

Bottom-Line-Up-Front

- Evidence-based process bundles for *Staphylococcus aureus* bacteremia known to benefit patient outcomes¹
- Few studies exist assessing the value of an evidence-based bundle in Enterobacterales bacteremia²
- Current 2009 guideline duration: 7 to 14 days of antibiotics for gram negative blood stream infections³
- Recent studies: Shorter antibiotic durations (~7 days) outcomes similar to longer durations when treating uncomplicated gram-negative bacteremia⁴⁻⁶
- Internal study: Antibiotic durations > 7 days make up 87% of treatment

Objective: To determine the impact of an evidence-based bundle for uncomplicated Enterobacterales bacteremia on the duration of antibiotic therapy.

Methods: Design

Retrospective quasi-experimental pre- post- analysis at Legacy Health's six adult medical centers in Oregon and Washington.

Phases:

- Pre-Implementation: January 1, 2016 to December 31, 2017
- Post-Implementation: January 1, 2020 to April 4, 2020

Inclusion Criteria:

- All patients with Enterobacterales bacteremia
- ≥ 18 years old
- One episode of bacteremia per patient (unless separated by ≥ 3 months)

Exclusion Criteria:

- Polymicrobial bacteremia
- Death within first 48 hours of receiving antibiotics
- Patients receiving end of life care
- Failure to receive at least one antibiotic with in vitro activity
- Immunocompromised status
- Unable to obtain source control
- Metastatic sites of infection

Study Outcomes:

- Primary: Proportion of patients receiving 6-10 days of antibiotics with in vitro activity against the identified pathogen
- Secondary: Bacteria identified in blood culture, antibiotic prescribed for bacteremia, 30-day all-cause mortality, 30-day readmission rate related to Enterobacterales bacteremia, adherence to evidence-based bundle, time to IV to PO conversion, length of stay

Workflow Process:

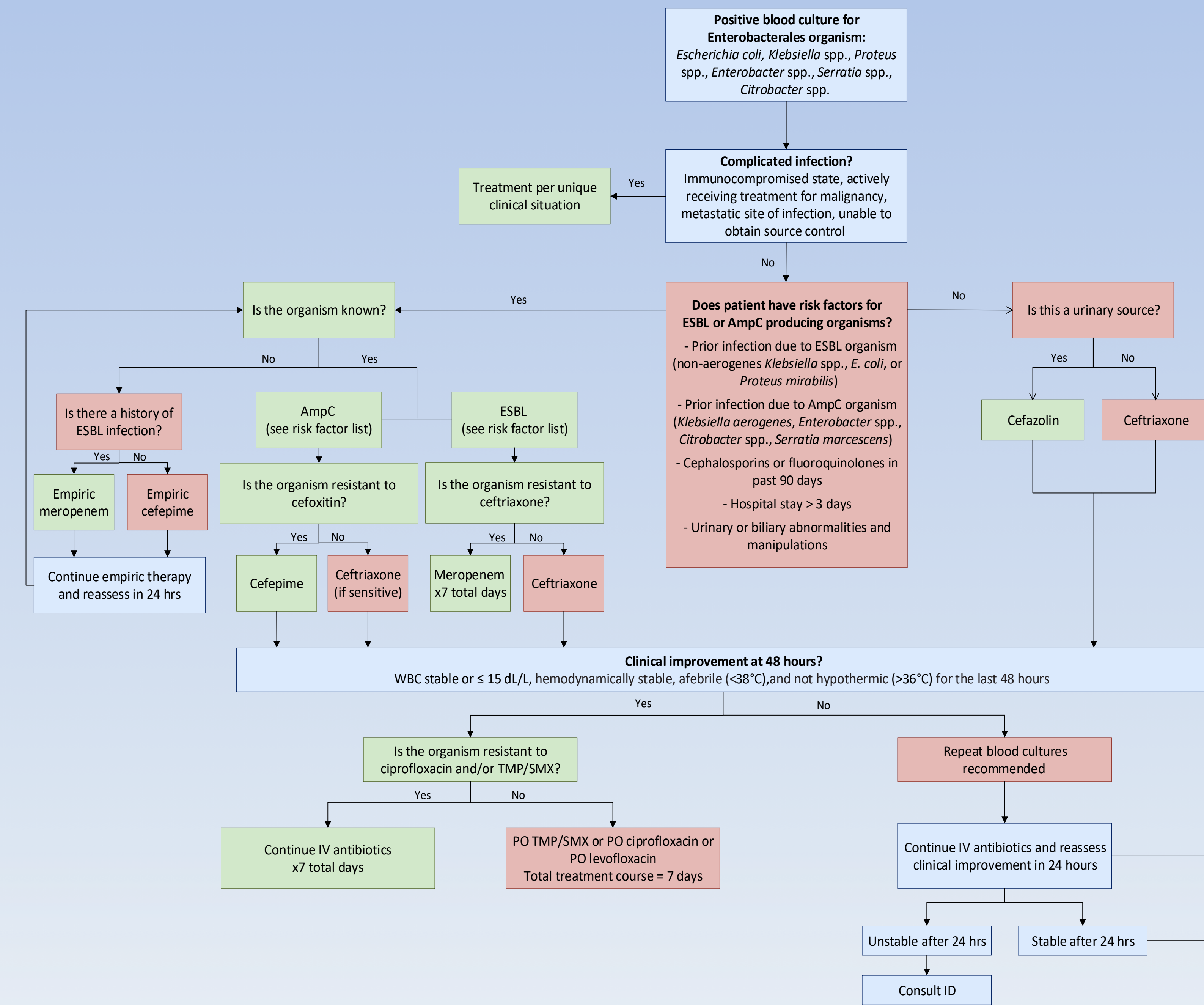
- Bundle implemented January 2020
- Bundle instructions (Figure 1) available online
- Quarterly data extracted for included patients for analysis

