Jason.Funaro@duke.edu
DUMC Box 3089
Durham, NC 27710
Phone: (860)-304-5769

Impact of Education and Data Feedback Interventions on Outpatient Prescribing for Urinary Tract Infections

Funaro JR[1], Moehring RW[2,3], Yang S[4], Lee H-J[4], Sarubbi CB[1,2], Anderson DJ[2,3], Wrenn RH[1,2]
1- Department of Pharmacy, Duke University Medical Center, Durham, NC, USA 2- Duke Center for Antimicrobial Stewardship and Infection Prevention, Durham, NC, USA; 3-Division Of Infectious Diseases, Duke University Medical Center, Durham, NC, USA; 4- Department of Biostatistics and Bioinformatics, Duke University School of Medicine, Durham, NC, USA

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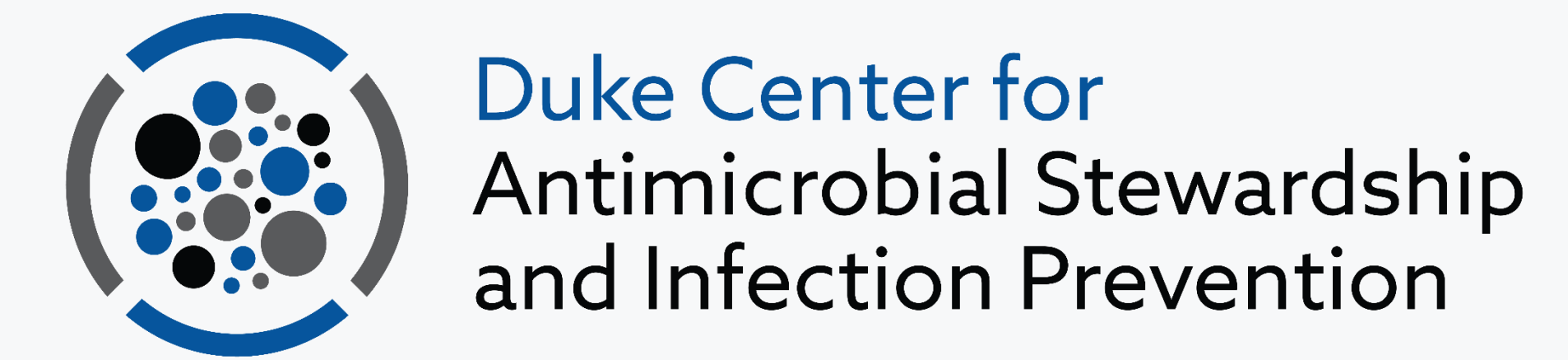
Abstract

Background: Urinary tract infections (UTIs) are the most common outpatient indication for antibiotics and an excellent target for outpatient antimicrobial stewardship (AS) interventions. This study evaluated the impact of education and data feedback on outpatient UTI diagnosis and prescribing.

Methods: A clinic specific antibiogram, diagnosis and treatment guideline, and educational session were provided at one urgent care (UC) and one primary care (PC) clinic in Durham, NC in August and November of 2017. Educators reviewed the appropriate diagnosis, treatment, and duration of therapy for UTIs, including avoidance of treatment for asymptomatic bacteriuria and choice of first line agents with lower collateral damage. Adult encounters with a UTI diagnosis code from 11/2016 to 11/2017 and from 8/2016 to 8/2017 were included in the pre-intervention cohort for UC and PC, respectively. The post-intervention cohort included encounters following education intervention to 4/2018. Summary data of UTI diagnoses and guideline concordant prescriptions were fed back to clinics February 2018. The primary endpoint was proportion of first or second-line antibiotic choice for UTI according to clinic-specific guidelines. Pre- and post-intervention phase and trend changes were assessed by an interrupted time series approach.

Results: Data were collected on 2,450 and 632 UTI encounters at UC and PC, respectively. Guideline concordant prescribing increased at UC from 36.4% at baseline to 55.7% in the five months after the education and at PC from 63.2% at baseline to 75.5% in the eight months after the education (Figure 1). The mean number of UTI diagnoses per two-week period decreased at UC from 71.8 at baseline to 51.2 and at PC from 16 at baseline to 12.5 after the education (Figure 2).

Conclusion: Clinicians increased guideline concordant prescribing and reduced diagnosis rates for UTIs. AS is effective at improving guideline directed diagnosis and management of UTIs in outpatient settings.

