Teams

- Evidence-based diagnosis and treatment guidelines
- Monthly educational webinars
- Statewide and regional meetings
- Optional site visits
- Access to local and national experts
- Quarterly feedback of individual hospital data with benchmarking

Evidence-based Guidelines

UTI

- Antibiotics only if localizing UTI symptoms
- Alternatives to fluoroquinolones as first-line therapy
- Duration: 5-7 days

Skin infections

- Single antibiotic targeting gram-positive pathogens
- Duration: 5-7 days

Main Outcomes and Targets

UTI

- Change in use of fluoroquinolones (**30% decrease**)
- Change in proportion of cases treated with antibiotics that met criteria for symptomatic UTI (**15% increase**)
- Change in median duration of therapy (**20% decrease**)

Main Outcomes and Targets

Skin infections

- Change in use of antibiotics with broad spectrum of gram-negative activity (**30% decrease**)
 - β -lactamase inhibitors, carbapenems, fluoroquinolones, 2nd-5th generation cephalosporins
- Change in median duration of therapy (**20% decrease**)

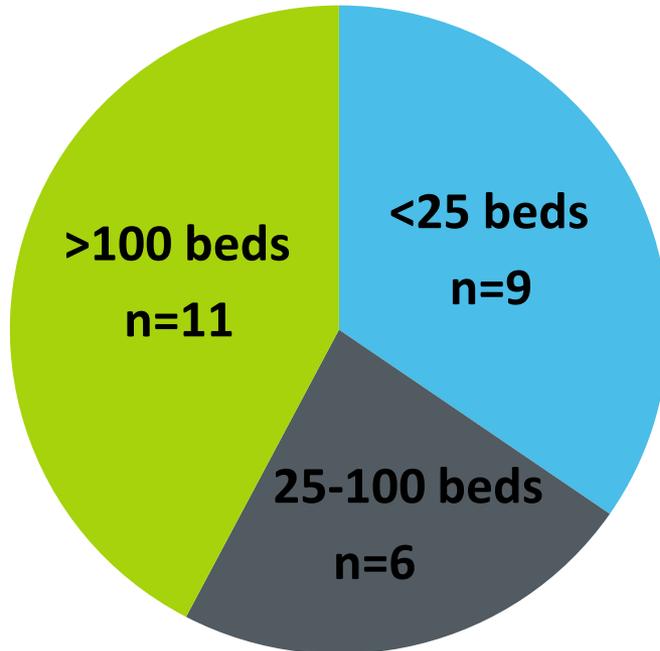
Data Collection

- Standardized ICD-10 codes to identify potential cases
 - Cellulitis, abscess, wound infection
 - Cystitis, complicated UTI, pyelonephritis, or catheter-associated UTI
- Manual case review:
 - 80 cases prior to intervention (12 months in 2014)
 - 20 cases per quarter during intervention (18 months)
- REDCap database

