

# The Cost-Effectiveness of the Pediatric Antimicrobial Stewardship Program in a Non-Freestanding Children's Hospital

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## BACKGROUND

- Pediatric-specific antimicrobial stewardship program (Ped ASP) plays a crucial role in patient care, largely through its benefit on improving clinical outcomes and reducing hospital expenditures.<sup>1</sup>
- In contrast to adult antimicrobial stewardship counterparts, pediatric programs face unique challenges, including consideration for varying side effect profiles, pharmacokinetics, and pharmacodynamics that may change with age and weight.<sup>2</sup>
- Additional challenges are particularly evident in programs within non-freestanding children's hospitals, largely due to resource limitations and overlap with an adult-focused infrastructure.<sup>2</sup>
- Having a Ped ASP has been shown to optimize antimicrobial use, improve patient outcomes, and reduce healthcare expenditures.<sup>3-6</sup>
- Combining the Ped ASP outcome data with economic evaluations allows us to assess the gained benefits within limited financial resources in a non-freestanding children's hospital.

## OBJECTIVES

- Demonstrate outcome data including antibiotic days of therapy per 1000 patient days and narrow-versus-broad spectrum antibiotic usage during years 2020 to 2021.
- Evaluate the estimated cost-savings of a Ped ASP in a non-free standing children's hospital.

## METHODS

- The Community Regional Medical Center (CRMC) is a 685 bed medical center located in Fresno, California.
- A 10-bed pediatric intensive care unit (PICU), 11-bed general pediatrics unit (PED), and 84-bed level 3 neonatal intensive care unit exist within CRMC. Impacted by the COVID-19 pandemic, pediatric services were reduced to 4 PICU and 10 PED beds.
- Ped ASP activities include thrice weekly chart reviews followed by "handshake rounds," as well as quarterly review of documented interventions.
- The estimated annual cost savings was calculated using an average cost savings of \$732 (range \$2.5 – 2,640) per patient, as reported by Nathwani D et al in a systemic review on value of hospital ASP program.<sup>3</sup>
- Values of each antimicrobial-specific intervention in the Electronic Medical Record system were estimated based on costs of human workload per day, cost-savings in medication expenses, costs-averted in laboratory and imaging studies, and projected decrease in length of hospital stay reported in studies.<sup>7-8</sup>

## RESULTS

- During 2020 - 2021, antibiotic days of therapy per 1,000 patient days (DOT) decreased from 290 to 110 in PED but increased from 433 to 569 in PICU. Figure 1 shows a quarterly breakdown of DOT from 2020 to 2021.