Background

- Approximately 10% of all ambulatory care visits will result in an antibiotic prescription, of which 50% are prescribed inappropriately and up to 30% are unnecessary[1-3]
- UTIs are the most common outpatient bacterial infection; antimicrobial therapy for UTIs is often discordant from what is recommended by national consensus guidelines (GL)[4]
- Data regarding the efficacy of antimicrobial stewardship (AS) interventions for outpatient UTIs are limited

Methods

- A prospective, quality improvement AS initiative was conducted at one primary care (PC) and one urgent care (UC) clinic in Durham, NC
- **Study population:** adult patients seen for acute UTI at PC or UC between 8/1/16 and 4/3/18
- **Primary endpoint:** rate of guideline concordant antibiotic prescriptions
- **Statistics:** interrupted time series analysis used to assess phase and trend changes
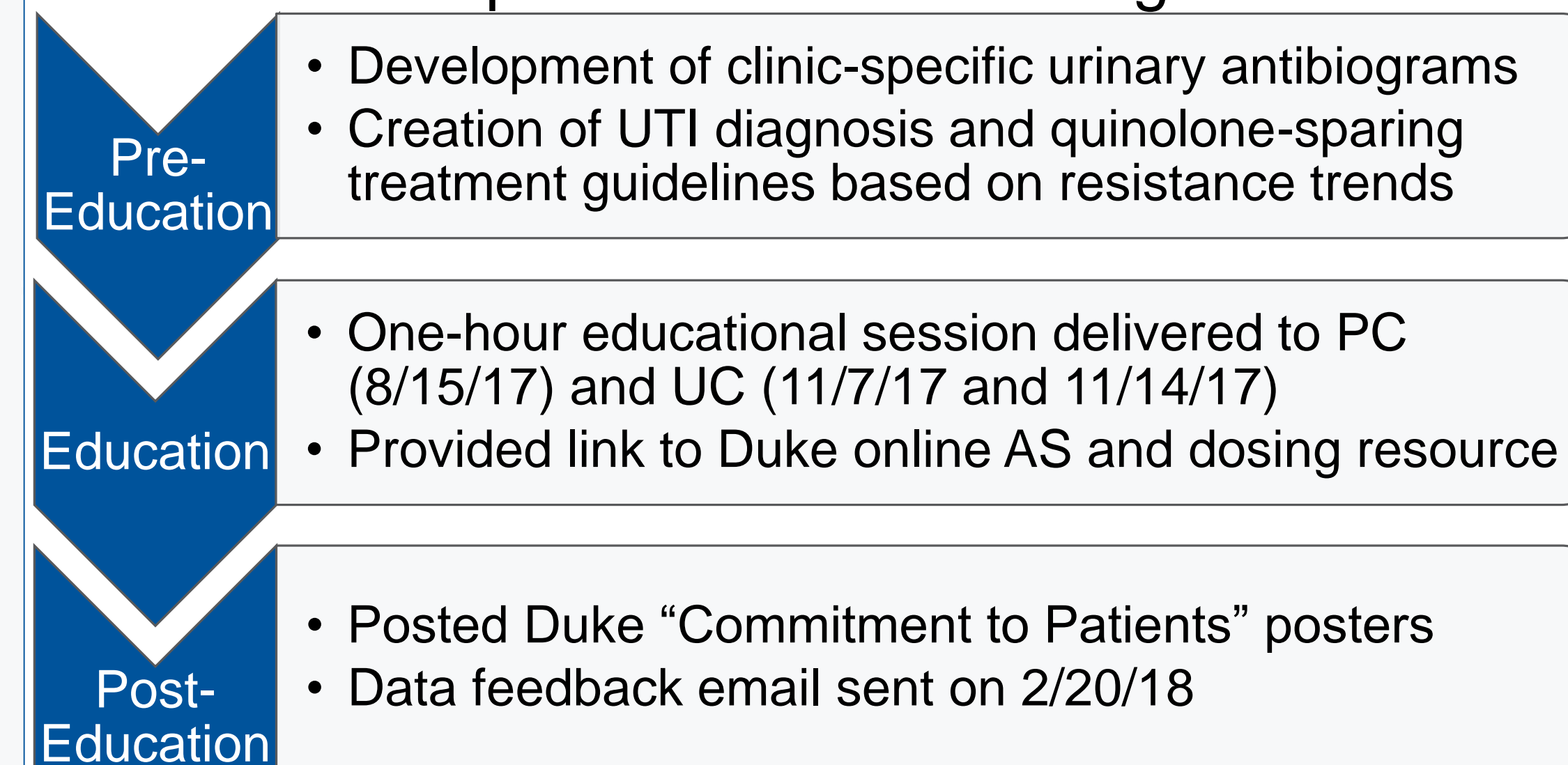
Pre-Education
- Development of clinic-specific urinary antibiograms
- Creation of UTI diagnosis and quinolone-sparing treatment guidelines based on resistance trends

