

Background

- There are several clinical tools for prediction of antimicrobial resistance.
- Utility of these tools in the management of bloodstream infections (BSI) due to resistant bacteria remains unclear.

Aims

- Examine the impact of utilization of the extended-spectrum beta-lactamase (ESBL) prediction score on time to initiation of appropriate antimicrobial therapy (AAT) in BSI due to ceftriaxone resistant (CRO-R) *Enterobacterales*

Methods

- Patients: Hospitalized adults with BSI due to CRO-R *Enterobacterales* from January 1, 2010 to December 31, 2017 at Prisma Health-Midlands hospitals in SC
- ESBL prediction score was used to stratify risk of resistance prior to conventional antimicrobial susceptibility results [Table 1, Figure 1]
- Antimicrobial stewardship intervention was implemented in January of 2014 [Figures 2 & 3]
- Student's t-test to compare mean time to AAT before and after intervention

Results

- 92 unique adult patients had CRO-R *Enterobacterales* BSI during 8-year study period
- Overall, median age was 66 years, 52 (57%) were men, 68 (74%) had community-onset BSI
- Urinary tract was most common source of BSI
- Escherichia coli* and *Klebsiella* species were the most common bloodstream isolates [Figure 4]
- The majority (68%) of CRO-R isolates produced ESBLs
- No major differences in demographics or clinical characteristics before (n=45) and after (n=47) intervention
- Mean time to AAT was 1.5 days shorter after antimicrobial stewardship intervention [Figure 5]
- Results were consistent among ESBL-producing *Enterobacterales* [Figure 5]

Table 1: ESBL Prediction Score

Variable	Point Allocation
Recent outpatient GI/GU Procedure*	1
Number of prior BL/FQ courses+	
0	0
1	1
≥2#	3
Prior infections/colonization with ESBL <i>Enterobacterales</i> **	4

NOTE: GI: gastrointestinal; GU: genitourinary; BL: β-lactams; FQ: fluoroquinolones
* Within 30 days of bloodstream infection
+ Within 3 to 90 days of bloodstream infection
Multiple courses of antibiotics are given at least 3 days apart
** Within 365 days of bloodstream infections

