

# *Appropriate Vancomycin Level Collection in CVICU*

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## *Problem Overview*

In CVICU, only 66% of vancomycin levels are collected appropriately, and this rate has been declining from April to December 2016. This is defined as either being collected within 60 minutes of the scheduled collection time, or within 120 minutes for Early AM levels. Inappropriately drawn levels lead to inaccurate dosing and treatment decisions, which may result in undertreating infections, increased antimicrobial resistance, and increased risk of adverse effects.

## *Aim Statement*

Increase appropriately collected vancomycin levels in CVICU from 66% to 80% by April 2017

## *Project Scope*

- Patients on vancomycin in CVICU
- Excludes any patients without vancomycin levels (i.e., those on post-operative prophylaxis)
- Will not assess appropriateness of order or vancomycin dosing

## *Business Case*

A vancomycin level drawn after the scheduled time could actually be supratherapeutic, potentially resulting in nephrotoxicity if the dose is not properly adjusted. Vancomycin-induced nephrotoxicity has been associated with a 46% increase in length of stay and a 17% increase in hospital cost. A vancomycin level drawn before the scheduled time may actually be subtherapeutic, potentially resulting in undertreating the infection. This may ultimately lead to increased antimicrobial resistance, which has been associated with an increased cost of \$18,588 to \$29,069 per patient, and increase in length of stay of 6.4 to 12.7 days, and an increase in mortality of 6.5%.

