

Assessment of Empiric Vancomycin Regimen in NICU Patients In Fraser Health



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Background

- Vancomycin exerts bactericidal activity at trough levels of 5 to 20 mg/L depending on infection and location
- Studies have evaluated vancomycin regimens in neonates
 - No consensus on best regimen to achieve target levels
- Current Fraser Health (FH) empiric regimen uses post-menstrual age (PMA) and day of life (DOL):

PMA	Dose
Less than 30 weeks	10 mg/kg q12h
30 weeks or more, DOL 0 to 7	10 to 15 mg/kg q12h
30 weeks or more, DOL more than 7	10 to 15 mg/kg q8h

- To target levels of 5 to 15 mg/L
- Literature shows low incidence of vancomycin nephrotoxicity (1 to 9%)

Objectives

- Determine % of neonates that achieved target trough levels with empiric vancomycin regimen
- Identify time to negative culture and clinical resolution
- Determine incidence of nephrotoxicity with vancomycin

Methods

- Design:** Chart review
- Inclusion:**
 - NICU patients who received vancomycin
 - Interpretable vancomycin trough level
 - Dates: June 2012 to May 2017
 - Hospitals: Surrey Memorial and Royal Columbian
- Exclusion:** PMA of 45 weeks or more
- Statistical Analysis:**
 - Descriptive statistics
 - Spearman's rho correlation
- Neonatal Nephrotoxicity criteria**
 - Serum creatinine (SCr) greater than 133 $\mu\text{mol/L}$
 - SCr increase of 26.5 $\mu\text{mol/L}$ or more
 - SCr increase of 50% or more
 - Urine output of less than 1 mL/kg/hr