Figure 1: Risk Stratification by ESBL Prediction Score

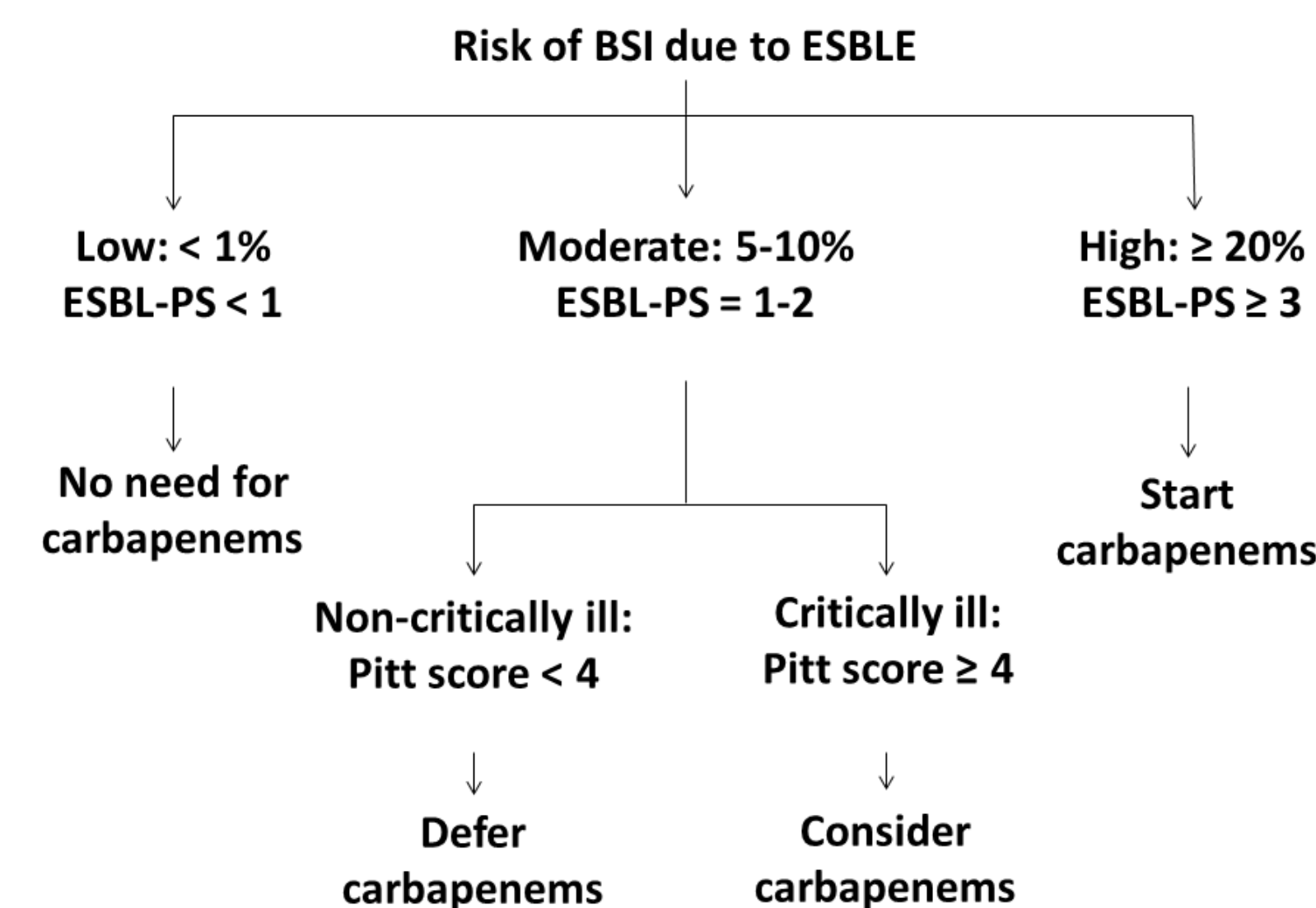


Table 1 & Figure 1 are modified from Augustine MR, et al. Clinical risk score for prediction of extended-spectrum beta-lactamase producing *Enterobacteriaceae* in bloodstream isolates. *Infect Control Hosp Epidemiol* 2017; 38: 266-272.

