



# Empiric Antibiotic Therapy with Vancomycin in Pediatric Patients



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## Background

- Vancomycin is routinely used for empiric treatment of sepsis in critically ill children
- Appropriate Use:
  - Treatment of  $\beta$ -lactam resistant gram positive organisms, empiric sepsis treatment, and patients with allergies to  $\beta$ -lactam antibiotics
- BC Children's Hospital (BCCH) antibiogram: most gram positive organisms susceptible to  $\beta$ -lactams, but not all
- Delaying appropriate antibiotics can result in poor outcomes
- Concerns about unnecessary vancomycin use include:
  - Increasing vancomycin resistance
  - Risk of adverse effects with exposure
- Prior to recommending change in empiric vancomycin, need to understand the use of empiric vancomycin in BCCH Pediatric Intensive Care Unit (PICU)

## Objectives

- Primary:**
  - Describe the use of vancomycin in children in the PICU for treatment of possible or confirmed infections
- Secondary:**
  - Identify the percentage of patients with an indication for vancomycin therapy
  - Describe the frequency of positive cultures and organisms
  - Describe adverse effects

## Methods

- Design:** Retrospective single cohort study
- Inclusion:** Term neonates to 19 years of age, received at least one dose of vancomycin in PICU between May 1, 2010 - August 31, 2016
- Exclusion:** Vancomycin for surgical prophylaxis
- Sample Size:**  $P=0.85$ ,  $d=0.06$ , 95% Confidence Level,  $N=136$
- Statistical Analysis:** Descriptive statistics
- Definitions:**
  - Positive Culture:** Pathogen isolated from sterile site
  - Adverse Effects:** Ototoxicity and Red-Neck Syndrome if documented as such in the health record
  - Nephrotoxicity:**  $> 44\mu\text{mol/L}$  or  $\geq 50\%$  increase in baseline serum creatinine

Table 1: Patient Characteristics

	N = 143
Age, median (IQR)	2 (0.4-7) years
Weight, median (IQR)	11 (5.6-20.8) kg
Female, n (%)	78 (54)
$\beta$ -lactam Allergy, n (%)	6 (4)
Infection Source*:	n (%)
Lower Respiratory Tract	58 (41)
Skin and Soft Tissue	16 (11)
CNS	7 (5)
Abdomen	5 (4)
Urinary Tract	5 (4)
Bone and Joint	2 (1)
Eyes, Ears, Nose, Throat	1 (1)
Unknown	57 (40)
Positive Culture, n (%)	77 (54)
Appropriate Indication, n (%)	141 (99)
Hospital Length of Stay (LOS) prior to vancomycin, median (IQR)	1 (0-11) days
PICU LOS prior to vancomycin, median (IQR)	0 (0-5.5) days
PICU LOS, median (IQR)	9 (3-22.9) days
PRISM III Score, median (IQR)	7 (3-15)
Mortality, n (%)	56 (39)

