

Vancomycin Overuse in a Neonatal Intensive Care Unit (NICU)

Galit Holzmann-Pazgal MD¹, Amir Khan MD¹, Christine Domonoske Pharm.D², Eric Eichenwald MD¹

¹University of Texas School of Med., Houston, TX, ²Memorial Hermann Hospital, Houston, TX

Abstract

Background: Antimicrobial stewardship is a major patient safety issue. One role of stewardship is to decrease the incidence of bacterial resistance by optimizing treatment of infectious pathogens. Vancomycin (Vanc) is one of the most frequently utilized antimicrobials, particularly in the NICU. Use of Vanc is an independent risk factor for acquisition, infection and prevalence of Vanc resistant organisms. The CDC has published guidelines for appropriate use of Vanc to prevent spread of Vanc resistance. Little data are available regarding the appropriateness of antimicrobial use, particularly Vanc, in the NICU setting.

Methods: Prospective observational study of Vanc utilization in the Children's Memorial Hermann Hospital NICU, a 118 bed level IV NICU. Vanc utilization for all infants >3 days old was collected from 10/1/2012 through 2/28/2013. Culture data was concurrently collected for all patients receiving antibiotic therapy. Vanc use was considered appropriate if used to treat infection due to targeted pathogens (MRSA, coagulase negative *staphylococcus* (CONS) or ampicillin resistant *enterococci*). Prevalence and judiciousness of Vanc use was described.

Results: 91 patients received antibiotics for 137 separate episodes over the 5 month period. 82/91 (90%) received Vanc for 115 episodes. 45/82 (55%) patients received Vanc for > 2 days, representing 59/115 (51%) of episodes. There were a total of 557 days of Vanc administration, representing 0.06 days/1,000 patient days. Vanc was utilized as empiric therapy of clinical sepsis and necrotizing enterocolitis (NEC). Of 59 episodes when Vanc was administered for > 2 days, only 8 (14%) had a positive clinical culture for which Vanc was indicated (4 for ≥ 2 blood cultures positive for CONS, 3 for MRSA infections, 1 for other infection due to CONS).

Conclusions: Vanc is inappropriately utilized in >85% of antibiotic administration episodes in our NICU. Despite culture data demonstrating low prevalence of MRSA and CONS infections, it is still utilized as the first line agent for suspicion of sepsis as well as NEC. In addition, it is often continued >2 days despite negative cultures. Interventions to decrease empiric, unnecessary Vanc usage in the NICU should be developed.

Background

Recommendations for judicious use of antimicrobials:

- Diagnose and treat infection by targeting the pathogen
- Treat infection and not colonization or contamination
- Stop treatment when cultures are negative or clinical course does not support antibiotic use.
- Utilize local organism susceptibility to guide antimicrobial use

Principles of judicious vancomycin use:

- Treatment of serious infections due to MRSA or other b lactam resistant gram positive organisms
- Avoid for treatment of single positive blood culture due to coagulase negative staphylococcus if second blood culture prior to antibiotics is negative
- Avoid for empiric use of presumed infections in patients with cultures negative for methicillin resistant gram positive agents.

NICUs prescribe vancomycin more than any other pediatric inpatient care setting.

Methods

Prospective observational study

240 bed tertiary care children's hospital with 118 bed NICU

Collected vancomycin utilization for all NICU patients >3 days of life over 5 month period (October 2012 through February 2013)

