Appropriate Vancomycin Level Collection in CVICU

CS&E Project

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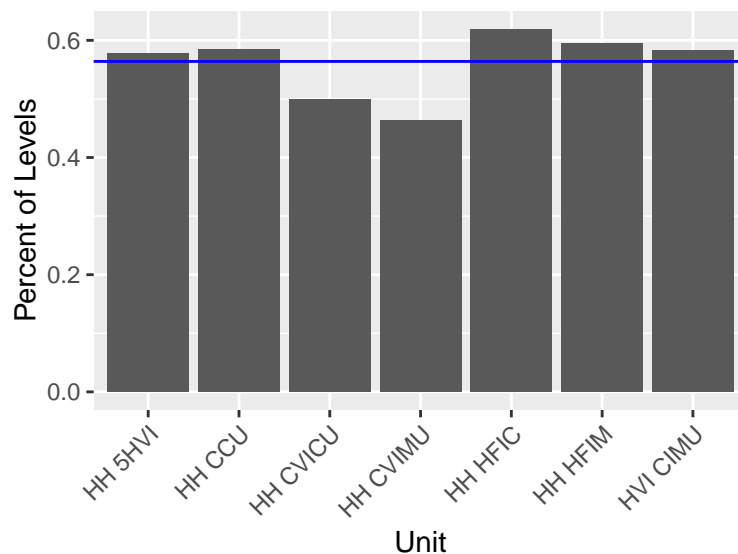
November 10, 2016

Result Summary

Figure 1: Appropriately Collected Vancomycin Levels

- Blue line represents HVI average

Warning: Removed 301 rows containing non-finite values (stat_boxplot).

Raw Data

Table 1: Raw Data for HVI and CVICU

	HVI	CVICU
n	1886	448
not_collected = TRUE (%)	295 (15.6)	113 (25.2)
timely90 = TRUE (%)	1189 (63.0)	258 (57.6)
timely60 = TRUE (%)	1044 (55.4)	224 (50.0)
timely30 = TRUE (%)	775 (41.1)	166 (37.1)
collect_detail_diff (mean (sd))	105.78 (387.53)	64.13 (233.15)
priority (%)		
- Add-on	12 (0.8)	1 (0.3)
- Add-on ST	18 (1.1)	2 (0.6)
- Routine	429 (26.9)	127 (37.8)
- Stat	445 (27.9)	70 (20.8)
- Timed Study	693 (43.4)	136 (40.5)

	HVI	CVICU
shift = night (%)	838 (44.6)	200 (44.7)

Orders Placed by Vancomycin Request

Table 2: Orders by Vancomycin Request

	HVI	CVICU
n	181	40
shift = night (%)	48 (26.5)	9 (22.5)

Exploration of CVICU Levels

By Shift

Table 3: Vancomycin Levels in CVICU by Nursing Shift

	day	night	p
n	247	200	
appropriate = TRUE (%)	104 (42.1)	120 (60.0)	<0.001
not_collected = TRUE (%)	98 (39.7)	15 (7.5)	<0.001

By Month

Table 4: Vancomycin Levels in CVICU by Month

	2016-04-01	2016-05-01	2016-06-01	2016-07-01	2016-08-01	2016-09-01	p
n	96	68	71	77	45	77	
appropriate = TRUE (%)	39 (40.6)	28 (41.2)	36 (50.7)	45 (58.4)	25 (55.6)	44 (57.1)	0.159
not_collected = TRUE (%)	31 (32.3)	24 (35.3)	18 (25.4)	15 (19.5)	8 (17.8)	16 (20.8)	0.069
shift = night (%)	48 (50.0)	33 (48.5)	27 (38.0)	36 (46.8)	16 (35.6)	34 (44.2)	0.647