Statistical Analysis:

- Sample size of 48 patients needed to achieve a power of 80%
- Alpha 0.05, beta 0.2, effect size 0.4
- Chi squared for primary outcome and multiple regression analysis for covariates

Methods: Evidence-Based Bundle

Figure 1. Enterobacterales bacteremia evidence-based bundle



Results

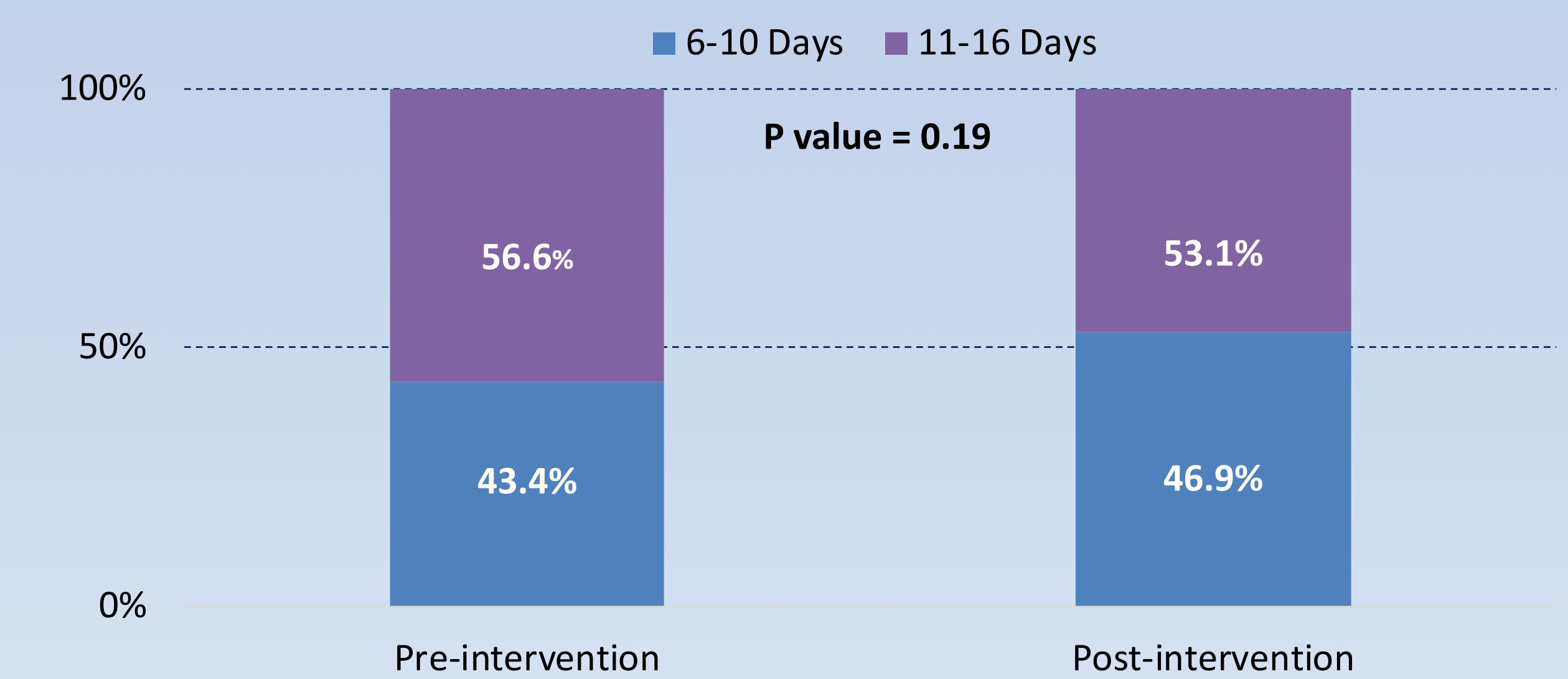
Table 1. Baseline characteristics of both the pre- and post-intervention groups.

