Operating Room Utilization: Analysis of Nights and Weekends.

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Operating Room Utilization: Analysis of Nights and Weekends

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Introduction

With increasing public demand for efficiency and decreased costs, the operating room (OR), is coming under increased scrutiny.[1] Despite the focus of improving utilization and productivity, many operating rooms have resisted change.[2] At most hospitals, the OR suite is filled to capacity between approximately 7am and 3pm, followed by a necessary "wind-down" time which extends to accommodate the inherent unpredictability of operative times.[3]

Problem Statement

In patients requiring surgery, how has the operating room utilization during "off-peak" hours (weeknights: Monday, Tuesday, Wednesday, Thursday 5p-7a; weekend: Fri 5p –Mon 7am) changed since implementation of the *Coordination of Care Improvement Project* at Lehigh Valley Health Network?

Methods

A retrospective review of night and weekend operating room utilization at the Lehigh Valley Hospital, Cedar Crest (LVHCC) after the implementation of the new electronic health record system, EPIC.

All operations were reviewed from August 2015 - January 2017; with patient information limited to age and gender.

- **Inclusion criteria:**
  - Any operation during "off-peak" hours
- **Exclusion criteria:**
  - All operations between 7am and 5pm, Monday through Friday
  - Any endoscopic procedures
  - Any operations not at LVHCC Main OR.

The months of February to July were excluded due to lack of pairing ability.

Statistical analysis was conducted using a paired t-test during "off-peak" weeknights and weekends.

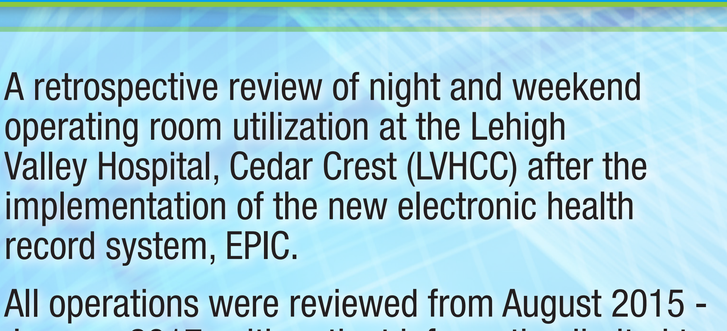


Figure 1. Consort diagram depicting inclusion and exclusion criteria.

Results

Among operations between Aug 2015 and January 2017, we reviewed a total of 59,052 hours during 24,658 operations (Table 1). Of those, 2,360 weekend cases were performed for a total of 4,281 hours of OR usage. Patient demographics were not appreciably different between periods (Table 2). During "off-peak" weeknights, 1,602 cases were performed during 3,014 hours of OR usage. Average night time OR utilization ranged from 5.22 to 11.66 hours. Comparison of weeknight cases showed statistically significant increase in average cases per night (Table 3). No statistically significant increase in cases per month, hours per month, or minutes per case was seen. Analysis of weekend cases showed no significant differences between cases per month, cases per night, cases per day, or average minutes per case (Table 4).

Table 1. Case Details

	Total	%	Period 1	%	Period 2	%
Cases	24658		7725	31.3	8657	35.1
Hours	59051.9		18858.2	31.9	20401.7	34.5
Avg Hours/Case	2.39		2.44		2.36	
Avg Min/Case	143.7		146.5		141.4	
Inpatient Cases	17562	71.2	5610	72.6	6052	69.9
Outpatient Cases	7096	28.8	2115	27.4	2605	30.1
Weeknight Cases	1602	6.5	487	6.3	575	6.6
Weekend Cases	2360	9.6	784	10.1	813	9.4

Table 1. Categorical Case Details. Description of over overall cases, hours of OR time, Inpatient and Outpatient cases, and Weeknight and Weekend breakdown with percentages.

Table 2. Patient Demographics

	Total	%	Period 1	%	Period 2	%
Avg Age	53.9		54.8		53.4	
Avg Adult Age	57.3		58.2		56.8	
Avg Pediatric Age	6.6		6.6		6.7	
Pediatric Cases	1666	6.8	509	6.6	589	6.8
# Male Patients	11909	48.3	3752	48.6	4139	47.8
# Female Patients	12744	51.7	3971	51.4	4516	52.2
# Unknown Gender	5		2		2	

Table 2. Categorical Patient Demographics. Description of average patient age on a case, as well as pediatric vs adult averages.