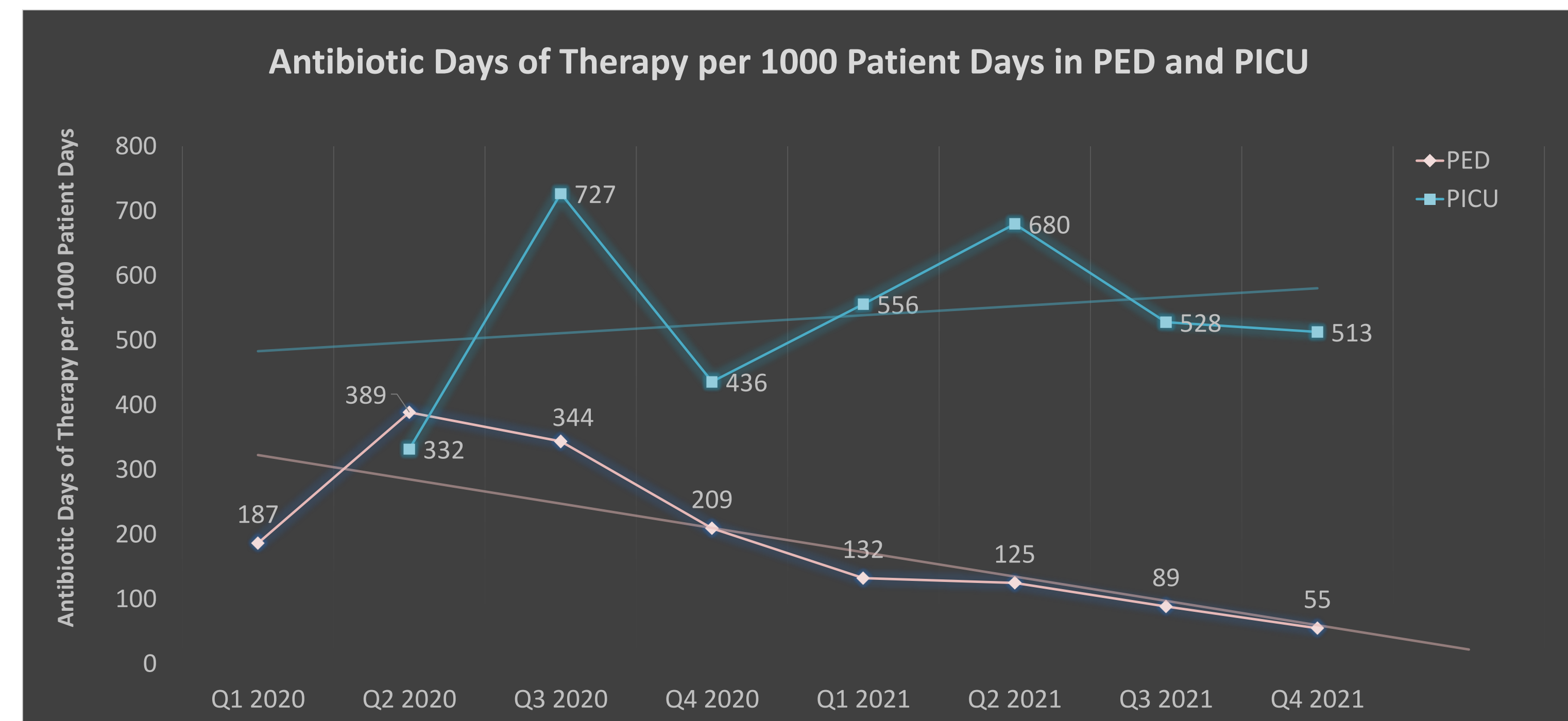


Figure 1 Antibiotic days of therapy per 1,000 patient days

- In 2020, 286 reviews were completed of 155 patients which projected an annual average cost savings of \$113,460 (range: \$387.5 - \$409,200). In 2021, 256 reviews of 116 patients projected an annual average cost savings of \$84,912 (range \$290 - \$306,240).
- An estimated overall annual cost-savings was \$99,186. The total number of ASP-specific interventions in 2020 and 2021 were 172 and 146, with projected pharmacy intervention values of \$26,354 and \$19,170 respectively.

	PED 2020	PICU 2020	PED 2021	PICU 2021
Total Charts Reviewed	235	51	121	135
Total number of Patients	107	48	70	46
Cost-Savings (\$)	78,324	35,136	51,240	33,672
Range of Cost-Savings (\$)	267.5 – 282,480	120 – 126,720	175 – 184,800	115 – 121,440
Annual Cost-Savings (\$)	113,460		84,912	
Range of Annual Cost-Savings (\$)	387.5 – 409,200		290 – 306,240	

Interventions	Value (\$)	PED 2020	PICU 2020	PED 2021	PICU 2021	Total	Percentage (%)
Antibiotic recommendations	100	43	9	36	23	111	34.9
Antibiotic dose adjusted	100	26	6	10	11	53	16.7
Antibiotic IV-to-PO	100	27	3	11	4	45	14.2
Antibiotic discontinued	150	19	3	5	14	41	12.9
Draw lab	76	13	0	9	11	33	10.4
Antibiotic de-escalation	450	12	1	6	3	22	6.9
Reserved antimicrobial evaluation	450	2	4	0	0	6	1.9
Antibiotic allergy clarified	483	0	2	0	0	2	0.6
Antibiotic and pathogen mismatch	1000	1	0	0	1	2	0.6
D/C unnecessary antibiotic combination	150	1	0	0	1	2	0.6
Antibiotic level avoided	100	0	0	0	1	1	0.3
Total number of Interventions		144	28	77	69	318	
Value of Interventions (\$)		20,888	5,466	9,834	9,336		
Annual Value of Interventions (\$)		26,354		19,170			

## RESULTS cont'd

- Ratio of broad to narrow-spectrum antibiotic usage decreased from 0.46 to 0.2 in PED and 0.69 to 0.63 in PICU (Figures 2 and 3).