Education
- One-hour educational session delivered to PC (8/15/17) and UC (11/7/17 and 11/14/17)
- Provided link to Duke online AS and dosing resource

Post-Education
- Posted Duke "Commitment to Patients" posters
- Data feedback email sent on 2/20/18

Table 1. Clinic-specific GL antibiotic recommendations for UTI

	Recommended Agent	
Cystitis	**Primary Care**	**Urgent Care**
1st line	Nitrofurantoin TMP-SMX	Nitrofurantoin
2nd line	Cephalexin	Cephalexin
3rd line	Ciprofloxacin Fosfomycin	TMP-SMX Ciprofloxacin Fosfomycin
Pyelonephritis	**Primary Care**	**Urgent Care**
1st line	Ciprofloxacin	Ceftriaxone AND TMP-SMX OR ciprofloxacin
2nd line	Ceftriaxone AND either TMP-SMX OR PO beta-lactam	Ceftriaxone AND PO beta-lactam

Results

Table 2. Antibiotics prescribed before and after education

	Urgent Care		Primary Care	
Antibiotic	Baseline	Post-Education	Baseline	Post-Education
Nitrofurantoin	24%	34%	26%	37%
Fluoroquinolone	23%	14%	26%	14%
TMP-SMX	19%	9%	25%	18%
PO Beta-Lactam	10%	15%	9%	14%
Ceftriaxone	8%	11%	1%	2%
GL-Concordant	**36.4%**	**55.7%**	**63.2%**	**75.5%**

