

## **3rd Place: Assessment of the Real-world Use of Procalcitonin at a Large Academic Institution**

Olivia Morren

Follow this and additional works at: <https://scholarlyworks.lvhn.org/research-scholars-posters>

**Let us know how access to this document benefits you**

---

### **Published In/Presented At**

Morren, O. Slenker, A. Kile, J. (2019, August). *Assessment of the Real-world Use of Procalcitonin at a Large Academic Institution*. Poster Presented at: LVHN Research Scholar Program Poster Session, Lehigh Valley Health Network, Allentown, PA.

This is brought to you for free and open access by LVHN Scholarly Works. It has been accepted for inclusion in LVHN Scholarly Works by an authorized administrator. For more information, please contact [LibraryServices@lvhn.org](mailto:LibraryServices@lvhn.org).

# Assessment of the Real-world Use of Procalcitonin at a Large Academic Institution

Olivia Morren, Amy Slenker MD, Jarrod Kile RPh., BCPS

Lehigh Valley Health Network, Allentown, Pennsylvania

## BACKGROUND

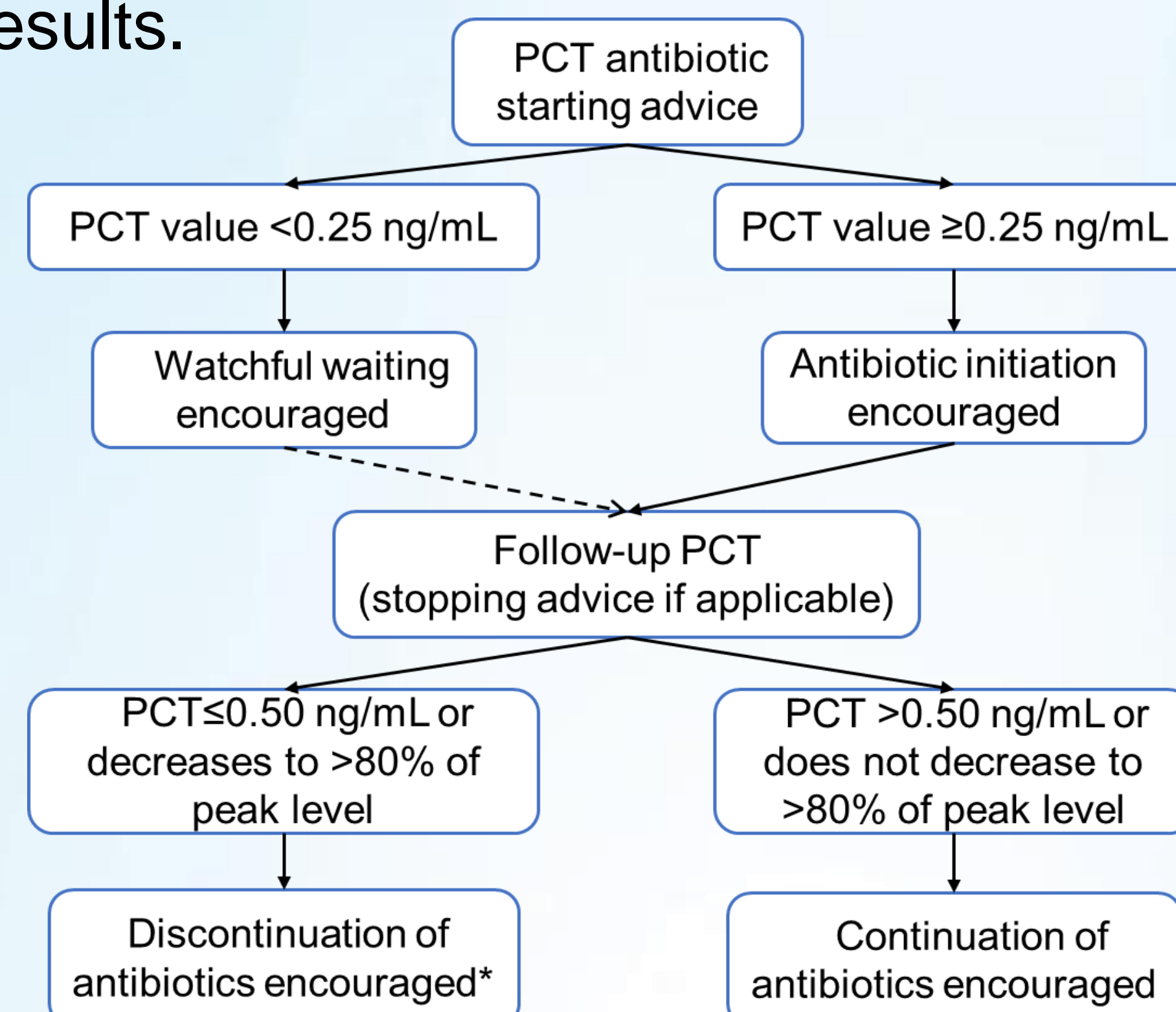
- Procalcitonin (PCT) is a highly sensitive and specific biomarker of inflammation and bacterial infections<sup>1</sup>.
- Specific levels (e.g. PCT  $\geq$  0.25-0.50 ng/mL) can be used to guide antibiotic initiation and prompt antibiotic discontinuation in conjunction with clinical judgment<sup>1,2</sup>.
- PCT-driven antibiotic treatment has been shown to shorten antibiotic exposure by 2-3.5 days and reduce antibiotic usage by 30% in critically ill patients without increasing adverse clinical outcomes<sup>2-4</sup>.