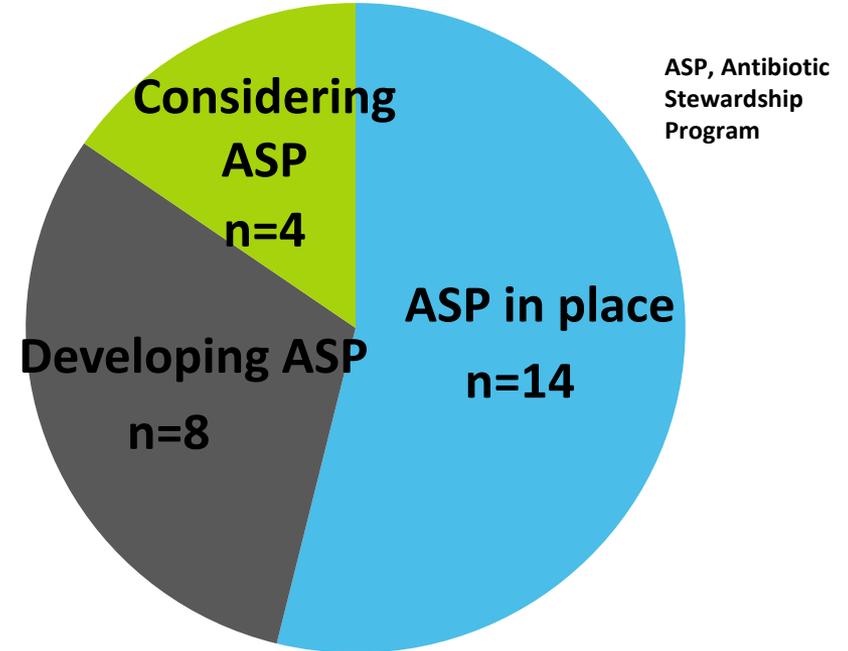
Hospital Characteristics

N = 26

Hospital size



Stewardship experience



Characteristics of UTI Cases

Characteristic	Baseline N = 1530	Intervention N = 2530
Age, median (IQR)	76 (62-85)	74 (60-84)
Female	1078 (70)	1759 (70)
Infection type		
Complicated cystitis	1371 (90)	2119 (84)
Pyelonephritis	76 (5)	227 (8)
Uncomplicated cystitis	83 (5)	184 (7)
Diabetes mellitus	400 (26)	749 (30)
Long term care facility resident	253 (17)	386 (15)
Fever ($\geq 38.0^{\circ}\text{C}$)	413 (27)	892 (36)
Leukocytosis ($\geq 12,000\text{mm}^3$)	863 (57)	1458 (58)