## *Pre-Intervention Data Analysis*

*Comparison of all HVI units*

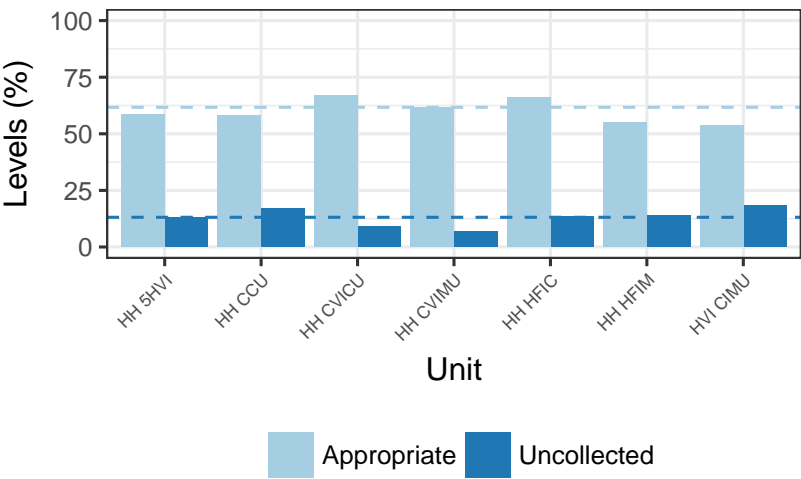


Figure 1: Appropriately Collected and Uncollected Vancomycin Levels

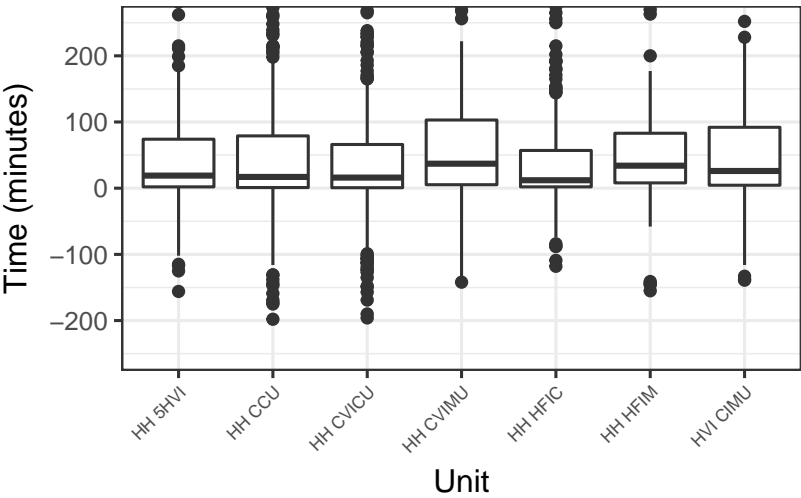


Figure 2: Time Difference Between Scheduled and Actual Level Collection

Table 1: Defects per Million Opportunities

event.unit	units	defects	opportunities	dpo	dpmo	sigma
HH 5HVI	395	163	1	0.4126582	412658.2	1.625
HH CCU	587	247	1	0.4207836	420783.6	1.625
HH CVICU	561	186	1	0.3315508	331550.8	1.875
HH CVIMU	242	93	1	0.3842975	384297.5	1.750
HH HFIC	456	154	1	0.3377193	337719.3	1.875
HH HFIM	135	61	1	0.4518519	451851.9	1.500
HVI CIMU	230	107	1	0.4652174	465217.4	1.500
HVI	2606	1011	1	0.3879509	387950.9	1.750

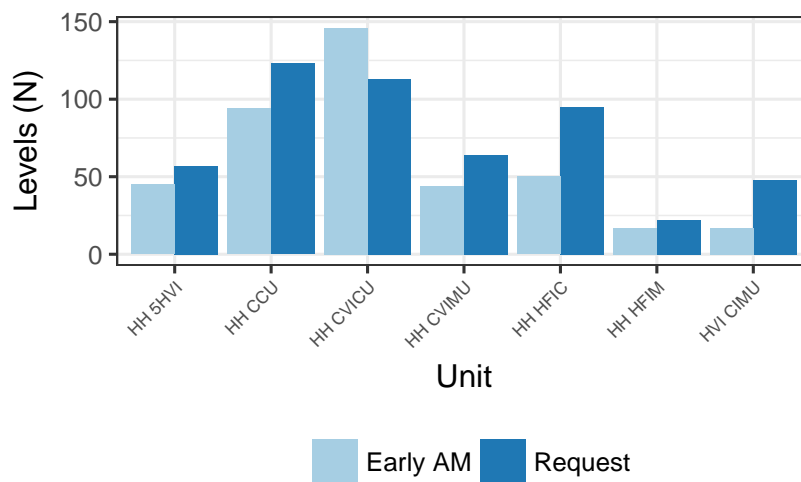


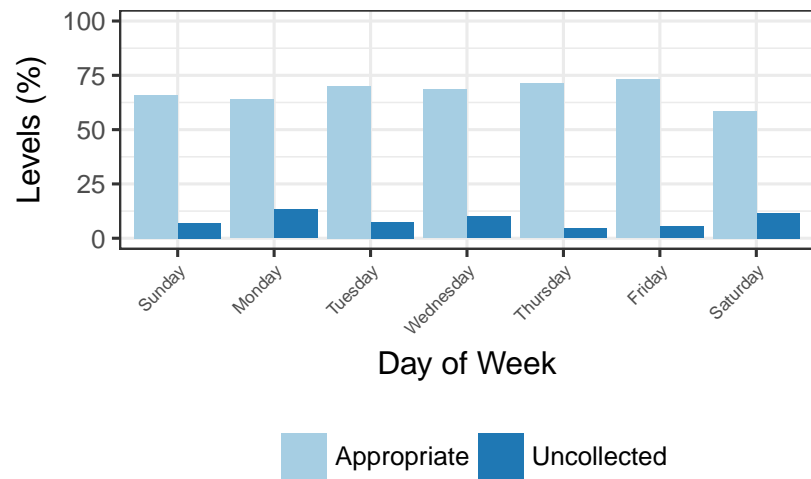
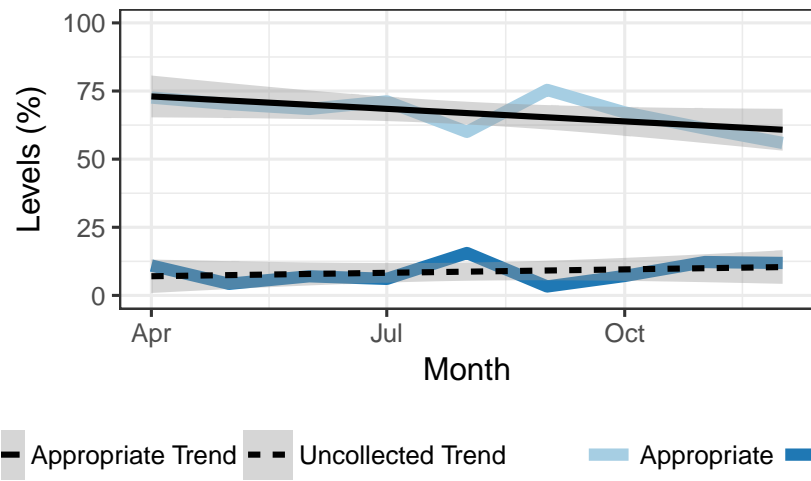
Figure 3: Orders for Early AM or by Vancomycin Request