## OBJECTIVE

- The purpose of this quality improvement project is to examine the real-world use of PCT at Lehigh Valley Health Network (LVHN) and assess the clinical impact of PCT-driven antibiotic usage.

## METHODS

- A retrospective chart review of 739 inpatient admissions to the LVH-Cedar Crest and LVH-Muhlenberg campuses from January 1<sup>st</sup> to March 31<sup>st</sup> 2018, who underwent PCT testing.
- Exclusion criteria: patients <18 years of age, transferred patients, invalid test results, and death within 24 hours of PCT results.



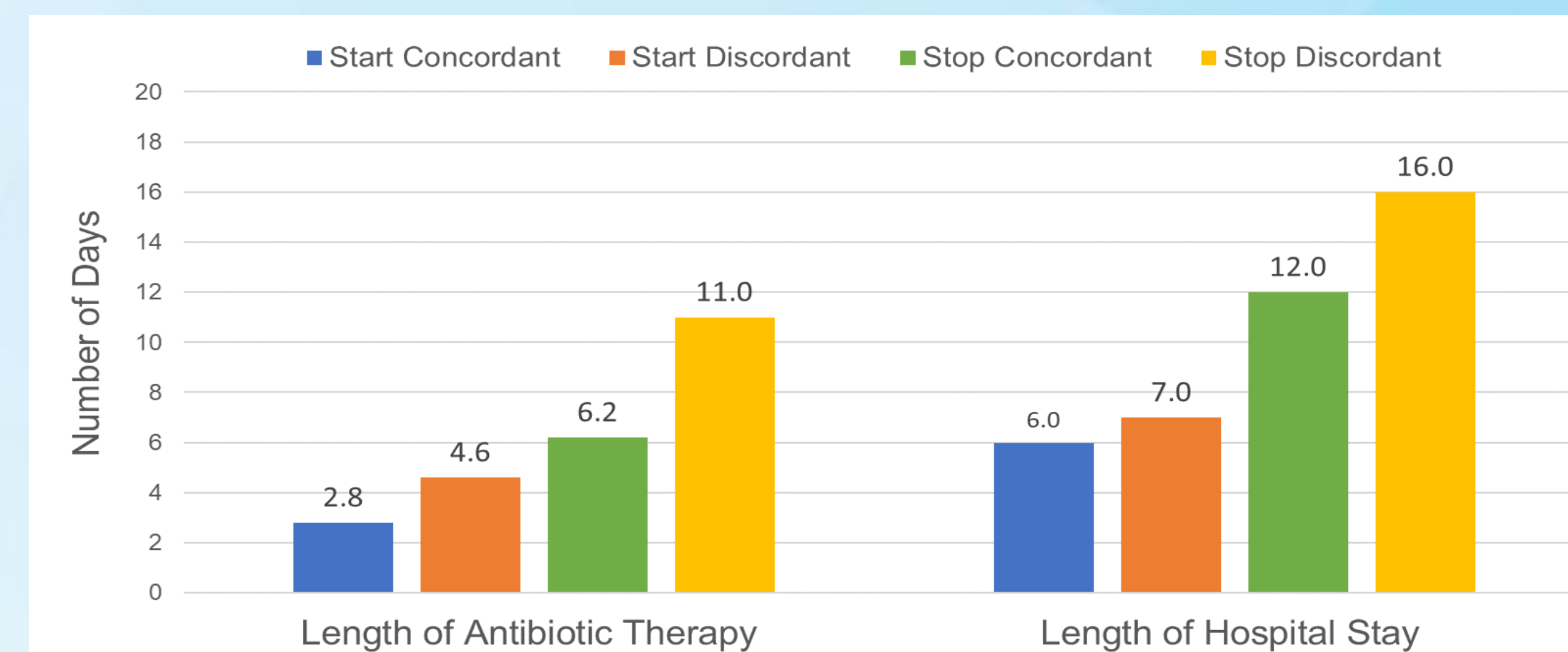
**Figure 1.** Literature-based Procalcitonin (PCT) protocol for antibiotic administration<sup>1,2</sup>. \*PCT results should not trump clinician judgment.