\* 8 Patients had more than one infection source

Figure 1. Organisms Cultured

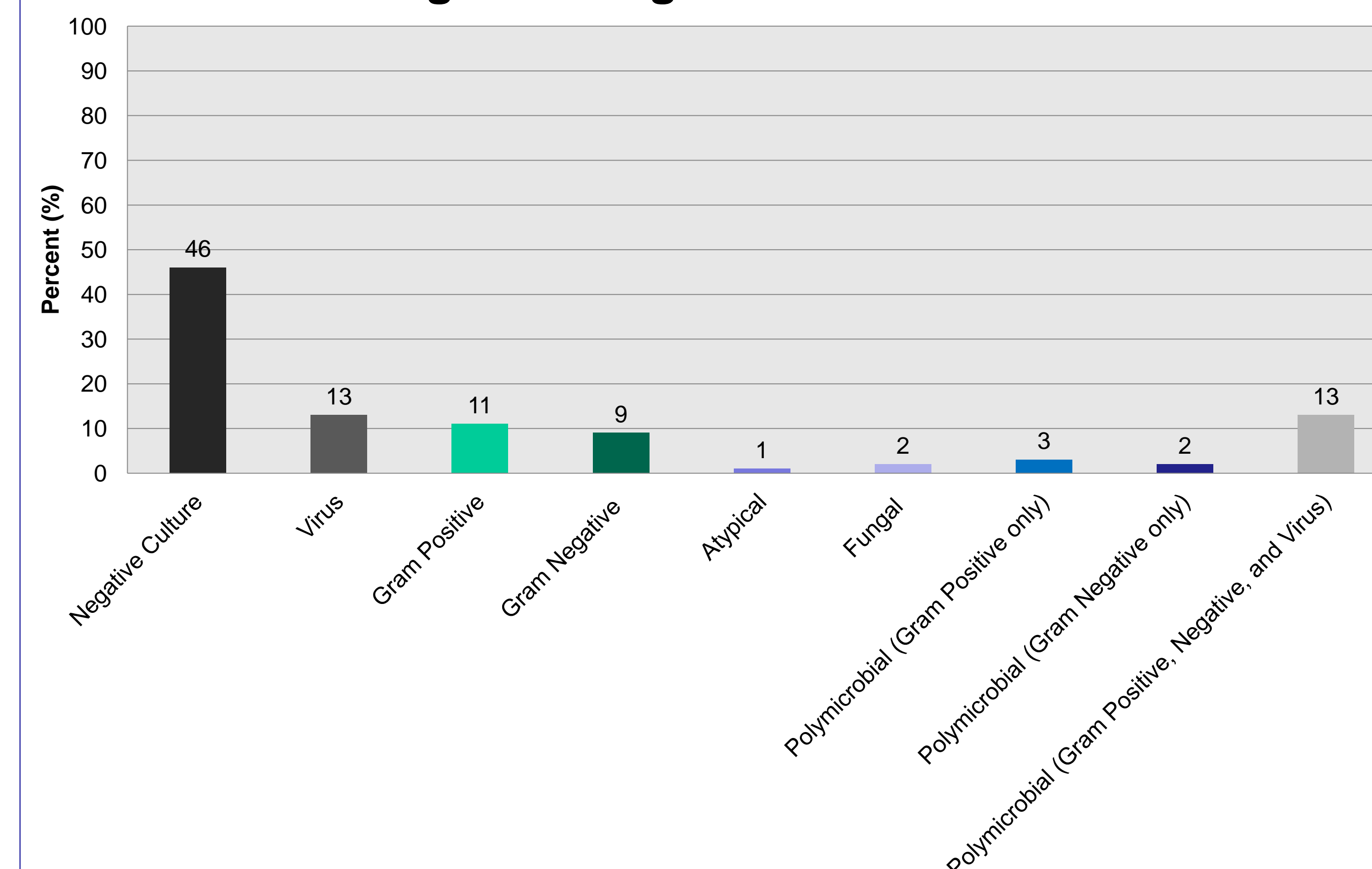


Figure 2. Gram Positive Organisms

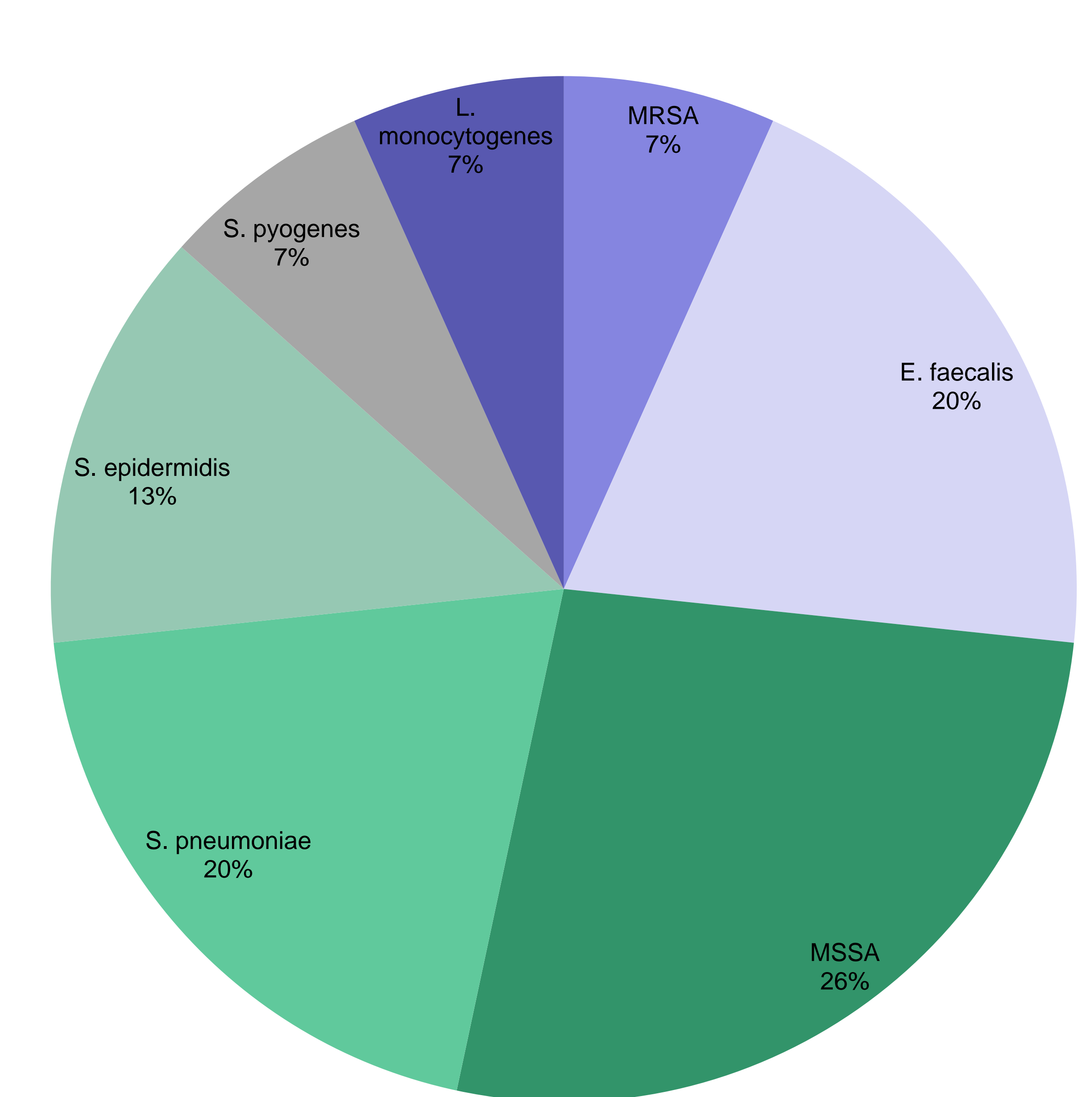


Table 2: Vancomycin Usage

Outcome	Median (IQR)
Vancomycin Dose	58.7 (41.3-60) mg/kg/day
Vancomycin Duration	2 (1-2.5) days

Table 3: Adverse Effects

Outcome	N = 143 (%)
Red-Neck Syndrome	5 (4)
Ototoxicity	0 (0)
Nephrotoxicity	2 (1)

## Conclusions

- The majority of the time, vancomycin was used appropriately and was stopped as soon as culture results were available to guide targeted therapy
- Adverse effects were minimal
- Future studies and discussion needed to determine if vancomycin is still required for empiric sepsis management