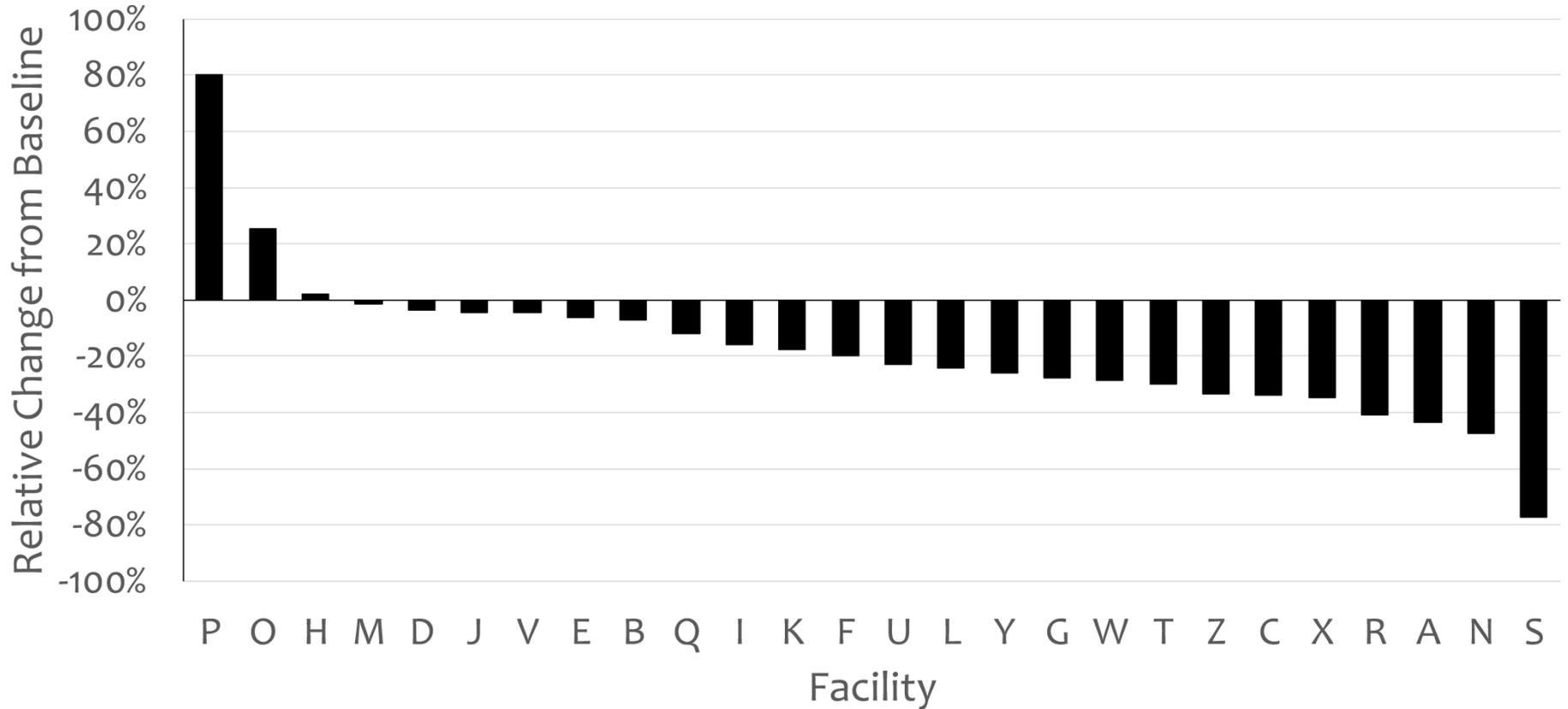
Characteristics of Skin Infection Cases

Characteristic	Baseline N = 722	Intervention N = 1030
Age, median (IQR)	60 (45-75)	60 (45-75)
Male	393 (54)	564 (55)
Infection type		
Non-purulent cellulitis	530 (73)	719 (70)
Wound infection/purulent cellulitis	134 (19)	211 (20)
Abscess	58 (8)	100 (10)
Diabetes mellitus	216 (30)	312 (30)
Fever ($\geq 38.0^{\circ}\text{C}$)	152 (21)	203 (20)
Leukocytosis ($\geq 12,000\text{mm}^3$)	409 (57)	509 (51)

Pre-post Analyses - UTI

Outcome	Baseline (n=1530)	Intervention (n=2530)	% change	<i>P</i>
Cases treated with a fluoroquinolone, n (%)	745 (49%)	1030 (41%)	-16	<0.001
Cases meeting IDSA definition of UTI, n (%)	786 (51%)	1367 (54%)	6	0.10
Duration of therapy, median (IQR)	7 (3-10)	7 (4-10)	0	0.99