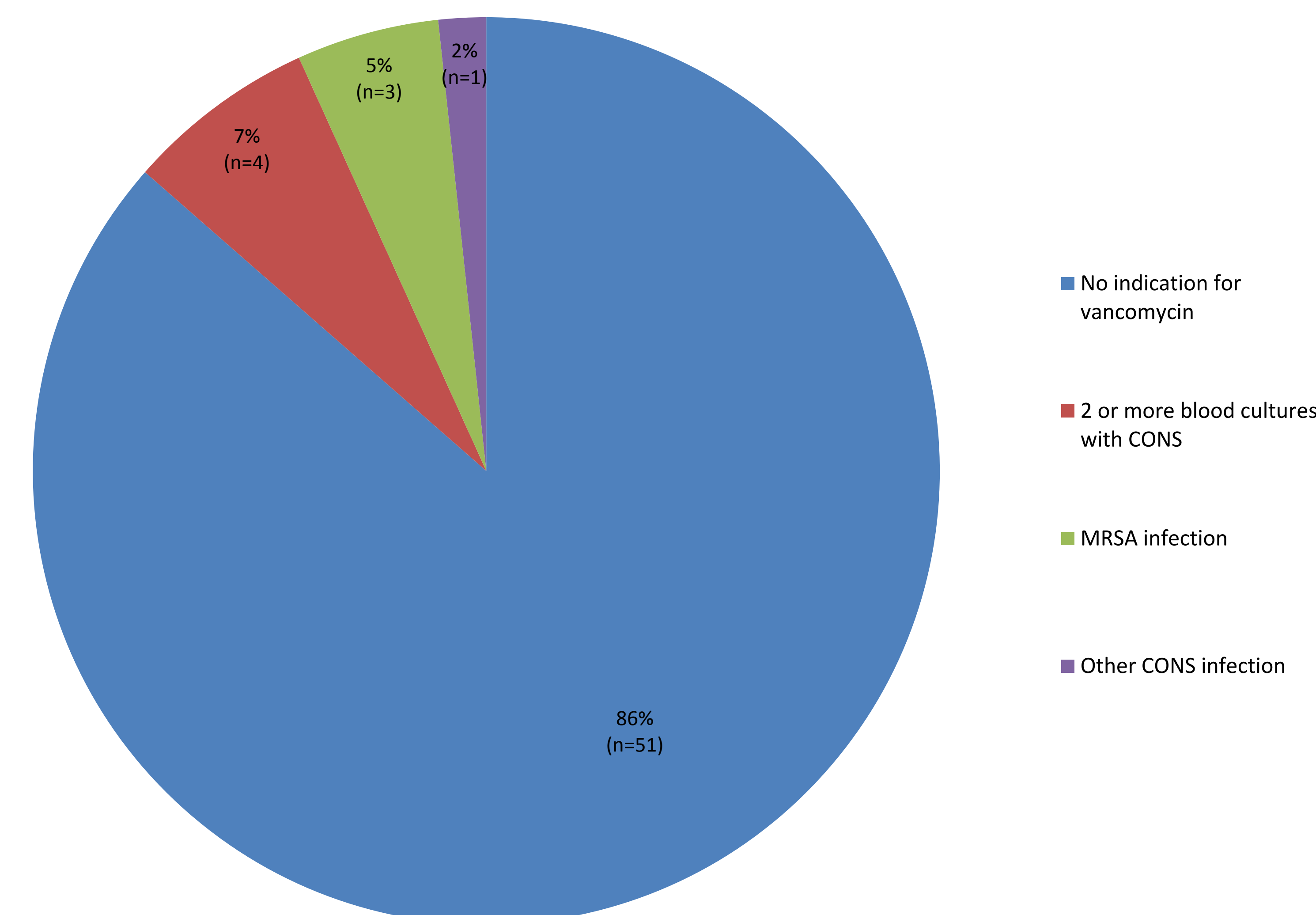
- Antimicrobial episodes per patient
- Duration of antibiotic use
- Indication for antibiotic
- Culture data

Vancomycin use was considered appropriate to treat:

- Infection due to MRSA, CONS, Ampicillin resistant *enterococci*
- 2/2 blood cultures positive for CONS