## RESULTS

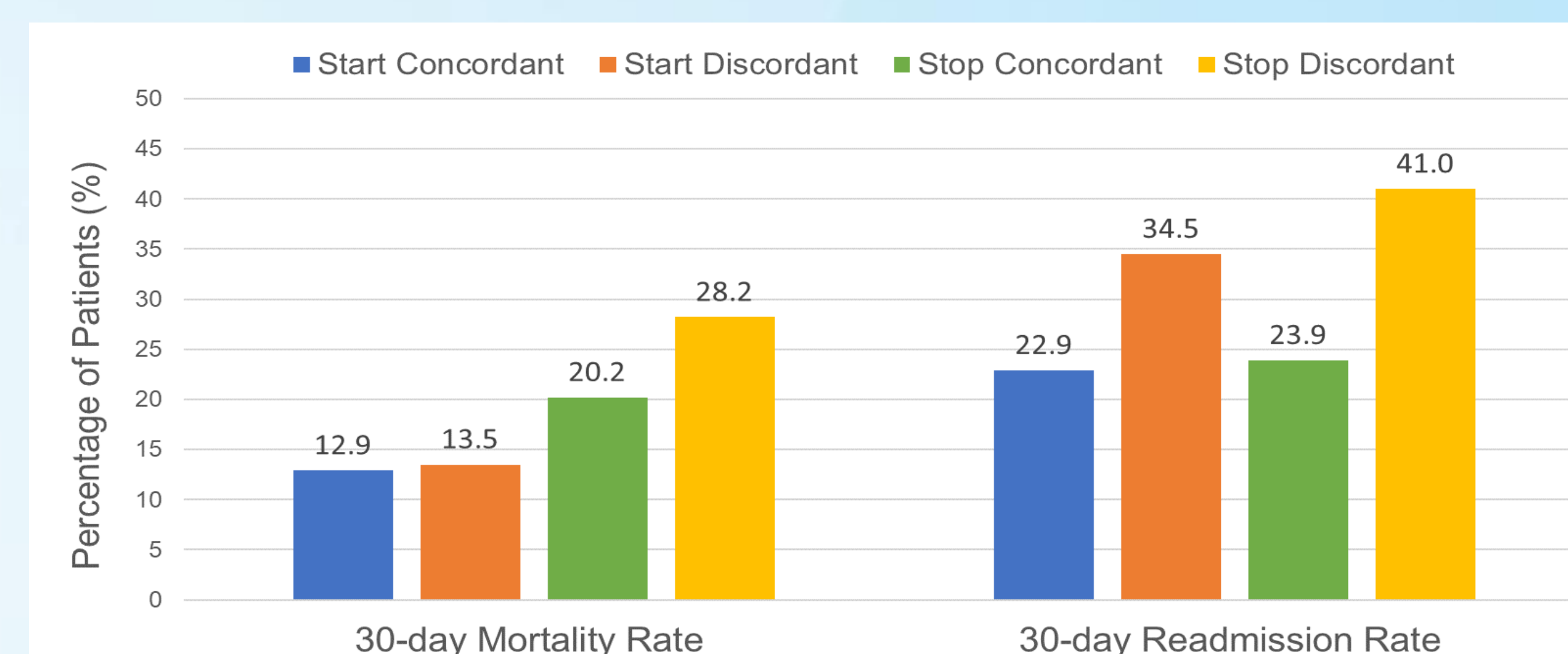
**Table 1.** Demographics and clinical data, stratified by concordant and discordant PCT starting and stopping antibiotic use.\*†

