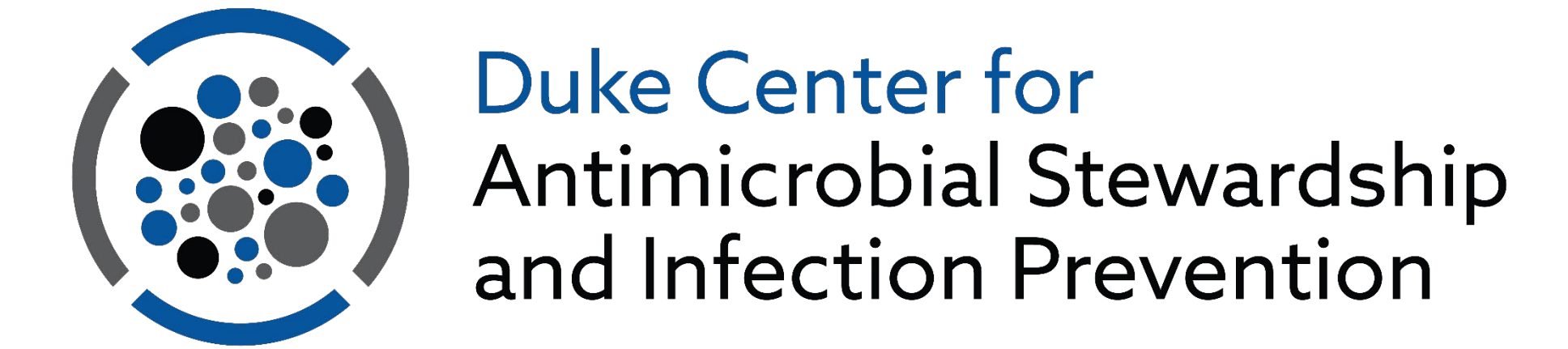


Effect of the Duke Antimicrobial Stewardship Outreach Network (DASON): A Multi-Center Time Series Analysis



Michael E. Yarrington, MD, Elizabeth Dodds Ashley, PharmD, MHS, Melissa Johnson, PharmD, MHS, Angelina Davis, PharmD, MS, April Dyer, PharmD, MBA, MSCR, Travis Jones, PharmD, Daniel Sexton, MD, FIDSA, FSHEA, Deverick Anderson, MD, MPH, FIDSA, FSHEA, Rebekah Moehring, MD, MPH
Duke Antimicrobial Stewardship Outreach Network, Durham, NC, USA



Abstract

Background: DASON is a 30-member, community hospital network in the southeastern US that supports development and growth of local antibiotic stewardship programs (ASPs). Collaborative activities include on-site visits from liaison clinical pharmacists, data sharing for routine feedback and benchmarking, and educational programs.

Methods: We performed a retrospective cohort analysis of antibiotic use (AU) in 17 hospitals that participated in DASON for a minimum of 42 months during 2013-2018. Segmented negative binomial regression models were used to estimate the change in facility-wide AU after an initial 1-year assessment, planning, and ASP intervention initiation period. Baseline AU trend (1 to 12 months) was compared against AU following the first year (13 to 42 months). Monthly AU rates were measured in days of therapy (DOT) per 1,000 patient days (pd). Models assessed overall AU and specific antibiotic groups, as defined by the National Healthcare Safety Network AU option. The models controlled for hospital size, presence of a pre-existing formal ASP upon network entry, and year of network entry.

Results: Hospital data included a total of 2,988,930 pd over 5 years. Facility-wide AU was increasing during the first year of network entry and then began decreasing by 0.2% per month ($p = 0.01$, Figure). Fluoroquinolone use was stagnant in year one and then decreased by 1.5% per month ($p < .001$, Figure). Antifungal agents were decreasing in year one and continued to decrease 0.7% per month thereafter ($p = 0.03$, Figure). Agents predominantly used for resistant Gram-positive infections and broad-spectrum agents used for hospital-onset infections were increasing during year one and then attenuated afterward, though the slope change did not reach statistical significance. The presence of a pre-existing formal ASP was not a significant covariate in any model, while bed size and year of network entry significantly contributed to models of some antibiotic groups.

