Building on Success: Impact of a Multidisciplinary Antimicrobial Stewardship Team in the Pediatric Cardiac Intensive Care Unit

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Background

- Antimicrobials are indispensable in the management of infections.
- Judicial use of antimicrobials mitigates the risk of antimicrobial resistance.
- A multidisciplinary antimicrobial stewardship team was created in 2020 within the Pediatric Cardiac Intensive Care Unit (CICU).
- Achieved initial aim of reducing unnecessary antimicrobial use within the CICU[1]

Objective

- Further reduce unnecessary antibiotic use within the CICU with pharmacy-based interventions

Methods

- Key intervention: Additional CICU clinical pharmacist hired in July 2024.
- Primary outcome measures: Days of therapy per 1000 patient days (DOT) for vancomycin, meropenem, and all antibiotics.
- Process measure: Utilization of sepsis rule out order set in the electronic medical record, initially implemented in January 2022.
- Balancing measure: Sepsis-related mortality, obtained from the Pediatric Cardiac Critical Care Consortium (PC4) registry.
- Setting: CICU at a quaternary cardiac center.
  - Initially 32-bed CICU, moved to a new facility with 36-beds in September 2024.
- Measures were tracked over time and analyzed using statistical process control charts.

Results

Figure 1: U-chart displaying the use of vancomycin

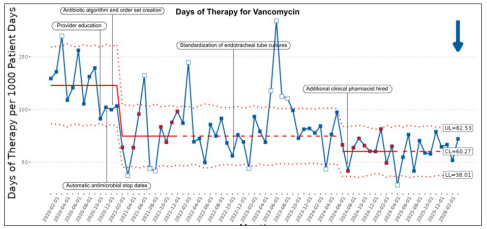


Figure 2: U-chart displaying the use of meropenem.

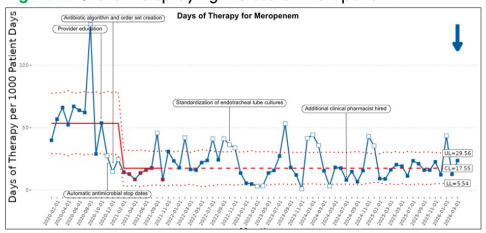


Figure 3: U-chart displaying the use of all antibiotics

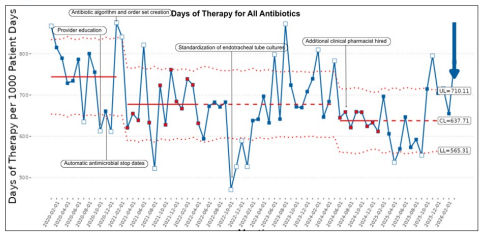


Figure 4: P-chart displaying percentage of sepsis-related mortality in the CICU by quarter.

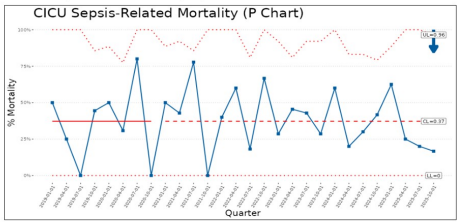
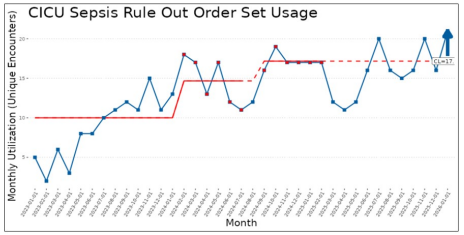


Figure 5: Run chart displaying utilization of a CICU sepsis rule out order set within the electronic medical record by month.



Results

- Sustained reduction in unnecessary broad-spectrum antimicrobial over a five-year period, building on previously published QI interventions (Figures 1 & 2).
- Further reduction in unnecessary antibiotic after addition of a third full-time CICU clinical pharmacist.
- Vancomycin use further decreased by 20% (75 to 60 DOT, Figure 1).
- Overall antibiotic use was reduced by 14% (744 to 638 DOT, Figure 3).
- No associated increase in sepsis-related mortality (Figure 4).
- Sepsis rule out order set utilization steadily increased over time (Figure 5).

Conclusions

- The addition of a dedicated third clinical pharmacist further reduced antimicrobial usage in an already successful antimicrobial stewardship program without an associated increase in mortality.
- Readily available expertise from clinical pharmacists can help to decrease unnecessary antibiotic usage

References

[1]Hillyer MM, Jaggi P, Chanani NK, Fernandez AJ, Zaki H, Fundora MP. Antimicrobial Stewardship and Improved Antibiotic Utilization in the Pediatric Cardiac Intensive Care Unit. Pediatr Qual Saf. 2024 Feb 5;9(1):e710. doi: 10.1097/pq9.0000000000000710. PMID: 38322295; PMCID: PMC10843537.