Characteristic	Full study cohort (N=739)	Start Concordant (N=487)	Start Discordant (N=200)	Stop Concordant (N=109)	Stop Discordant (N=39)
Age, years, median (IQR)	70 (58-80)	69 (58-80)	72 (60-82)	66 (54-79)	69 (57-79)
Female gender, n (%)	375 (50.7)	242 (49.7)	101 (50.5)	45 (41.3)	18 (46.2)
Race, n (%):					
Asian	5 (0.7)	3 (0.6)	1 (0.5)	3 (2.8)	0 (0)
African American	25 (3.4)	16 (3.3)	9 (4.5)	3 (2.8)	4 (10.2)
Caucasian	669 (90.5)	439 (90.1)	180 (90.0)	97 (88.8)	32 (82.1)
Multi-racial	17 (2.3)	13 (2.7)	4 (2.0)	3 (2.8)	1 (2.6)
Other/Unavailable	23 (3.1)	16 (3.3)	6 (3.0)	3 (2.8)	2 (5.1)
Total # PCTs per patient per encounter, median (range)	1 (1-6)	1 (1-6)	1 (1-5)	2 (1-6)	2 (1-6)
Start PCT result, n (%):					
<0.25 ng/mL	367 (49.7)	187 (38.4)	154 (77.0)	32 (29.3)	20 (51.3)
≥0.25 to <0.50 ng/mL	95 (12.9)	75 (15.4)	16 (8.0)	16 (14.7)	2 (5.1)
>0.50 ng/mL	277 (37.5)	225 (46.2)	30 (15.0)	61 (56.0)	17 (43.6)
Antibiotics received, n (%)	644 (87.1)	414 (85.0)	178 (89.0)	108 (99.0)	39 (100)
Order Location, n (%):					
LVH-Cedar Crest	476 (64.4)	302 (62.0)	138 (69.0)	71 (65.1)	26 (66.7)
LVH-Muhlenberg	263 (35.6)	185 (38.0)	62 (31.0)	38 (34.9)	13 (33.3)

Abbreviations: IQR, interquartile range; PCT, Procalcitonin; LVHN, Lehigh Valley Health Network. Assessment of provider concordance and discordance to PCT advice given a 24-hr. window for any PCT-driven antibiotic alterations, before and after PCT result reception. \*n=52 cases of N/A start adherence, n=591 cases of N/A stop adherence. † Concordant defined as: followed suggested PCT protocol. Discordant defined as: did not follow the suggested PCT protocol.