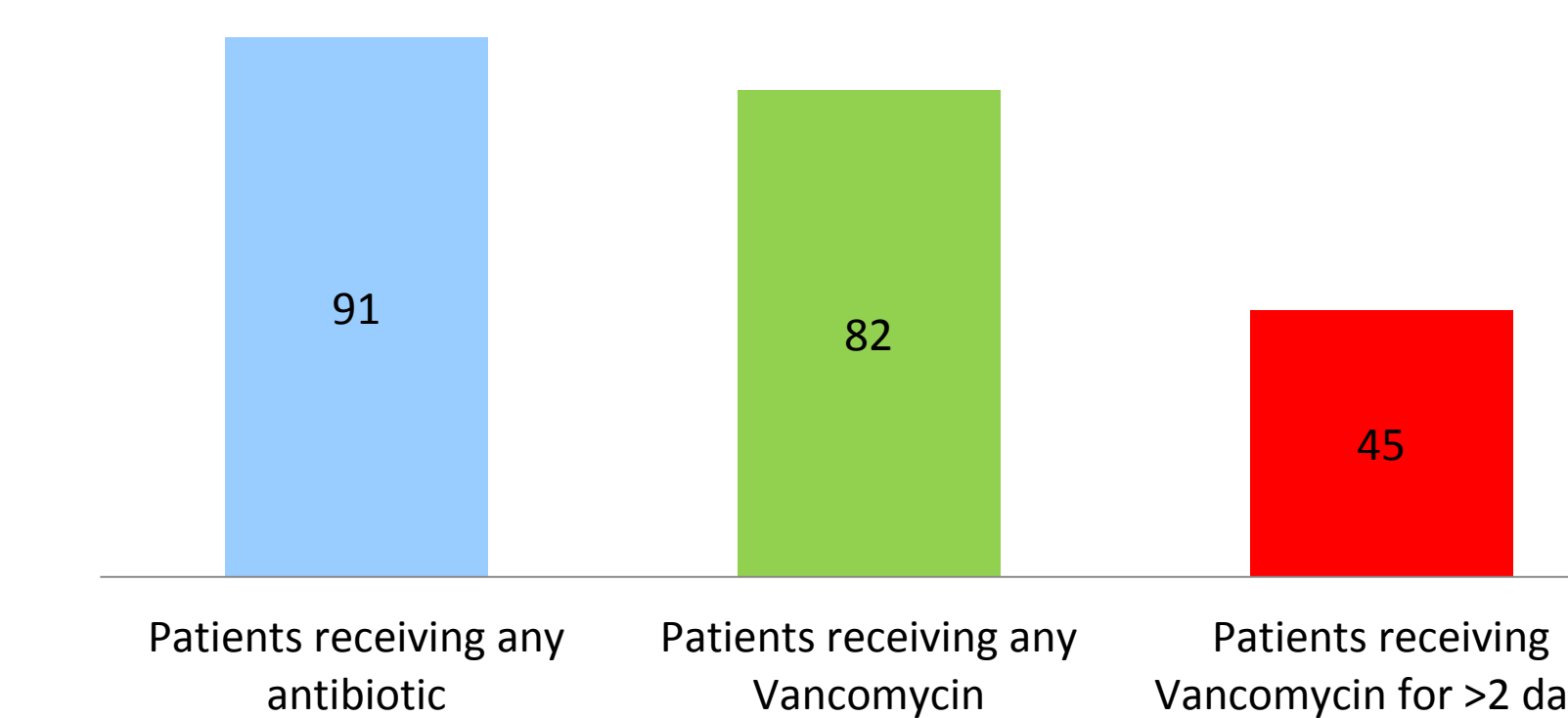
Results

Indication for > 2 days of Vancomycin Administration in the NICU (total n=59 episodes)



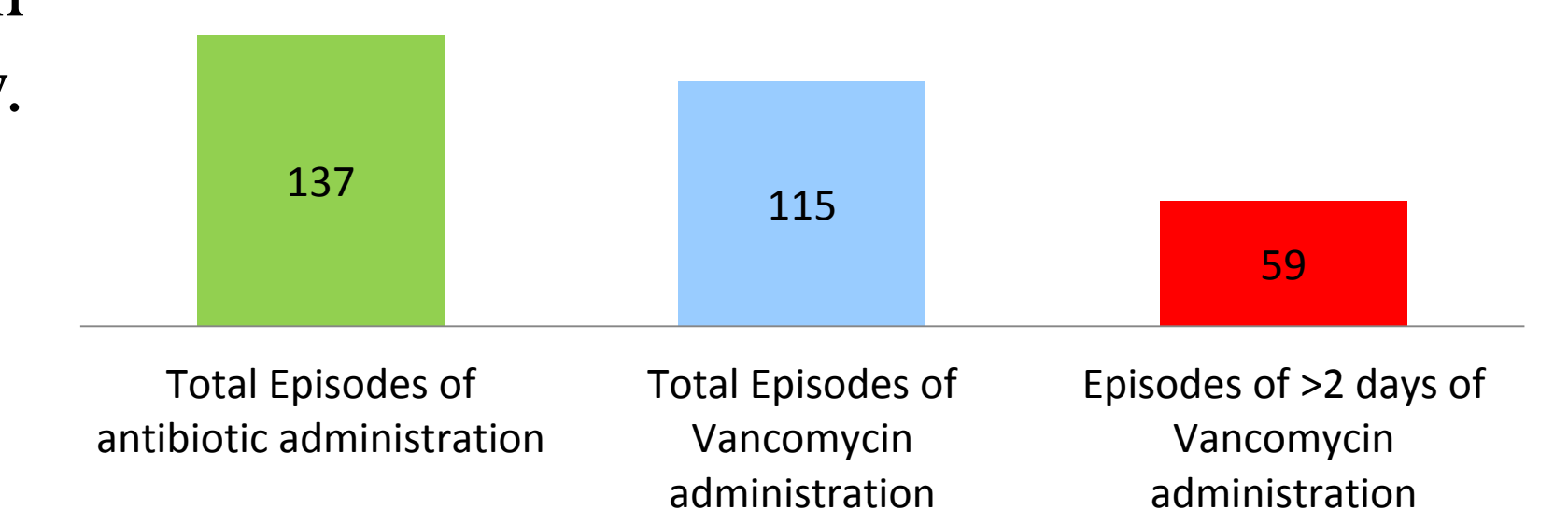
Results

Vancomycin Utilization in the NICU



Vancomycin was routinely utilized as empiric therapy for clinical sepsis and NEC (90% of patients receiving antimicrobials).

Episodes of Vancomycin Administration in the NICU



Prevalence of culture documented infection due to MRSA or CONS was extremely low.

-(8/ 59) episodes of >2 days of vancomycin administration

Conclusions

Vancomycin is inappropriately utilized in >85% of antibiotic administration episodes in our NICU despite culture data demonstrating low prevalence of MRSA or CONS infections.

Vancomycin is often continued for >2 days despite negative cultures.

Interventions to decrease empiric and prolonged unnecessary vancomycin utilization in the NICU should be developed.

References

Prevent Antimicrobial Resistance: 12 Steps to Protect Hospitalized Children.

www.cdc.gov/drugresistance/healthcare.

Centers for Disease Control and Prevention. Recommendations for prevention of vancomycin resistance: recommendations for the Hospital Infection Control Practices Advisory Committee. MMWR Recomm Rep. 1995;44:1-13.

AAP RedBook 2012. Principles of Appropriate Use of Vancomycin.

Keyserling HL, Sinkowitz-Cochran RL, Harris JM, et al. Vancomycin Use in Hospitalized Pediatric Patients. Pediatrics 2003;112:e104.