Results

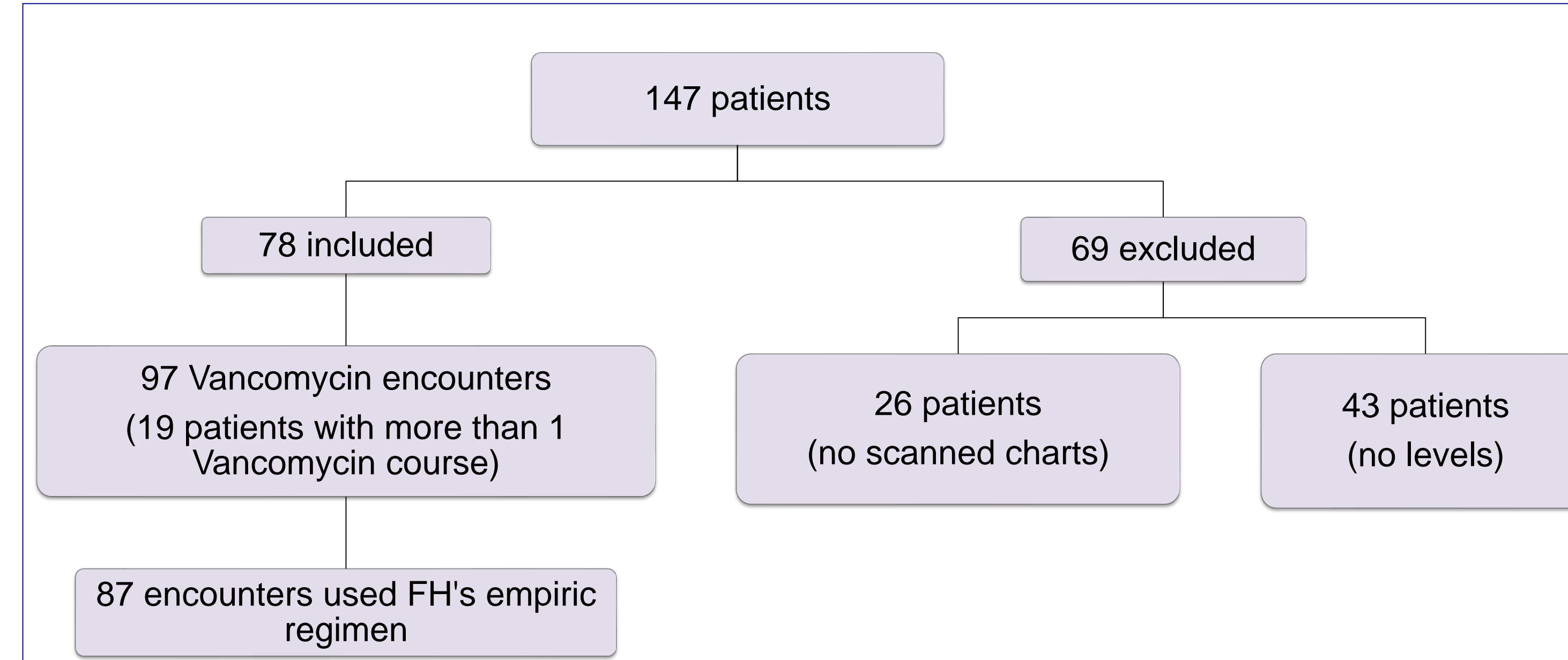


Figure 1: Patient inclusion flow diagram

Mean PMA (weeks)	30 (24 to 42)
Mean DOL (days)	17 (1 to 68)
Mean Birth weight (kg)	1 (0.38 to 4.25)
Mean Current weight (kg)	1.2 (0.44 to 4.25)
Mean urine output (mL/kg/hr)	3 (1.5 to 6.2)
Patients on vasopressors	2.2%
Received antibiotics 48h prior	44%

Infections	
CONS Bacteremia/Sepsis	25%
Suspected Sepsis	26%
Necrotising Enterocolitis (NEC)	22%
Ventilator Associated Pneumonia (VAP)	15%
Cellulitis	7%
Other Bacteremia (MSSA, Bacillus cereus, Group B Strep)	5%

Table 1: Patient characteristics (n=87)

