

# Interdisciplinary Cooperation in Development and Implementation Of a Standardized Protocol to Decrease Vancomycin use in a Level IV NICU

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**Project summary:** A team of neonatologists, NNPs, nursing staff, NICU PharmD and nursing leadership revised existing protocol for evaluation and treatment of early onset sepsis (EOS), late onset sepsis (LOS), necrotizing enterocolitis (NEC), and surgical site infection (SSI). Protocol replaced routine use of vancomycin with nafcillin pending sensitivities. Use of vancomycin was decreased by 50%, leading to decreased exposure to an antibiotic linked to development of resistant organisms, renal toxicity, and cost associated with following antibiotic levels. No increase in morbidity or mortality was associated with this revised protocol.

**Smart Aim:** By September 2016, we aim to decrease vancomycin use from an average of 3.2 days per 100 patient days to 1.5 days per 100 patient days, a decrease of 50%.

**Practice Setting:** Community based 58 bed level IV referral center in a Children's Hospital

**Population:** NICU admissions per year: 735

Transports per year: 210

VLBW births per year: 100

2015 rate of LOS in VLBW: 14%

2015 rate of NEC in VLBW: 6.3%

**Background:** One of the goals of antibiotic stewardship is to target culture identified pathogens with the narrowest spectrum antibiotic and discontinue antibiotics when cultures remain negative. Vancomycin exposure can increase multidrug resistant organisms. NICUs are the most frequent site of vancomycin use in pediatric inpatient setting.

**Baseline data:** In 2015, 64 of our admissions had 83 exposures to vancomycin. Fifteen (18%) of these exposures were associated with positive cultures. Only 7 of these 15 required vancomycin based on sensitivity testing of organism. These data suggest that some infants received vancomycin when not necessary to treat a specific infection. See Tables 1 and 2.

**Table 1: 2015 baseline data: number of vancomycin exposures, clinical indications**

Onetime dose for line exposure or peri-operative	7
2-3 days for rule out late onset sepsis (LOS)	30
Clinical sepsis/pneumonia with negative cultures	5
Necrotizing Enterocolitis (NEC)	10
Empiric surgical coverage (SSI)	17
Positive cultures	15

**Table 2: 2015 baseline data: vancomycin use with positive cultures**

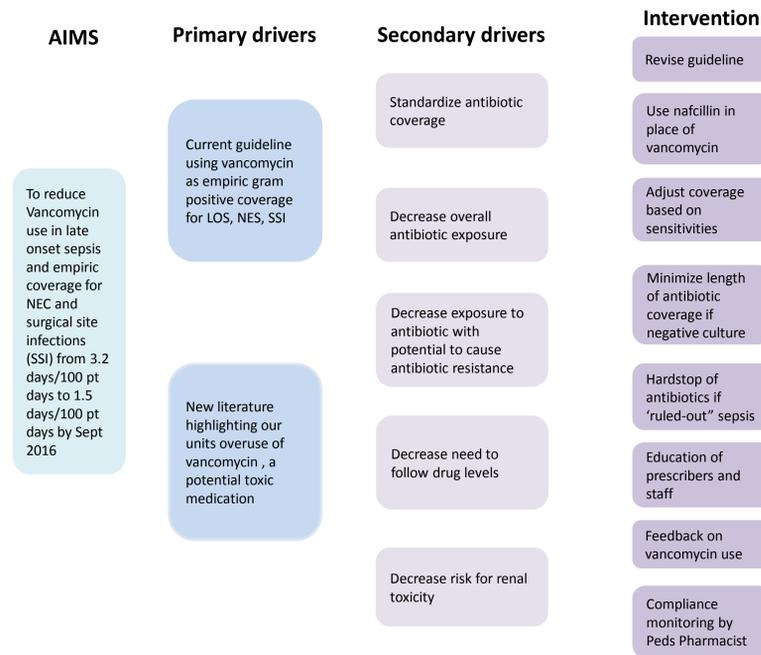
Initial therapy with vancomycin, changed to another antibiotic based on sensitivities	4
MRSA, full course of vancomycin	4
CONS, Staph warnerii	3
Vancomycin therapy, organism sensitive to oxacillin	4

**Key words:** vancomycin, late onset sepsis (LOS), necrotizing enterocolitis (NEC),

Surgical site infection (SSI), antimicrobial resistance, standardized protocol, interdisciplinary cooperation