By Day of Week

Table 5: Vancomycin Levels in CVICU by Day of Week

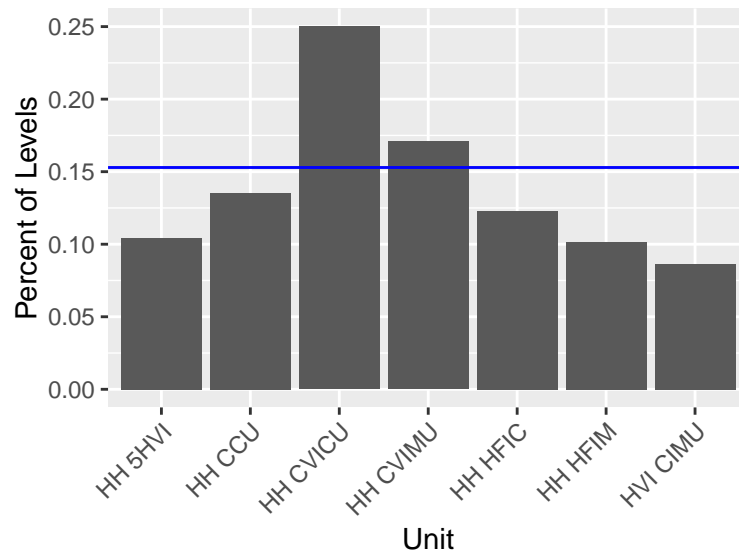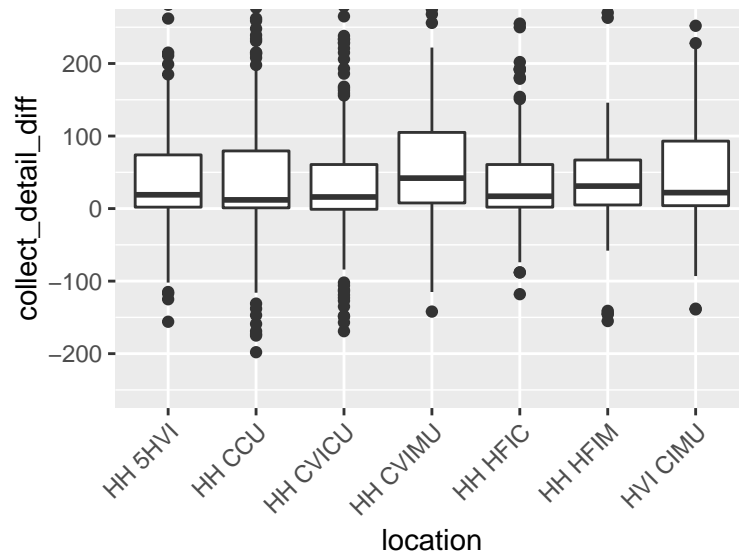|	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	p
n	77	59	64	55	56	67	69	
appropriate = TRUE (%)	37 (48.1)	27 (45.8)	33 (51.6)	27 (49.1)	29 (51.8)	35 (52.2)	36 (52.2)	0.987
not_collected = TRUE (%)	23 (29.9)	16 (27.1)	12 (18.8)	18 (32.7)	13 (23.2)	17 (25.4)	14 (20.3)	0.536
shift = night (%)	30 (39.0)	32 (54.2)	33 (51.6)	24 (43.6)	24 (42.9)	26 (38.8)	31 (44.9)	0.486

Figure 2: Vancomycin Levels Ordered But Not Collected

Figure 3: Time Difference Between Scheduled and Actual Level Collection

By Hour of Day

```
## Warning: Removed 1 rows containing non-finite values (stat_count).
```