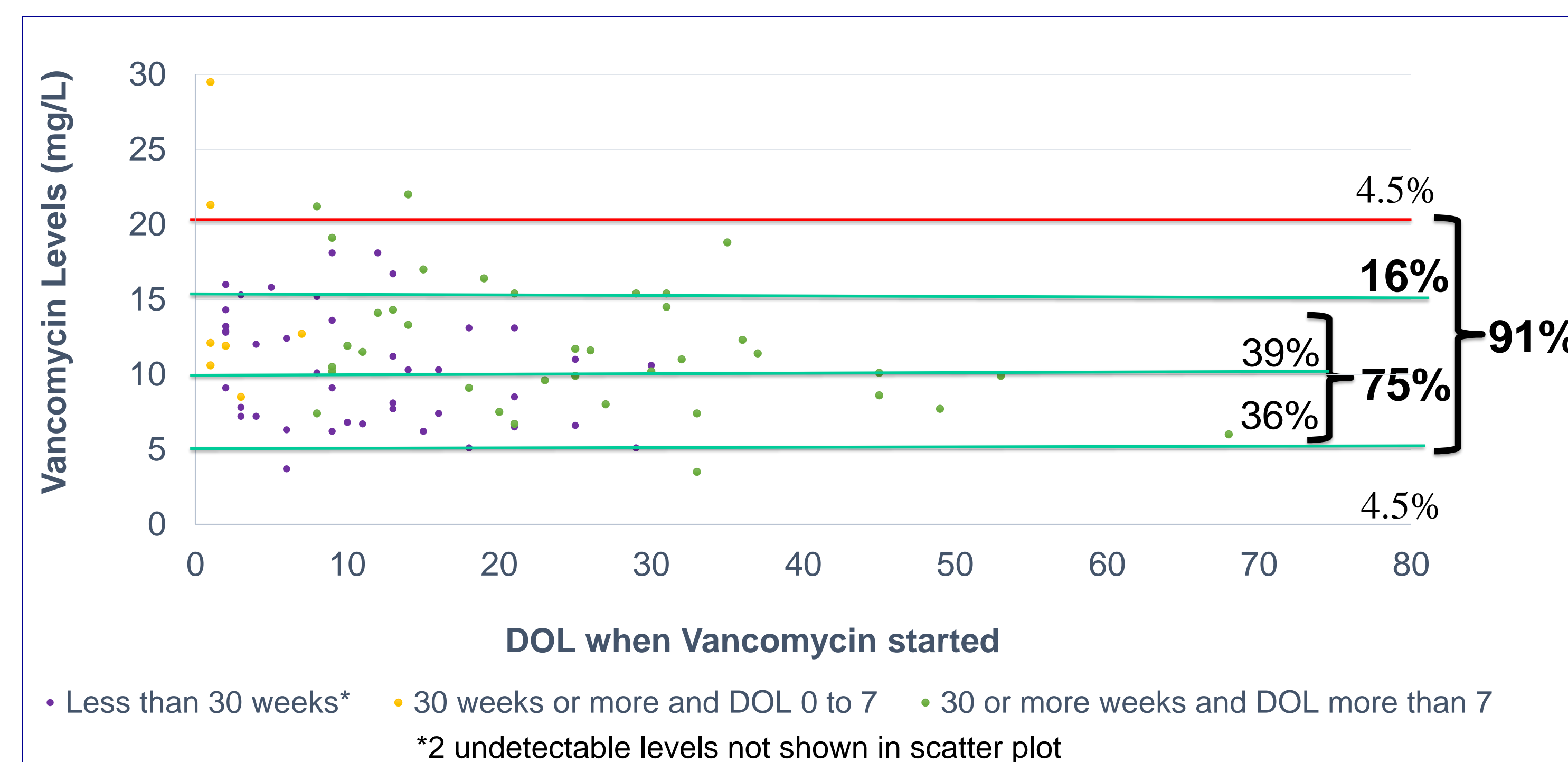


Figure 2: Vancomycin levels with FH's empiric dosing (n=87)