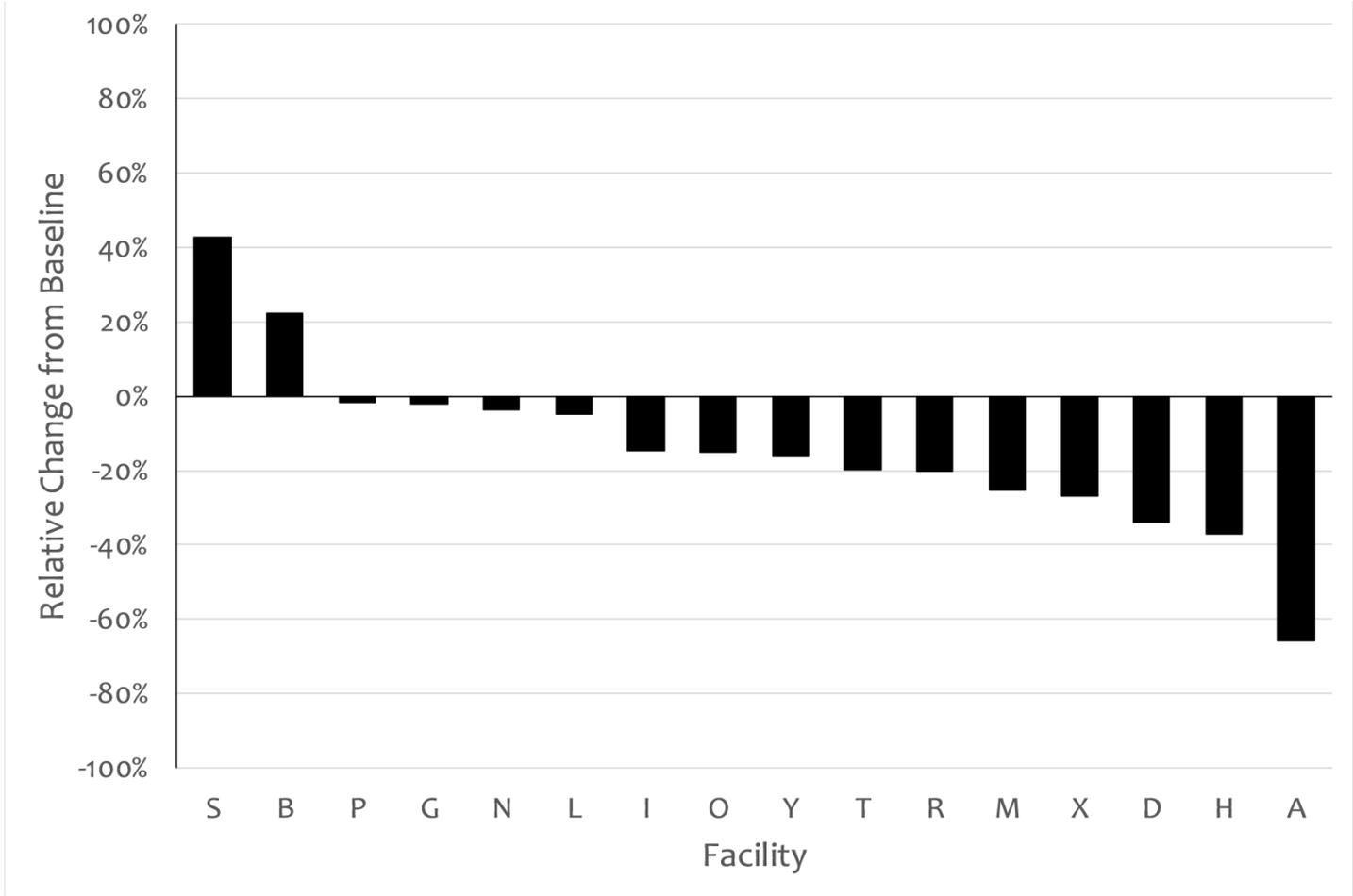
Performance by Hospital – FQ Exposure



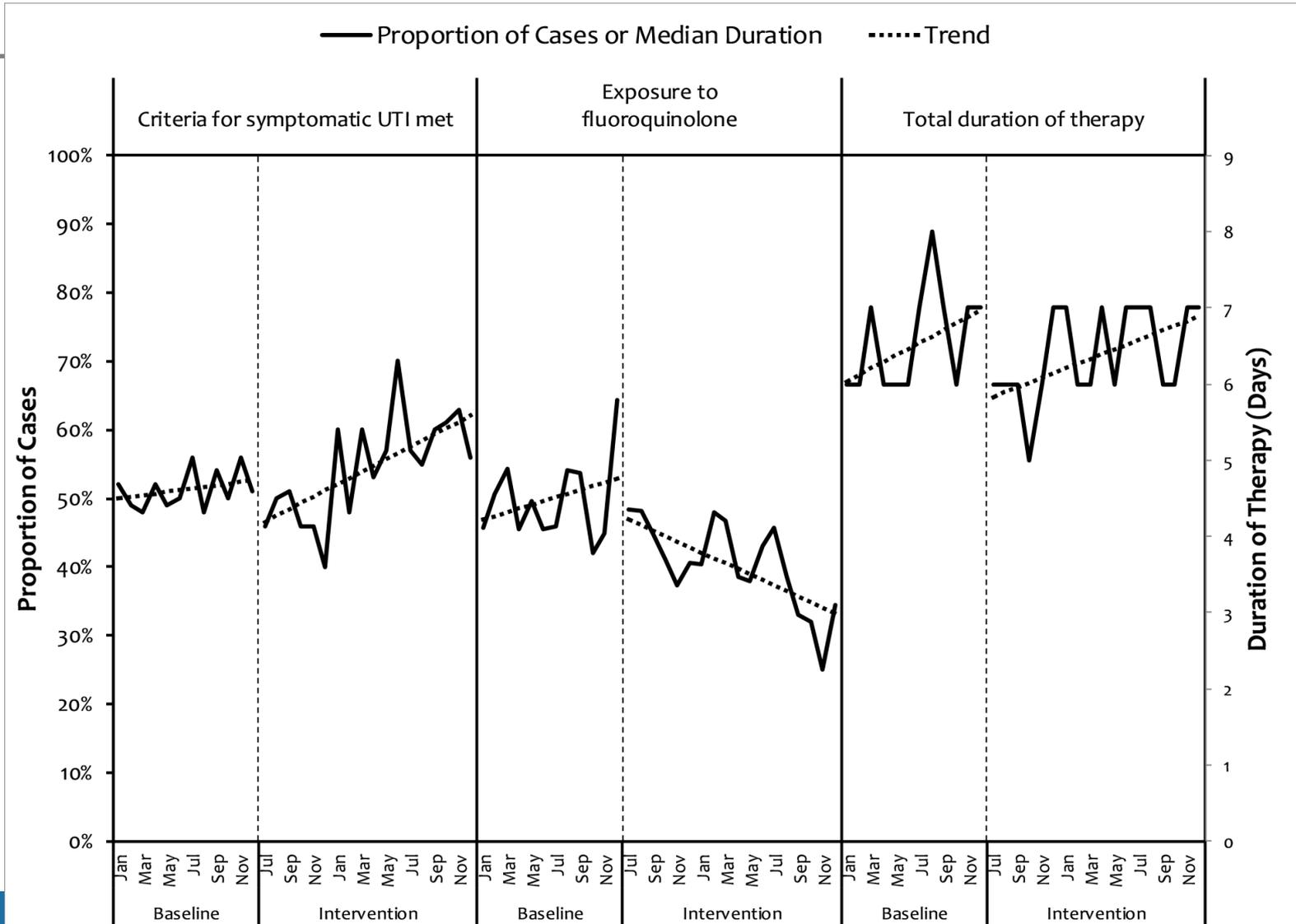
Pre-post Analyses – Skin Infections

Outcome	Baseline (n=722)	Intervention (n=1030)	% change	<i>P</i>