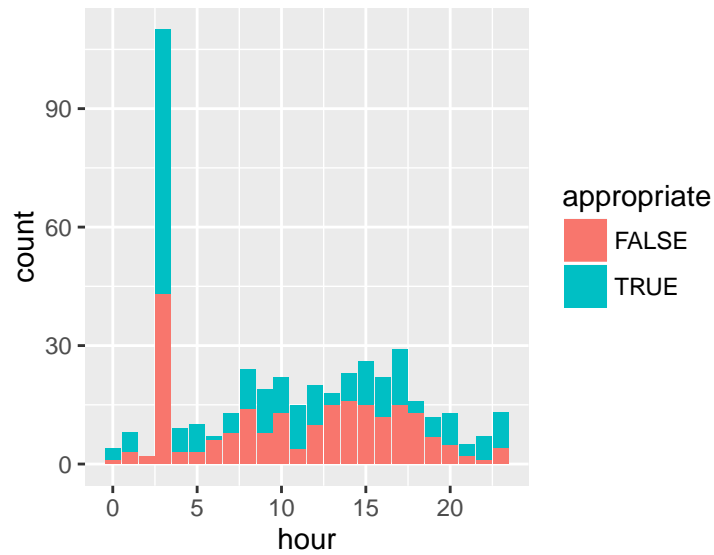Figure 4: Appropriately vs. Inappriately Collected Levels by Hour of Day

```
## Warning: Removed 1 rows containing non-finite values (stat_count).
```
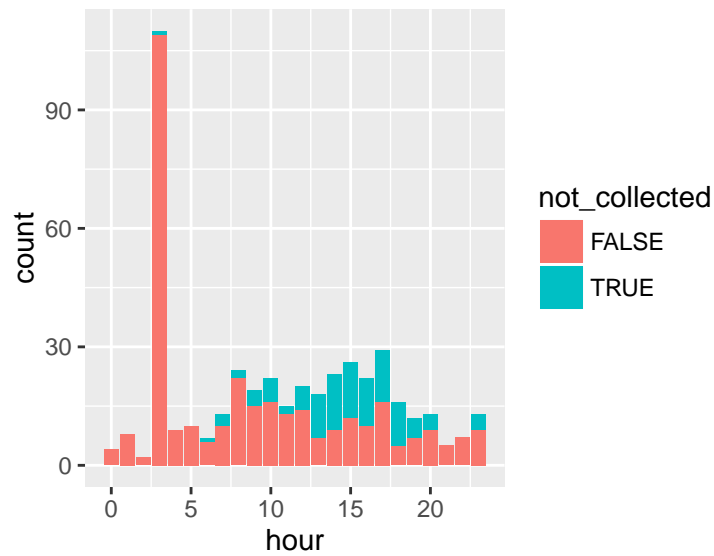

Figure 5: Collected vs. Un-Collected Levels by Hour of Day

Timing

Distribution of difference between desired draw time and actual draw time.

```
## Warning: Removed 114 rows containing non-finite values (stat_density).
```
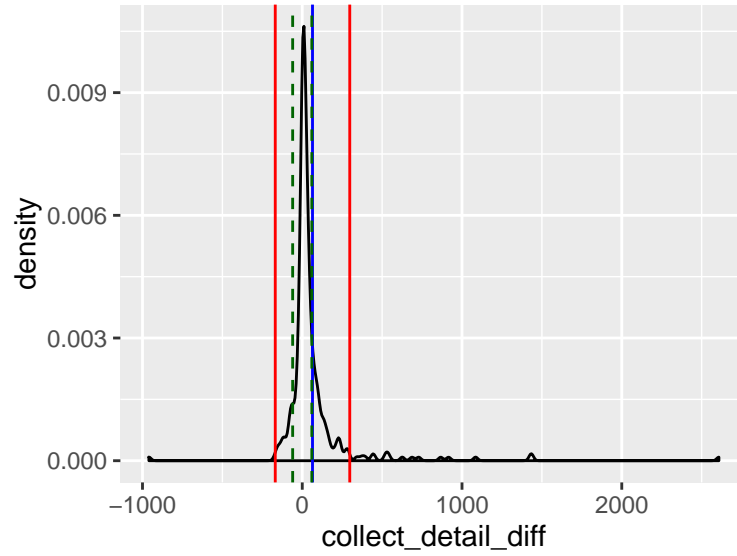
Figure 6: Distribution of Time Difference Between Desired and Actual Collection

- Blue line represents mean
- Red lines represent standard deviation
- Green dashed lines represent 60 minutes
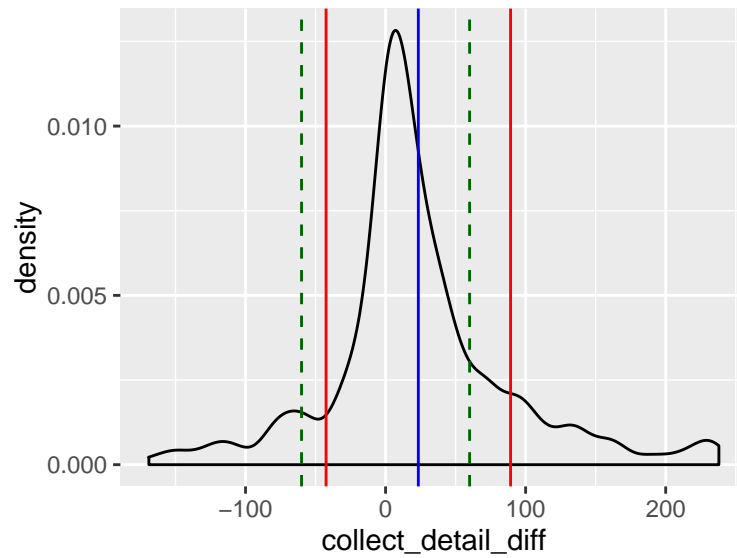
Remove extreme outliers