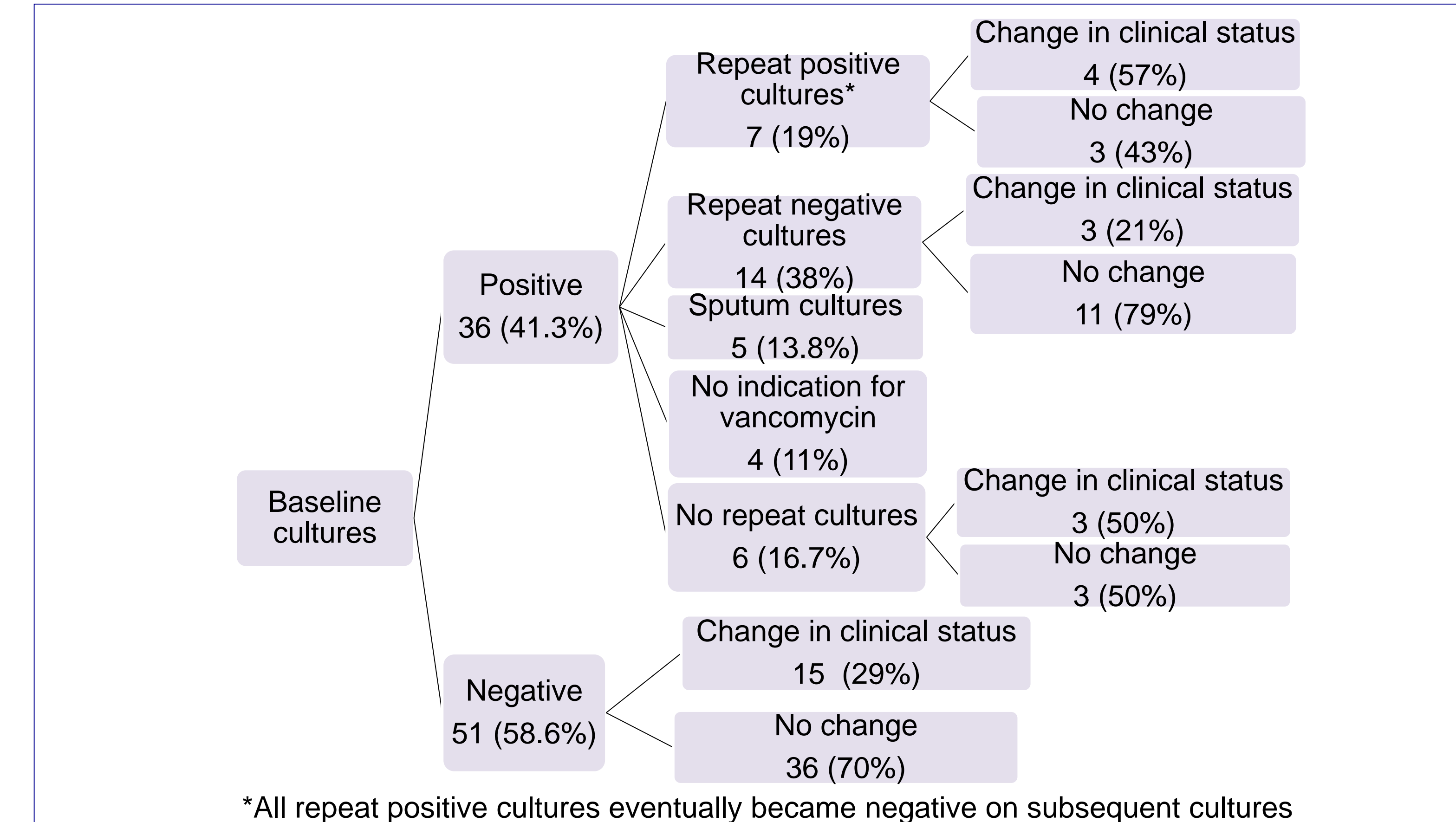


Figure 3: Culture results and clinical status

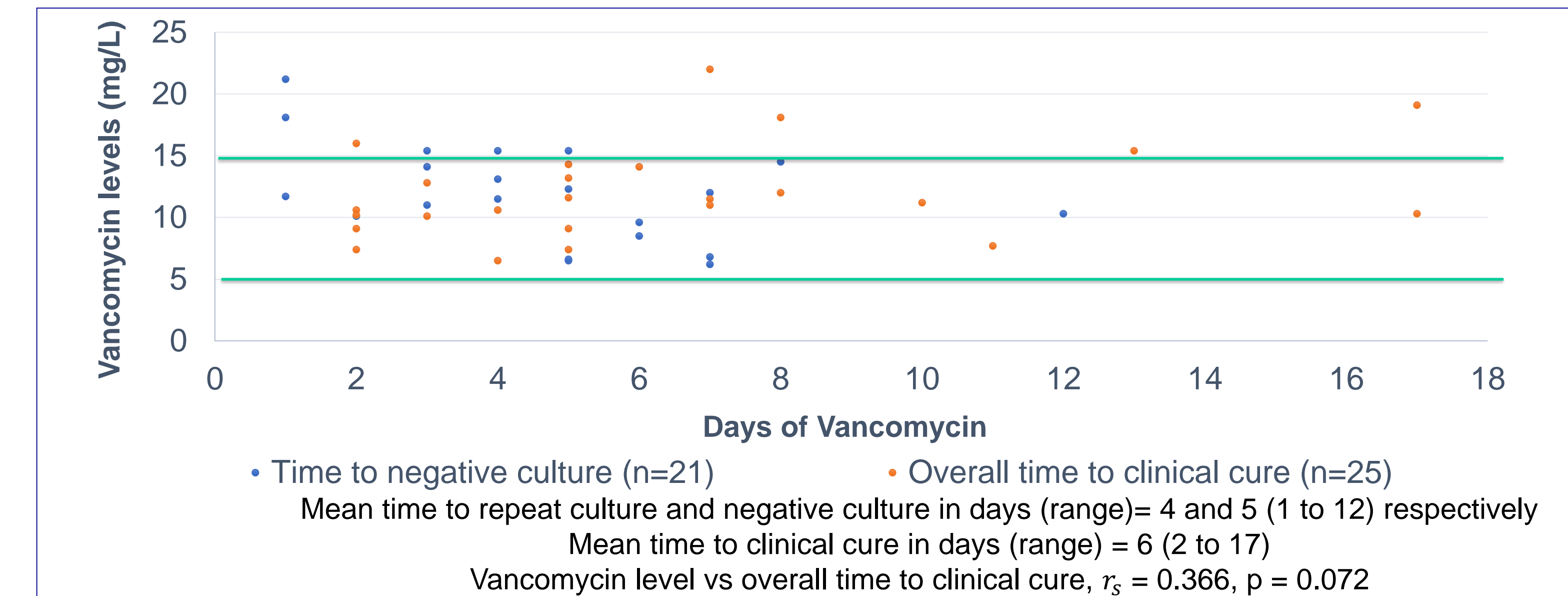


Figure 4: Time to negative culture and clinical cure

PMA (weeks)	DOL (days)	Urine output (mL/kg/h)	SCr ($\mu\text{mol/L}$)	Change in SCr	Vancomycin Level	Concomitant Nephrotoxins
25+1	10	2.9	74 → 130	76%	13.6 → 22.4	Yes
27+4	13	2.2	74 → 126	70%	18.1	Yes
28+4	3	0.58	40 → 80	50%	15.3	No
30+5	9	0.99	89 → 66	-25%	21.2	No
31+2*	1	1.3	167	N/A	29.5	Yes
34+1	1	0	107	N/A	21	Yes

*Patient had septic shock requiring vasopressors

Table 2: Patients with nephrotoxicity (n=6)

Limitations

- Small number of patients had objective changes in clinical status
- Inconsistent urine output charting

Conclusions

- 75% of patients achieved target trough levels with FH's empiric regimen
- The PMA mean time to negative culture and clinical cure was 5 and 6 days, respectively
- The overall incidence of nephrotoxicity was 7.7%
 - 0% if level 15 mg/L or less
 - 33% if level more than 15 mg/L