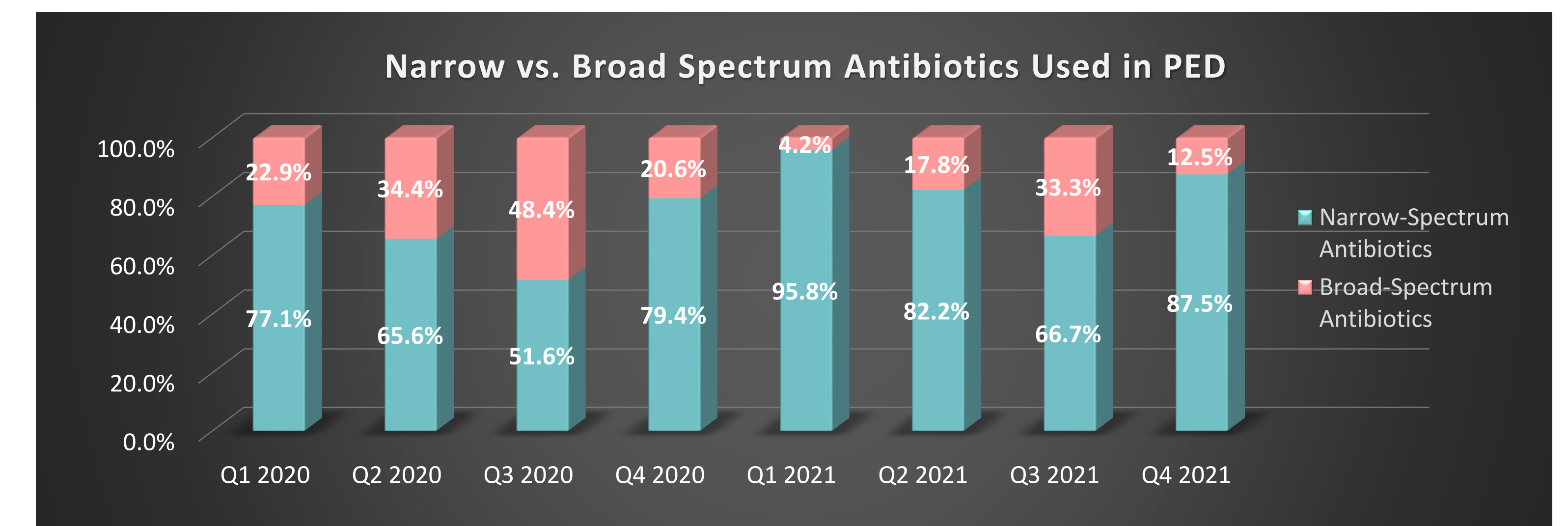


Figure 2 Narrow vs. Broad Spectrum Antibiotics Used in PED

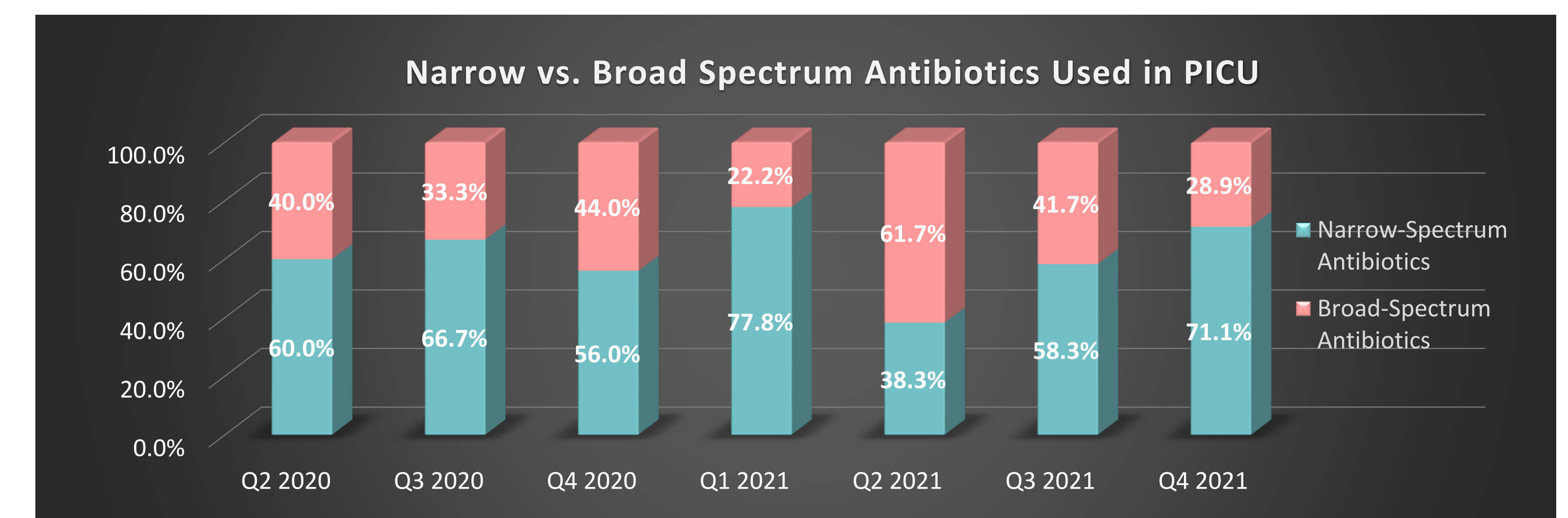


Figure 3 Narrow vs. Broad Spectrum Antibiotics Used in PICU

## CONCLUSION

- We demonstrated a potential cost-saving of our Ped ASP.
- Our Ped ASP reduced the usage of broad-spectrum antibiotics in both PED and PICU; this could reduce emerging resistant organisms in long term.
- Implementing antibiotic time-out on specific broad-spectrum antibiotics based on local susceptibility data can further enhance the safety, appropriateness and cost savings of antimicrobial therapy.

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