Figure 7: Distribution of Time Difference Without Outliers

Relationship between how far in advance the level was ordered, and how close to desired draw time the level was actually drawn.
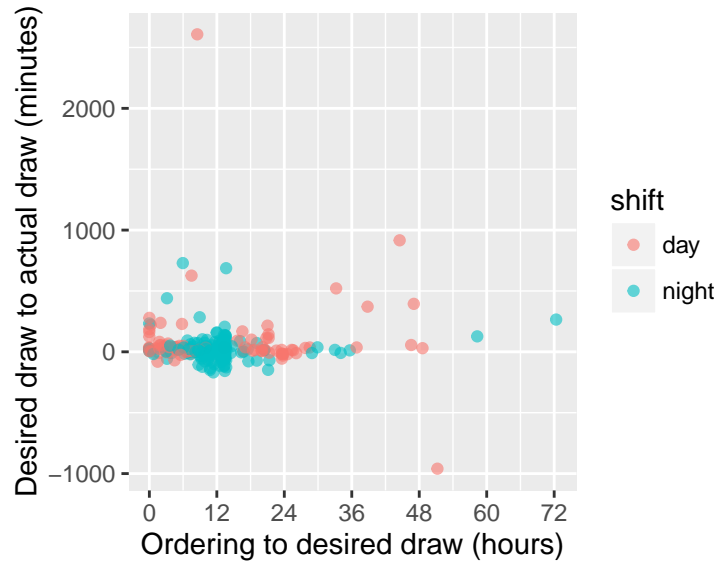
Figure 8: Time from order to draw vs. time to actual draw

Time Differences

Time (in minutes) between when levels was scheduled to be drawn and when it was actually drawn.

By Shift

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## Warning: Removed 114 rows containing non-finite values (stat_boxplot).
```
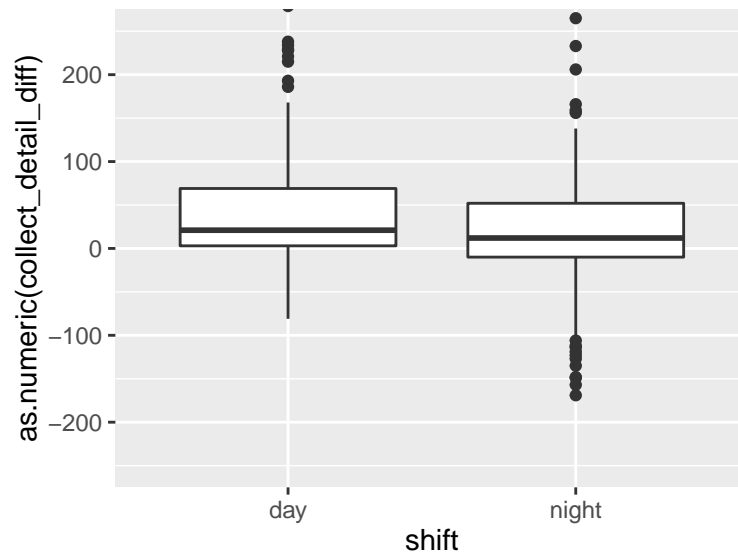

Figure 9: Time Difference Between Scheduled and Actual Level Collection

```
## 
##  Welch Two Sample t-test
## 
## data:  collect_detail_diff by shift
## t = 1.812, df = 226.61, p-value = 0.07131
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   -4.273111 101.978680
## sample estimates:
##   mean in group day mean in group night
##            91.18792            42.33514
```

Notes

- There are automatic vancomycin requests created by a Discern Advisor
  - Unclear where this is generated from
  - Request detail was usually several days prior to the order date
- Levels ordered as Early AM generate a child order with a scheduled time of 0300 the following day
  - The parent Early AM order was removed from this analysis due to an invalid scheduled collection time