Conclusions: Participation in DASON was associated with a decline in total AU and fluoroquinolone use, and a trend towards attenuated use of other broad-spectrum agents in community hospitals. Collaborative network experiences can help local ASPs achieve reductions in AU.

Background

- DASON is a 30-member, community hospital network in the southeastern US that supports development and growth of local antibiotic stewardship programs (ASPs).
- Collaborative activities include on-site visits from liaison clinical pharmacists, data sharing for routine feedback and benchmarking, and educational programs.

Methods

- Retrospective analysis of AU in 17 hospitals during first 42 months in network
- Segmented negative binomial regression to estimate AU rates measured in days of therapy per 1000 patient days (DOT/1000pd)
- AU change estimated after 12 month assessment without phase shift
- Controlled for hospital size, year of entry into network, and the presence of a formally recognized stewardship program upon entry
- Qualitative survey of stewardship activities performed at entry and annually in each facility

Results

- Facility-wide AU increased during the first year of network entry and then decreased by 0.2% per month
- Fluoroquinolone use was stagnant in year one and then decreased by 1.5% per month
- Broad-spectrum agents used for resistant Gram-positive infections and hospital-onset infections increased during year one and then attenuated afterward, though non-significant
- 0/17 (0%) hospitals met all 7 CDC Core Elements on entry to the network (median 4/7 Elements) while 17/17 (100%) hospitals met all 7 in 2019