Vancomycin level requests are excluded from the analysis of appropriate collection. Vancomycin levels ordered as Early AM are considered appropriate if they are drawn at 0300 plus/minus 120 minutes.

### CVICU Levels

Table 2: Vancomycin Levels in CVICU by Nursing Shift

	day	night	p
n	286	266	
appropriate = TRUE (%)	169 (59.1)	200 (75.2)	<0.001
uncollected = TRUE (%)	35 (12.2)	13 (4.9)	0.004



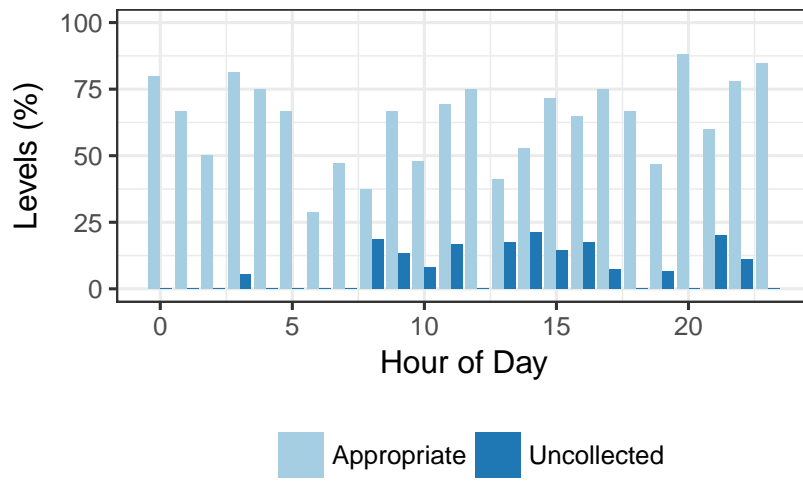


Figure 6: Levels Appropriately Collected and Uncollected by Hour of Day

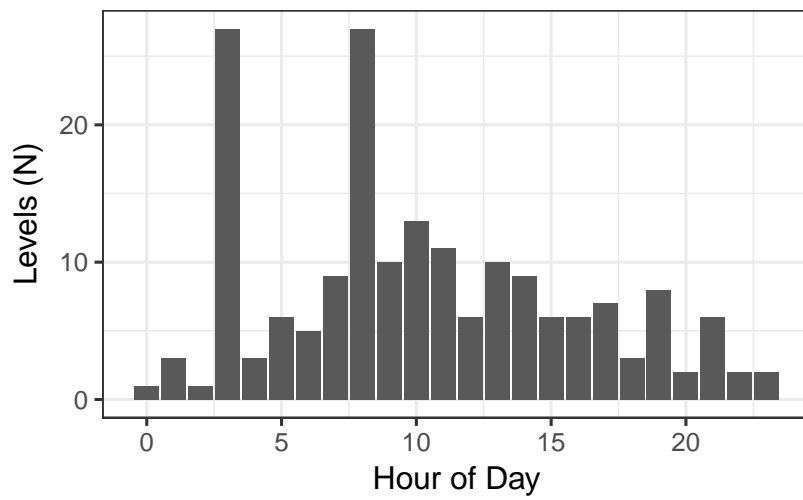


Figure 7: Number of Untimely Levels by Hours of Day