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## Drivers of Change:



## Tests of change:

**PDSA 1:** joined iNICQ antibiotic stewardship collaborative, September, 2015

**PDSA 2:** established interdisciplinary team including neonatologists, pediatric infectious disease specialist, NNPs, NICU pharmacist, BSNs to revise guideline, September 2015

**PDSA 3:** identified need to decrease vancomycin exposure based on baseline data, October 2015

**PDSA 4:** reviewed literature supporting use of nafcillin as appropriate alternative for LOS, NEC, SSI pending sensitivities, October 2015

**PDSA 5:** identified changes in practice to decrease vancomycin use, revised guideline to use nafcillin in place of vancomycin for LOS, NEC, SSI. Implemented ordering only 48 hours of antibiotics at time of initial orders, November 2015

**PDSA 6:** prescribing neonatologists and NNPs followed revised guideline for practice, December 2015

**PDSA 7:** extensive staff education regarding revised protocol based on literature review, February 2016

**PDSA 8:** formal feedback form NICU pharmacist regarding adherence to protocol, April 2016

**Data collection:** using EPIC, our electronic medical record, all patients who received vancomycin in the year 2015 were identified. The total number of days each infant received vancomycin and the clinical indication including culture results and sensitivities were manually extracted from the patients' charts. The total number of days of vancomycin exposure per month was divided by the total number of patient days for that month, giving vancomycin rate per 100 patient days.

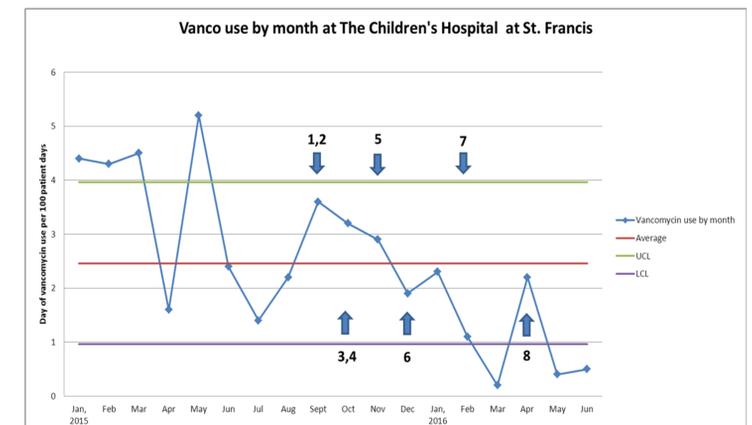
**Results:** the run chart shows a decrease in vancomycin use per 100 patient days from an average of 3.2 to 1.5. See tables 3 and 4 for total vancomycin exposure days and total patient days.

**Table 3: baseline data: number of days vancomycin per 100 patient days**

Month	Total days vanco	Patient days	Vanco use by month
Jan. 2015	49	1116	4.4
Feb 2015	48	1103	4.3
March 2015	55	1231	4.5
April 2015	16	990	1.6
May 2015	52	993	5.2
June 2015	26	1072	2.4
July 2015	17	1174	1.4
Aug 2015	29	1292	2.2
Sept 2015	45	1245	3.6
Oct 2015	43	1327	3.2

**Table 4: revised guideline: number of days vancomycin per 100 patient days**

Month	Total days vanco	Patient days	Vanco use by month
Nov 2015	35	1214	2.9
Dec 2015	21	1098	1.9
Jan 2016	24	1049	2.3
Feb 2016	15	1351	1.1
March 2016	3	1277	0.2
April 2016	24	1058	2.2
May 2016	5	1267	0.4
June 2016	7	1280	0.5



**Discussion:** by implementing a revised practice guideline that included using nafcillin in place of vancomycin for rule out LOS, NEC, and SSI, we were able to decrease vancomycin exposure. Results were tempered by an outbreak of MRSA in several infants and 1 micropremie with prolonged CONS sepsis after implementation of the revised guideline.

**Future directions:** work with infection control to decrease MRSA prevalence in our NICU

-monitor for increased morbidity and mortality for infants started on nafcillin

-upgrade EPIC to ensure compliance with minimum antibiotic coverage and allow close follow up of overall antibiotic utilization rate in the NICU

-upgrade EPIC to ensure automatic hard stop for 48 hours antibiotic therapy on initial order