Table 3. Weeknights

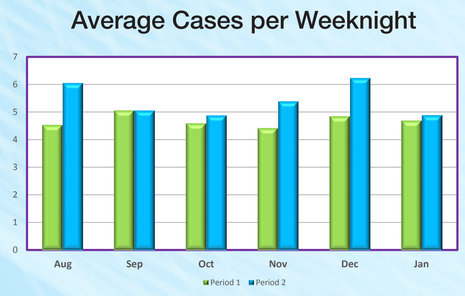
	Period 1	Period 2	Ave Δ	95% CI	P-value
Cases	487	575			
Cases/Month	81	96	14.5	-29.93 to 0.93	0.0605
Cases/Night	4.66	5.45	0.79	1.18 to -0.39	0.0004*
Hours	911.5	1086.6	175.1		
Hours/Month	153.6	181.1	27.51	-74.66 – 16.29	0.1599
Minutes	54691	65196	10505		
Cases/Month	112.3	113.38	1.08	-10.61 to 8.21	0.8023
# InPatient	461	512	51		
# OutPatient	26	63	37		

Table 3. Weeknights – Categorical data for cases performed during Period 1 (PD1) and Period 2 (PD2). Significant p-values designated with (*). Column titled "AVE Δ" is the difference between columns PD1 and PD2.

Table 4. Weekends

	Period 1	Period 2	Ave Δ	95% CI	P-value
Cases	784	813			
Cases/Month	131	136	5	-36.12 to 26.45	0.7076
Cases/Night	4.02	4.32	0.3	-1.13 to 0.52	0.4480
Cases/Day	8.6	9.2	0.6	-1.55 to 0.45	0.2510
Hours	1452.4	1497.25	44.85		
Minutes	87142	89835			
Mins/Case	111.15	110.5	-0.65	-0.15 to 0.19	0.8161
# InPatient	769	801			
# OutPatient	15	12			

Table 4. Weekends. Categorical information regarding cases performed on weekend (Friday 5pm until Monday 7am). Column titled "AVE Δ" is the difference between columns PD1 and PD2.



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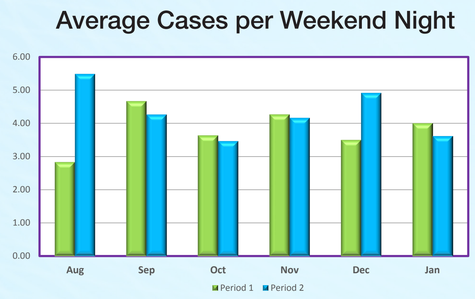

Figure 3. AAverage Cases per Weekend Night. Cases performed between the hours of 5pm and 7am on Friday, Saturday, or Sunday were averaged based on the number of weekend nights per month.

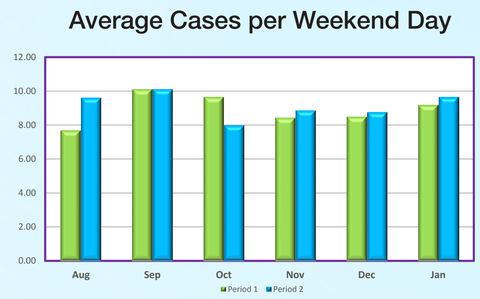

Figure 4. Average Cases per Weekend Day. Cases performed between the hours of 7am and 5pm on Saturday and Sunday were counted and then averaged based on the number of weekend days per month.

Conclusion

Present analysis indicates a small but significant increase in operating room utilization during "off-peak" weeknights. Comparison of weekend operating room utilization showed largely unchanged OR utilization, further supporting the hypothesis that the *Coordination of Care Improvement Project* influenced physician utilization of "off-peak" OR availability, however, absolute causality has not been established. We propose further investigation of practice and specialty types, as well as OR staffing and costs, including OR and patient LOS information, for the described periods would be beneficial in determining whether there was a significant monetary effect on the efficacy of OR practices and patient outcomes.

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