Exposure to antibiotics with broad gram-negative activity, n (%)	440 (61%)	551 (53%)	-13	0.001
Duration of therapy, median (IQR)	11 (8-13)	10 (8-13)	-9	0.03

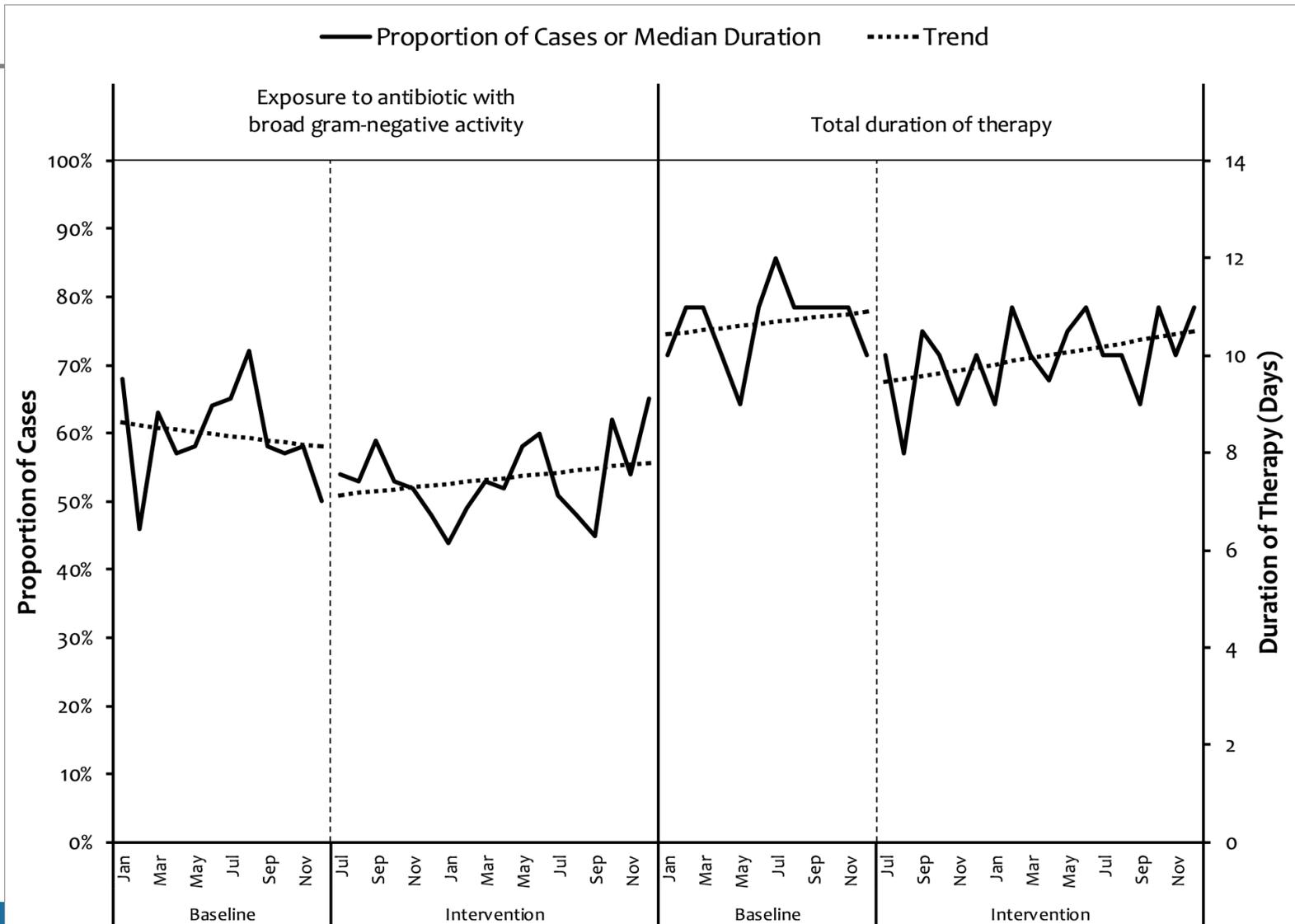
Performance by Hospital – Exposure to Broad Gram-Negative Antibiotics