Results

Figure 2: Timeline of Intervention Implementation

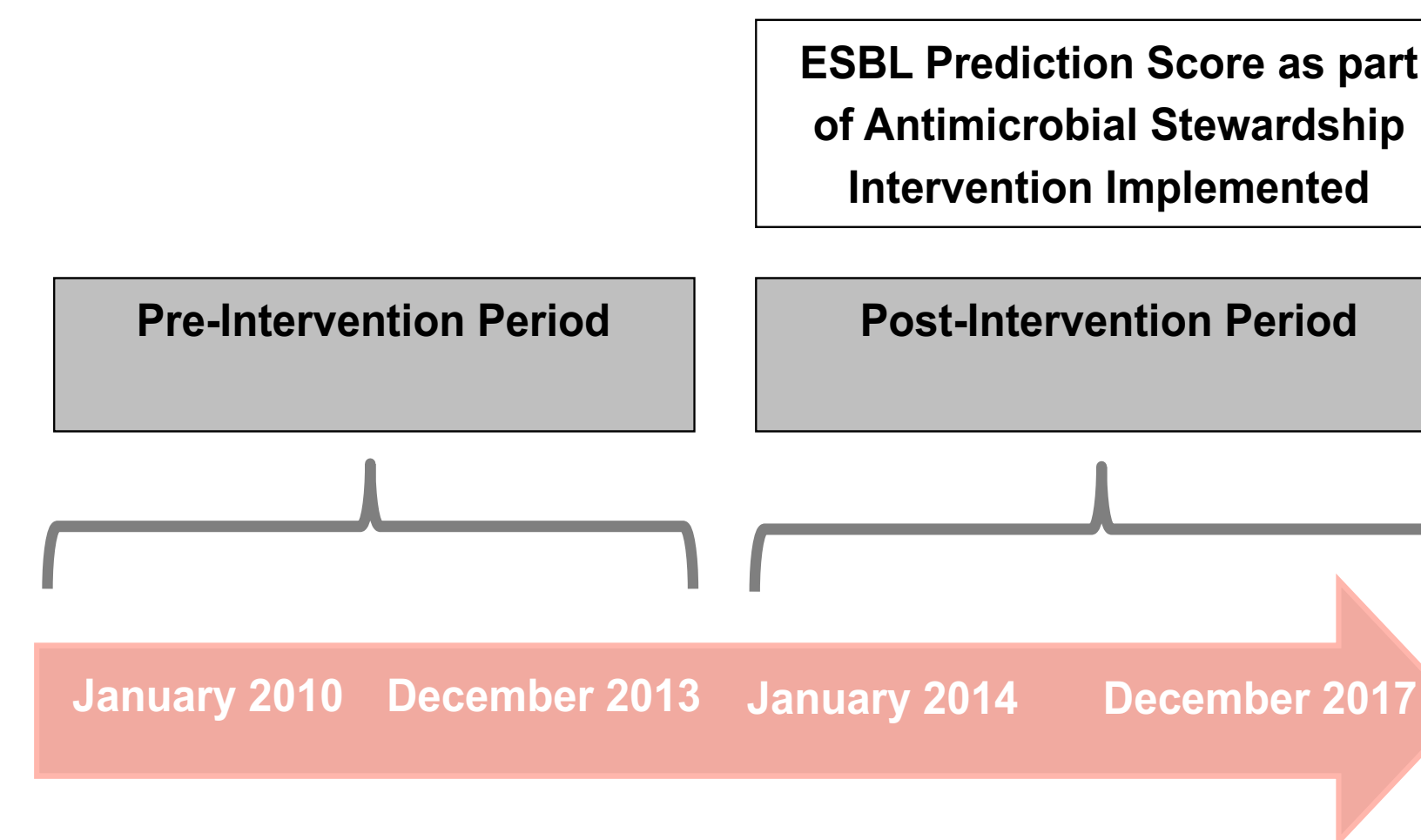


Figure 3: Application of ESBL Prediction Score in Management of *Enterobacterales* BSI