Figure 1. Time-series analysis of the percentage of UTI visits with prescriptions for guideline-concordant antibiotics
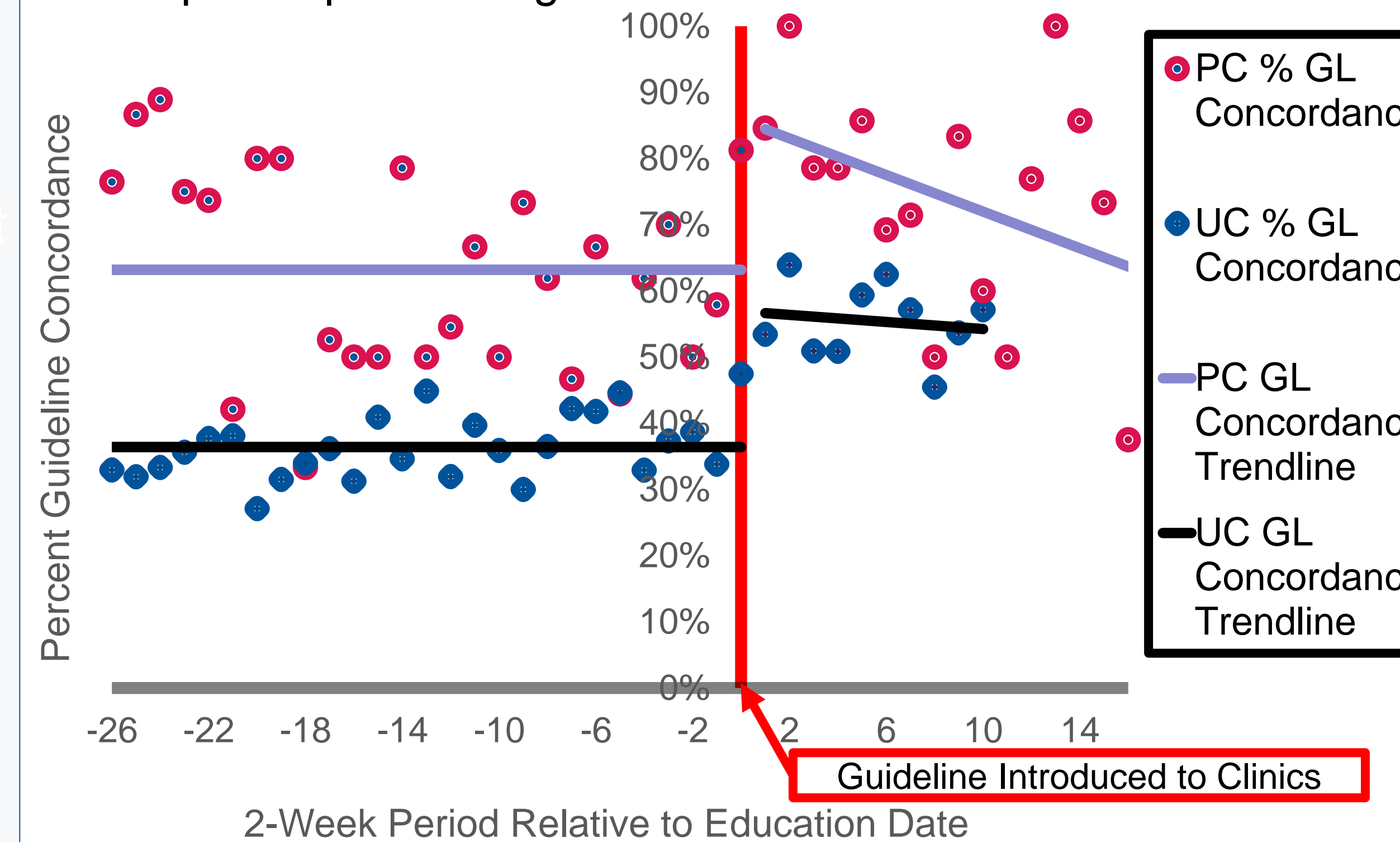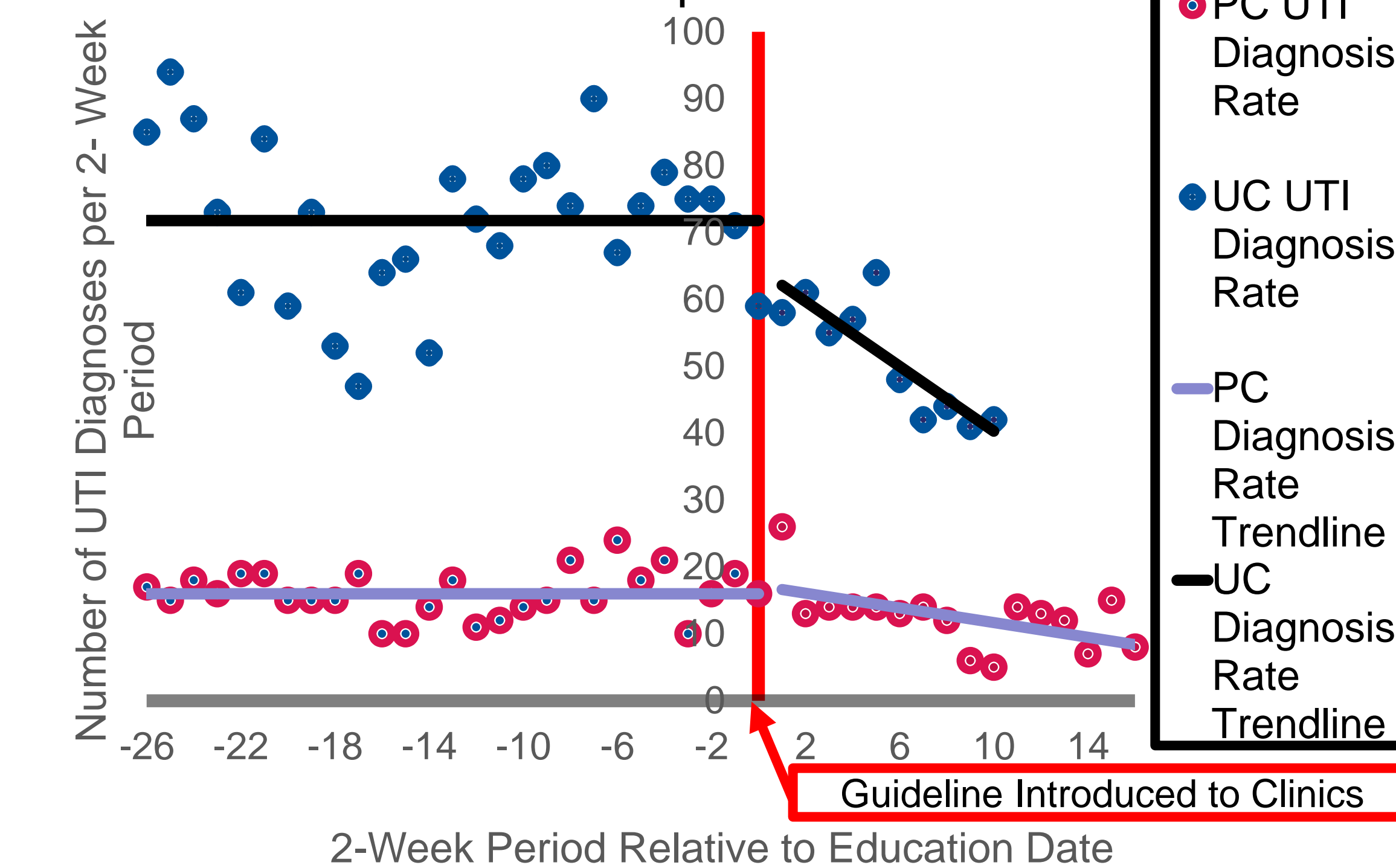