Time Series Analysis - UTI



Time Series Analysis – Skin Infections



Impact by Hospital Size and ID Expertise

Critical access vs. non-critical access hospitals

- Critical access hospitals performed better than larger hospitals across all outcomes

ID expert vs. no ID expert on hospital team

- Presence of ID expert on hospital teams not consistently associated with better performance

Limitations

- Quality improvement project
 - Pre-post intervention, no control group
 - Variation in implementation across sites
- Data collection
 - Quality of medical record abstraction
 - Loss of one hospital in the last two quarters of intervention
- Surrogate outcome measures
- Unclear if changes sustained over longer period

Strengths

- Application of collaborative methodology to antibiotic stewardship
- Measurable performance targets
- Generalizable across diverse hospitals
- Modest cost (\$150-175K per year)
- Springboard for stewardship programs

Conclusions

- Feasible approach to engage unaffiliated hospitals in a common stewardship target
- Overall performance targets partially met
 - Notable reductions in use of antibiotics with broad gram-negative activity
- Numerous hospitals demonstrated high degree of success
- Effective platform for future interventions



Barriers for Hospitals

- Resource limitations (personnel, time)
- Lack of local ID experts
- Staff turnover
- Buy-in
- Manual data collection

Lessons Learned

- Increase accountability of hospital teams
- Track implementation processes to identify key factors for success
- Identify and address barriers at hospital level
- Limit data collection burden
- Focus on sustainability of intervention
- Engagement and support of rural and critical access hospitals

Acknowledgments

Colorado Hospital Association

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Our Participating hospitals

Our Partners:

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CO ACHA

Steering committee members

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John Hammer
Tim Jenkins
Bryan Knepper
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Stacy Volk
Heidi Wald

Question 1

Which of the following changes in prescribing were observed in hospitals participating in the UTI intervention?

- A. Reduced use of vancomycin
- B. Reduced use of fluoroquinolones
- C. Shorter durations of therapy
- D. All of the above

Question 2

Which of the following changes in prescribing were observed in hospitals participating in the skin infection intervention?

- A. Reduced use of antibiotics with a broad spectrum of gram-negative activity
- B. Increased use of vancomycin
- C. Longer durations of therapy
- D. All of the above

Reference

Jenkins TC, Hulett T, Knepper BC, Shihadeh KC, Meyer MJ, Barber GR, Hammer JH, Wald HL. A statewide antibiotic stewardship collaborative to improve the diagnosis and treatment of urinary tract and skin and soft tissue infections. *Clin Infect Dis* 2018; 67:1550-1558.