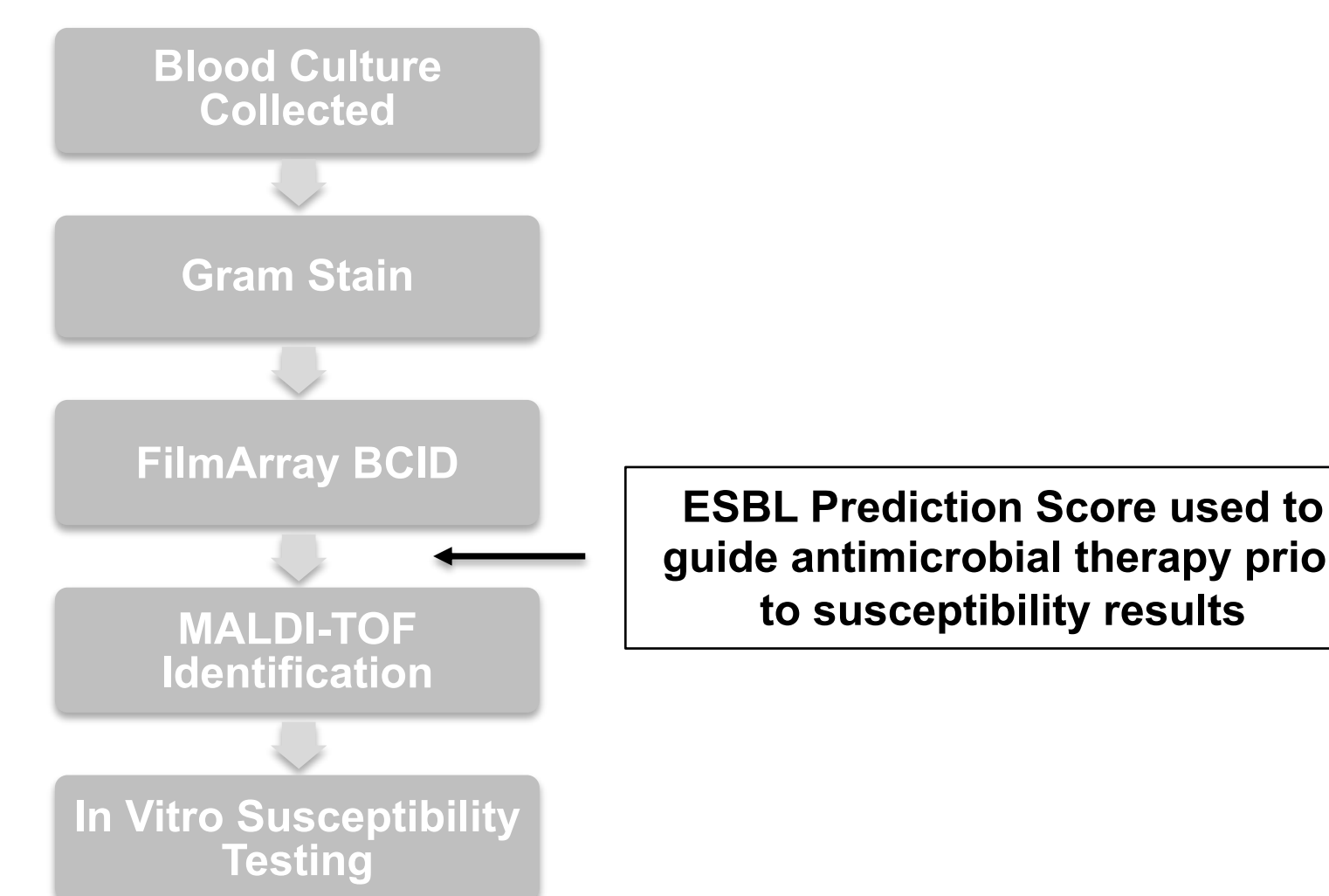


Figure 4: Microbiology of Ceftriaxone-Resistant *Enterobacterales* Bloodstream Isolates