- PC % GL Concordance
- UC % GL Concordance
- PC GL Concordance Trendline
- UC GL Concordance Trendline

Percent Guideline Concordance
2-Week Period Relative to Education Date
Guideline Introduced to Clinics

Figure 2. Time-series analysis of the number of UTI encounters with antibiotics prescribed

- PC UTI Diagnosis Rate
- UC UTI Diagnosis Rate
- PC Diagnosis Rate Trendline
- UC Diagnosis Rate Trendline

Number of UTI Diagnoses per 2- Week Period
2-Week Period Relative to Education Date
Guideline Introduced to Clinics

- Prescriptions for guideline-concordant antibiotics increased by 25.5% (95% CI: 14.1% to 36.9%) after education (p<0.001); quinolone prescribing decreased by 38% at UC and 46% at PC
- For every two weeks after the education, guideline-concordance and the number of UTI diagnoses decreased by 1.3% and 3.9%, respectively
- There was no change in rates of treatment failure or adverse effects as a result of the education

Conclusions

- Providing education, clinic-specific antibiograms, and UTI guidelines is effective at improving guideline-concordant management of UTIs in outpatient settings
- The magnitude of this AS intervention diminishes with time, future studies are needed to assess the effect of routine data feedback on the durability of an AS intervention
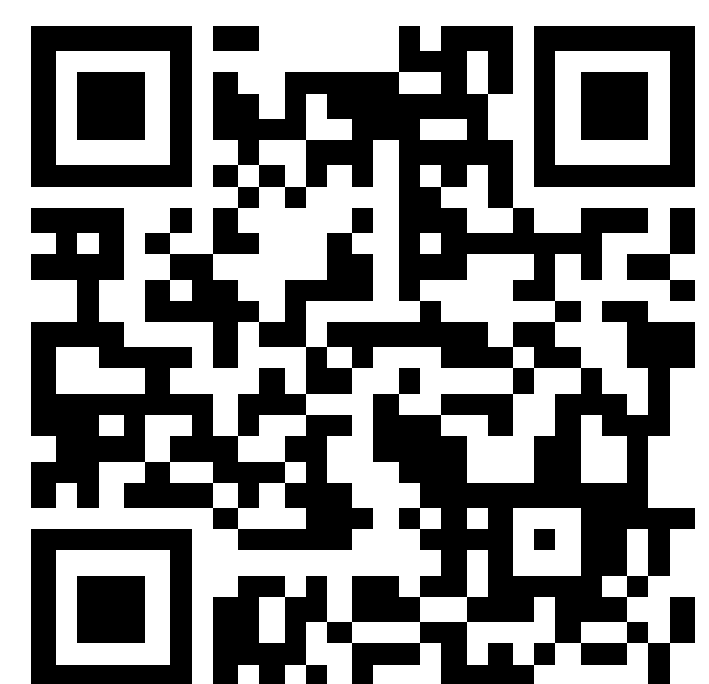
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