Figure 1. Perceived Barriers to Stewardship Implementation

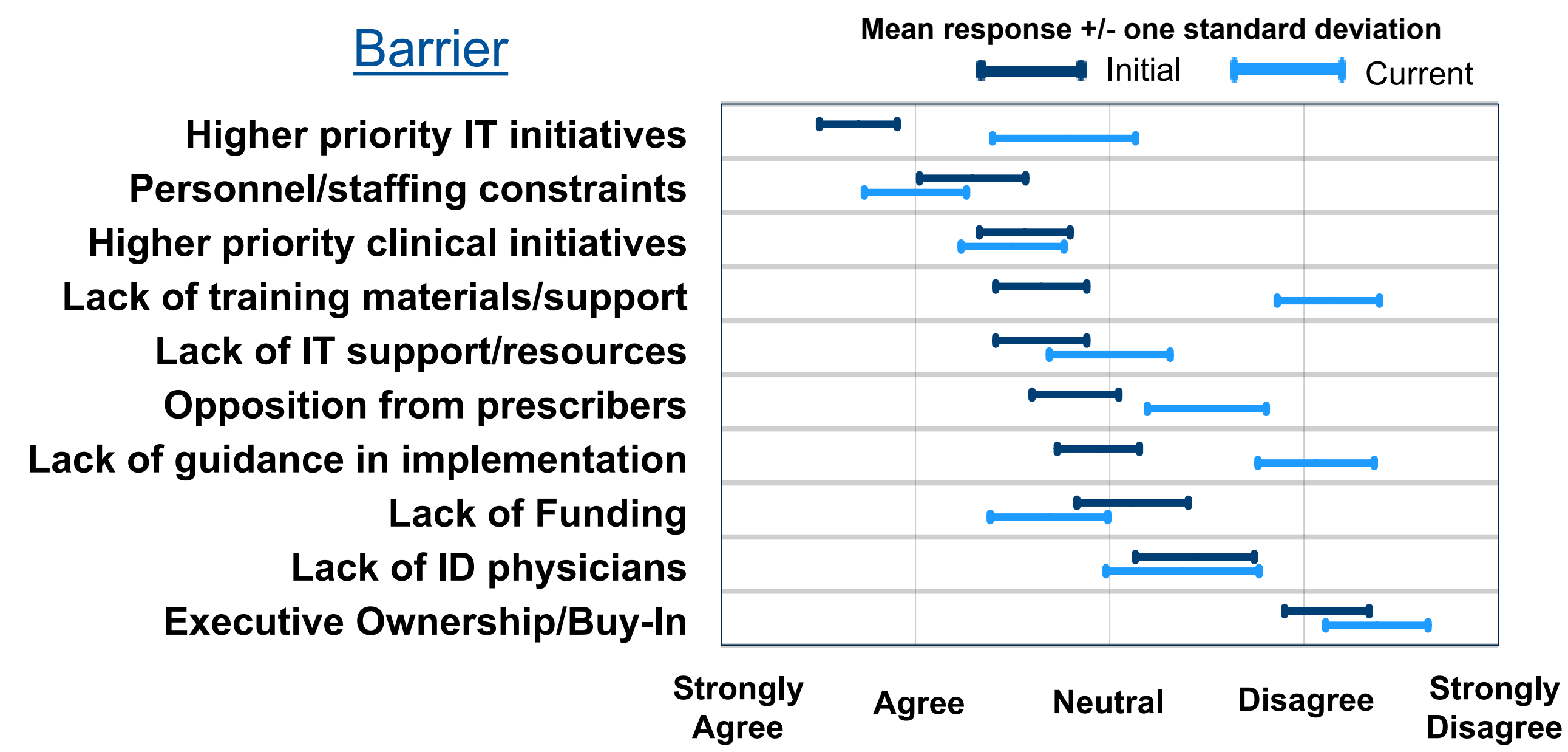


Figure 2. Antimicrobial Use Over Time

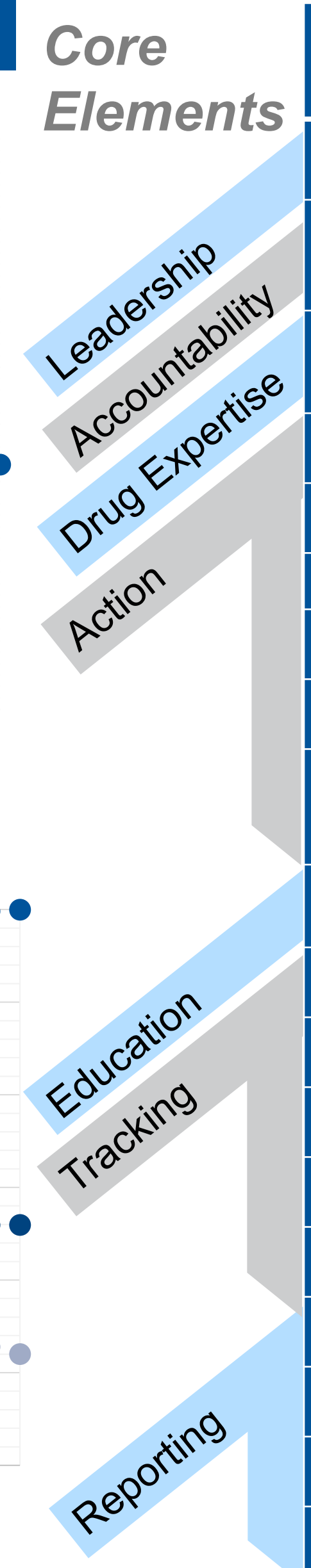
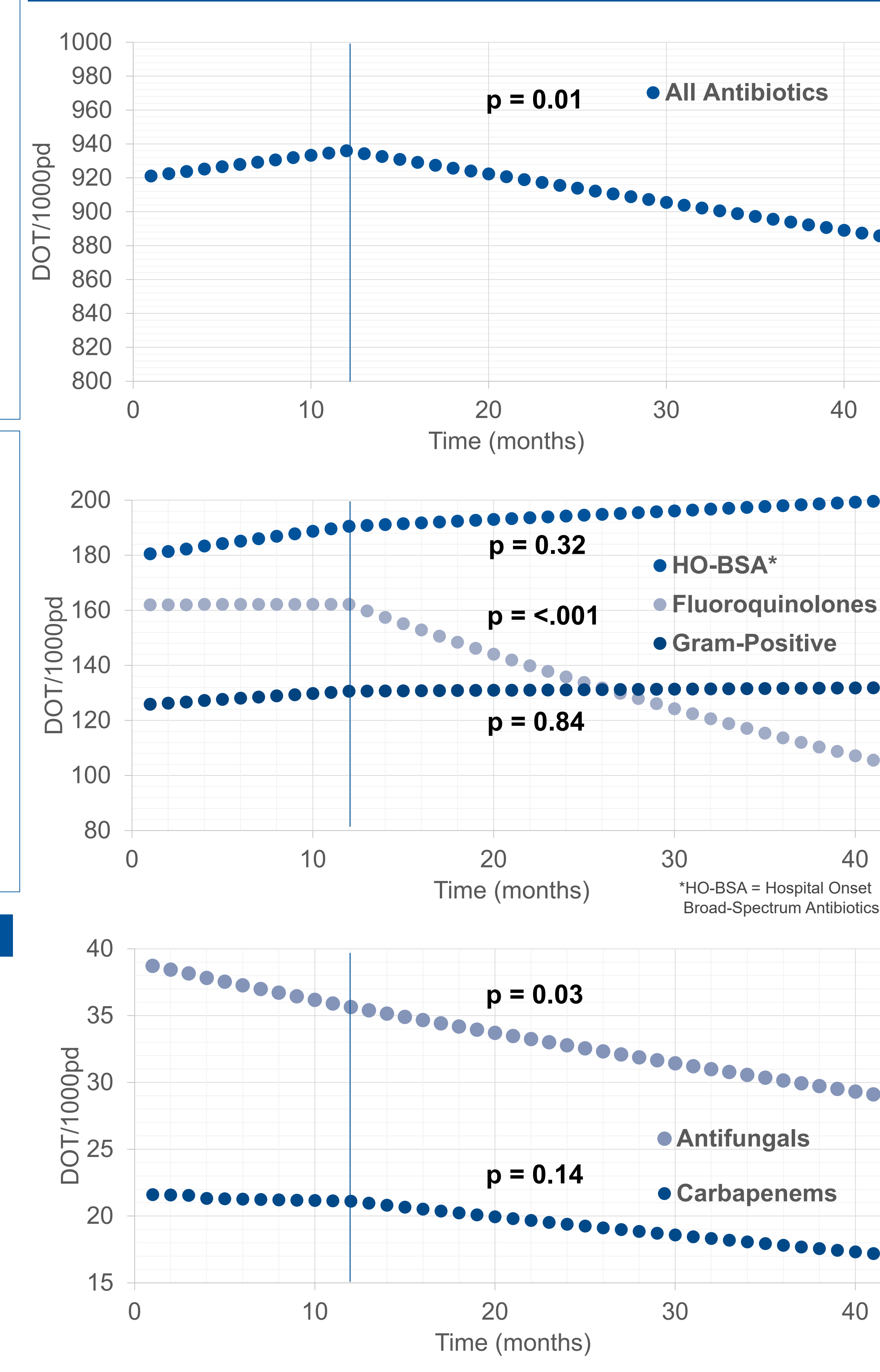