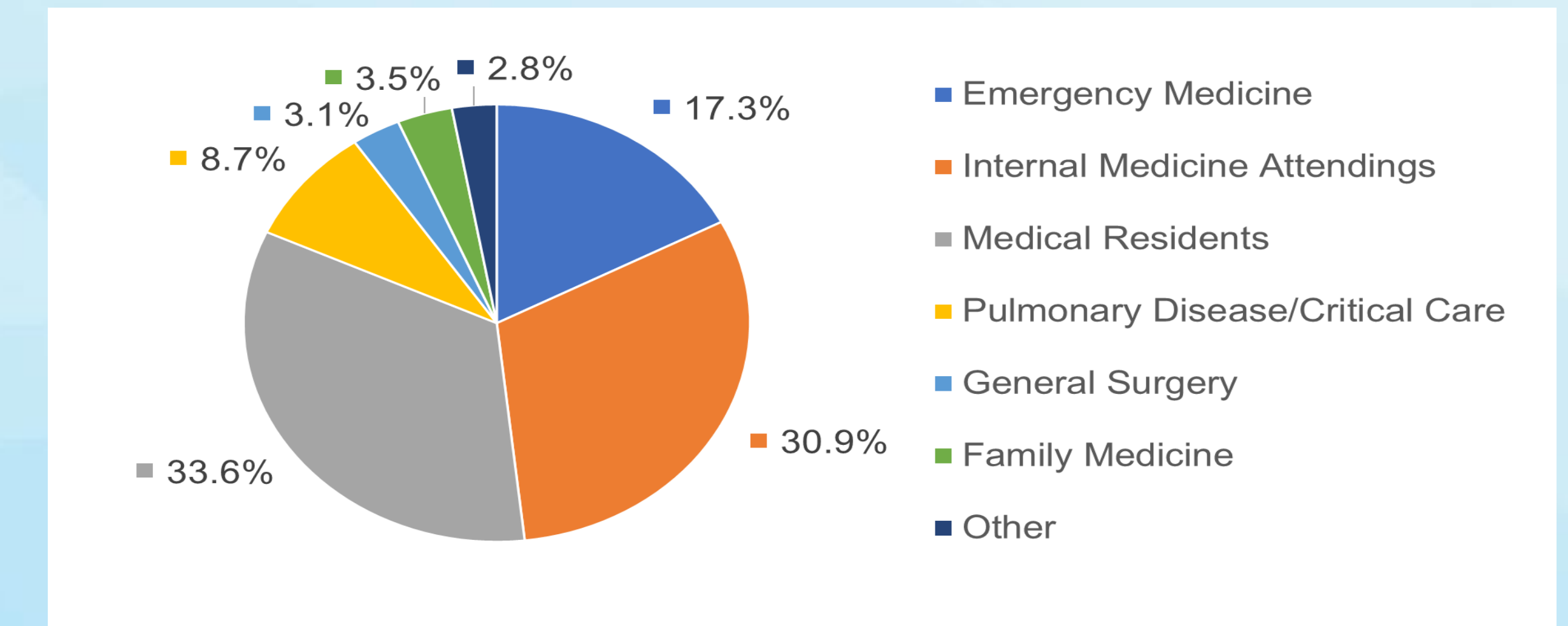


**Figure 2.** Median length of antibiotic therapy and hospital stay (days) stratified by PCT-driven antibiotic adherence N=739.



**Figure 3.** 30-day all-cause mortality and readmission rates (%) stratified by PCT-driven antibiotic adherence N=739.

## RESULTS



**Figure 4.** Procalcitonin ordering by provider specialty.

- 3,531 PCT tests were performed at LVHN in 2018 – accounting for \$436,925.94 in charges.
- Some patients (n=41, 5.5%) received >2 PCT tests (range=3-6) during a single hospital admission.
- Patients with a negative (<0.25 ng/mL) first PCT result were more likely (23.0% vs 77.0%) to have non-PCT driven antibiotic initiation (Table 1).
- For concordant follow-up PCT testing, antibiotic discontinuation occurred 4.8 days earlier and the median length of hospital stay was 4 days shorter (Table 1).

## CONCLUSIONS

- Discordant PCT test results and antibiotic usage occurred in 27.1% of cases during antibiotic initiation and in 26.4% of cases for applicable follow-up PCT testing.
- An increase in the days of antibiotic therapy, length of stay, 30-day mortality, and 30-day readmission rates were noted in discordant antibiotic start and stop cohorts, this warrants further analysis (Figure 2,3).
- Increased education regarding appropriate Procalcitonin test usage and interpretation is needed at LVHN.
- Future Directions: explore effectiveness of properly used PCT tests to decrease hospital spending on excessive antibiotic-use and in turn, examine the impact on risks for antibiotic-resistance

### REFERENCES

- Broyles, MR. Impact of Procalcitonin-Guided Antibiotic Management on Antibiotic Exposure and Outcomes: Real-World Evidence. *OFID*. 2017;4(4):1-8.
- Hohn A, Balfer N, Heising B, Hertel S, Wiemer JC, Hochreiter M, Schröder S. Adherence to a procalcitonin-guided antibiotic treatment protocol in patients with severe sepsis and septic shock. *Ann. Intensive Care*. 2018;8:68-77.
- Mitsuma S, Mansour MK, Dekker JP, Kim J, Rahman MZ, Tweed-Kent A, Schuetz P. Promising New Assays and Technologies for the Diagnosis and Management of Infectious Diseases. *OFID*. 2012;5(7): 996-1002.
- Sager R, Kutz A, Mueller B, Schuetz P. Procalcitonin-guided antibiotic diagnosis and antibiotic stewardship revisited. *BMC Medicine*. 2017;15:15.