Variable	Pre-intervention (n=546)	Post-intervention (n=49)
Median Age, years (IQR)	72 (59-82)	71 (64-80)
Female sex, n (%)	312 (57.1)	29 (59.2)
Race, n (%)		
White or Caucasian	437 (80.0)	44 (89.8)
Hispanic or Latino	34 (6.2)	3 (6.1)
Black or African American	38 (7.0)	1 (2.0)
American Indian or Alaska Native	10 (1.8)	1 (2.0)
Asian	14 (2.6)	0 (0)
Native Hawaiian and Other Pacific Islander	6 (1.1)	0 (0)
Other/Unknown	7 (1.2)	0 (0)
Organism, n (%)		
E. coli	392 (71.8)	32 (65.3)
Non-aerogenes Klebsiella spp.	88 (16.1)	7 (14.3)
Klebsiella aerogenes	3 (0.5)	6 (12.2)
Proteus spp.	28 (5.1)	4 (8.2)
Enterobacter spp.	18 (3.3)	0 (0)
Serratia spp.	8 (1.5)	0 (0)
Citrobacter spp.	5 (0.9)	0 (0)
Other	4 (0.7)	0 (0)
Infection Source, n (%)		
Urinary	384 (70.3)	38 (77.6)
Biliary	53 (9.7)	6 (12.2)
Unclear	0 (0)	2 (4.1)
GI	26 (4.8)	1 (2.0)
Pulmonary	23 (4.2)	1 (2.0)
SSTI	6 (1.1)	1 (2.0)
Catheter associated	24 (4.4)	0 (0)
Other	0 (0)	0 (0)
Charlson Comorbidity Index, median (IQR)	5 (3-7)	5 (2-8)

Results

- No difference in the proportion of patients receiving 6-10 days of antibiotics (Figure 2)
- Decreased average duration of therapy in the post-intervention group, 10.6 days, compared with the pre-intervention group, 11.7 days (p=0.0047)
- No difference in other secondary outcomes
- Inpatient and outpatient duration of antibiotic therapy were 5.1 days and 5.4 days, respectively, for the post-intervention group

Figure 2. Proportion of patients with a duration of therapy of 6-10 days in both the pre-intervention and post-intervention groups.



Conclusion

- Education-based evidence-based bundles for Enterobacterales bacteremia does not increase the proportion of patients receiving a duration of antibiotic therapy of 6-10 days
- Education alone may be insufficient

Limitations and Next Steps

- Lack of mandatory education materials
- Microbiology lab suppression algorithm
- Pandemic
- Continue assessing new active interventions and collecting outcome data

References

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Disclosures:

Authors of this presentation disclose the following relationships with commercial interests related to the subject of the poster:
 Jena Stallsmith: Nothing to disclose; Chris Lopez: Nothing to disclose; Forrest Orme: Nothing to disclose; Regina Won: Nothing to disclose; Brigg Turner: Nothing to disclose; Dominic Chan: Advisory Consultation to Paratek Pharmaceuticals, CutisPharma, Fresenius Kabi

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