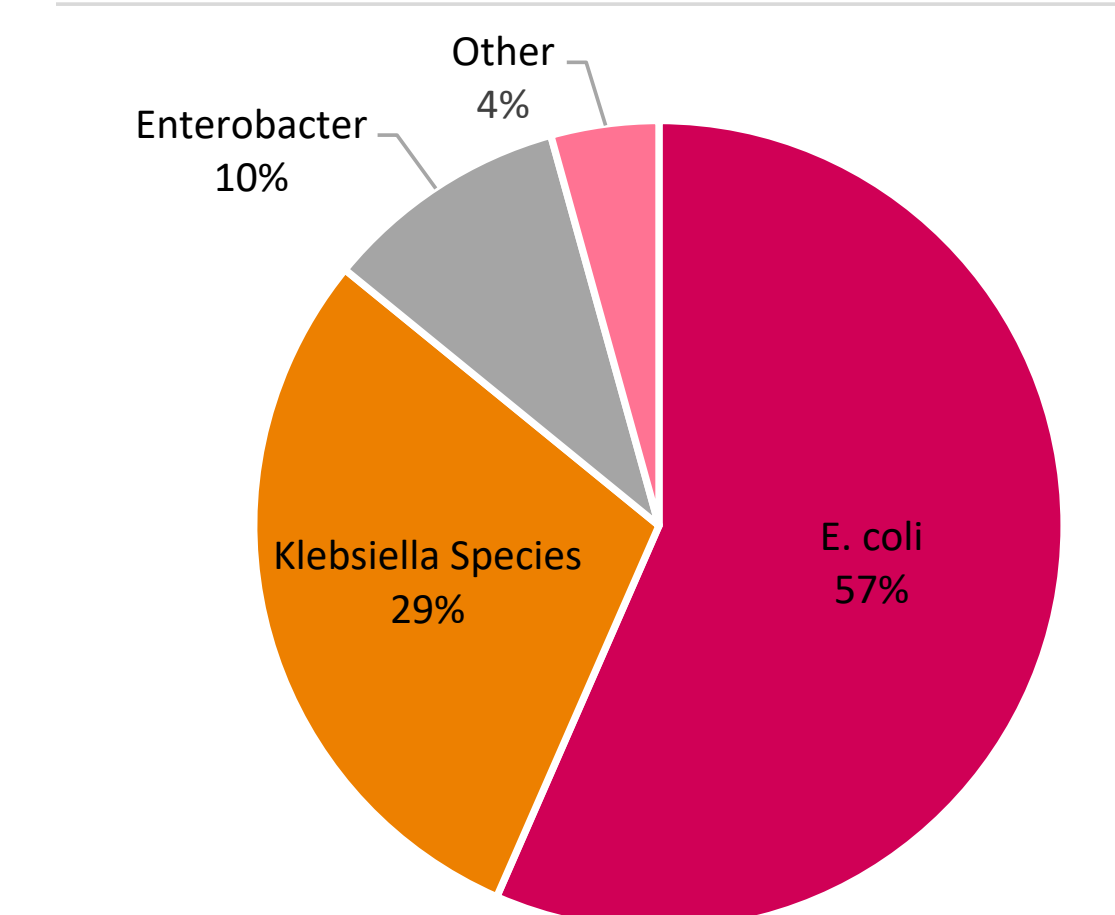
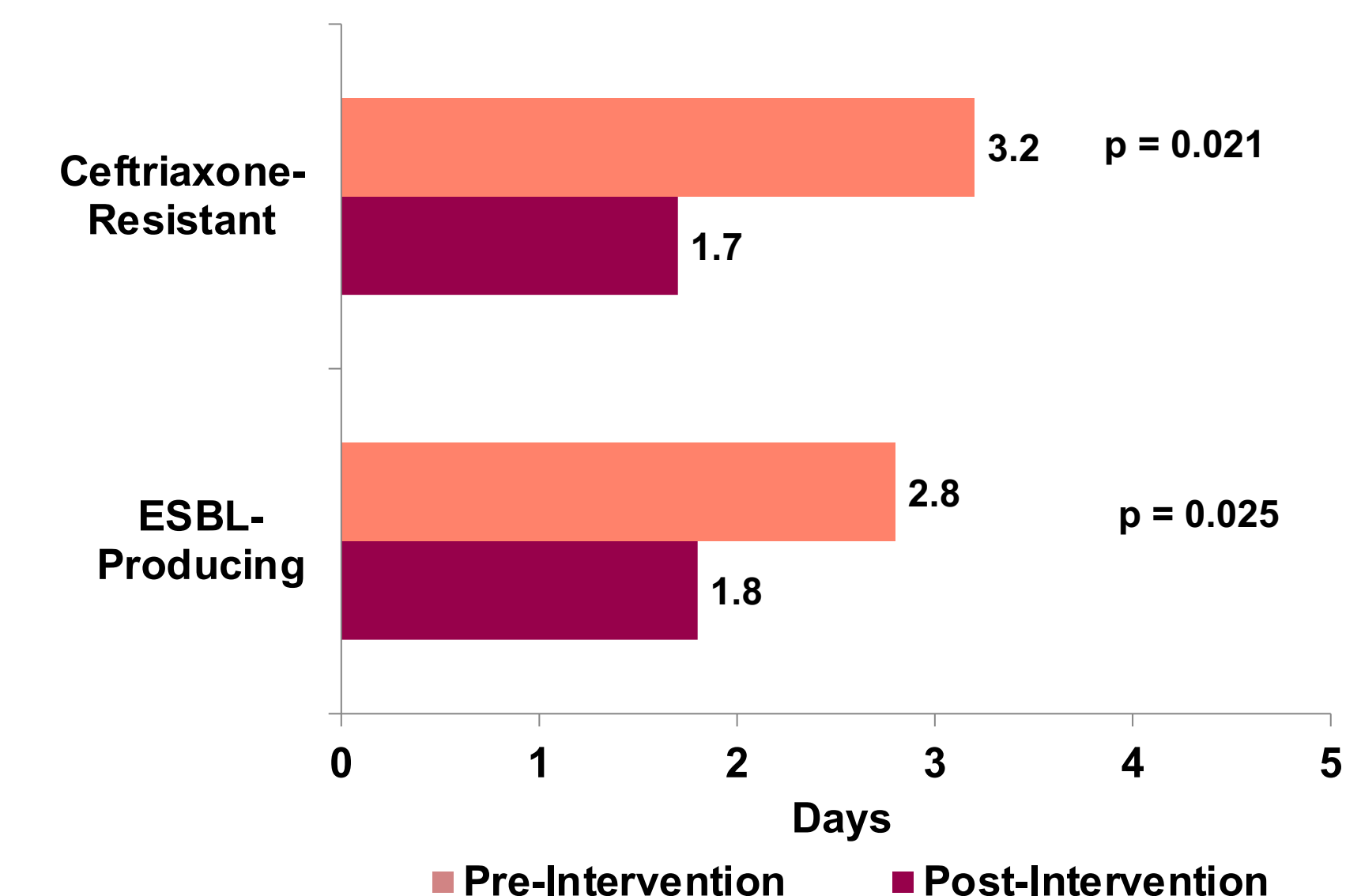


Figure 5: Time to Appropriate Antimicrobial Therapy Pre- and Post-Intervention



Conclusions

- Utilization of the ESBL prediction score as part of a real-time antimicrobial stewardship intervention significantly reduced time to appropriate antimicrobial therapy in BSI due to CRO-R and ESBL-producing *Enterobacterales*