Table 1. Survey Responses	Initial Needs Assessment	2019
Formal Stewardship Policy	5/17 (29%)	17/17 (100%)
Identified Responsible Person/Committee	9/17 (53%)	17/17 (100%)
ID-trained Clinical Pharmacist or Consultant	10/17 (59%)	17/17 (100%)
Restricted Antimicrobials (any)	11/17 (65%)	16/17 (94%)
Prospective Audit and Feedback	9/16 (56%)	16/17 (94%)
PK/PD Dose Optimization	16/17 (94%)	16/17 (94%)
Parenteral to Oral Conversion	13/17 (76%)	15/17 (88%)
Automatic Stop Orders	11/17 (65%)	15/17 (88%)
Streamlining or De-escalation of Therapy	6/17 (35%)	15/17 (88%)
Educational Initiatives	5/17 (29%)	17/17 (100%)
Antimicrobial Measures		
<i>Not Measured</i>	5/17 (29%)	0/17 (0%)
<i>Antimicrobial Expenditures</i>	11/17 (65%)	14/17 (82%)
<i>DDD</i>	1/17 (6%)	0/17 (0%)
<i>DOT</i>	3/17 (18%)	17/17 (100%)
Outcomes Reported		
<i>Antimicrobial Expenditures</i>	8/17 (47%)	13/17 (76%)
<i>Antimicrobial Resistance Trends</i>	9/17 (53%)	17/17 (100%)
<i>Antimicrobial Utilization</i>	1/17 (6%)	17/17 (100%)
All 7 Core Elements Met	0/17 (0%)	17/17 (100%)

Conclusions

- Participation in DASON was associated with a decline in total AU and fluoroquinolone use
- Collaborative network experiences can help local ASPs achieve reductions in antibiotic use
- Adherence to the CDC Core Elements improved for all hospitals within DASON



P-values relate to difference between post-'intervention' slope and null. Time is the number of months post entry into the DASON network.