Session Number: P02

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM22

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: Anesthesia Utilization Index

Author Block: **E. Bowe**[1], M. K. Bowe[2], K. A. Findley[3];
[1]Anesthesiology, University of Kentucky, Lexington, KY, [2]Resourceone Medical Billing, LLC, Columbia, SC, [3]UK Medical Center, Lexington, KY.

Abstract Body: INTRODUCTION Currently many hospitals provide support to anesthesia groups for clinical service. A factor contributing to clinical revenue inadequate to meet a group's cost may be failure to use anesthesia services when they are available. METHODS We present a metric, the Anesthesia Utilization Index (AUI), to evaluate utilization of available anesthesia minutes during nominal operating hours. AUI is the ratio of billed anesthesia minutes for all cases in each anesthetizing location divided by the number of minutes service was contractually required within institution-specific prime time. We compared AUI in 5 different institutions - 1 academic medical center (AMC), 1 large community hospital (LCH), 2 small community hospitals (SCH), and 1 office based surgical practice (OBP). Within AMC, which is a tertiary referral center and Level 1 Trauma facility, we compared AUI for the main operating room (MOR), an ambulatory surgery center (ASC), and non-operating room anesthetizing locations. Within LCH we compared AUI between the MOR and 2 ASCs. RESULTS AUI was lower for the SCHs than for the AMC or the LCH; within the AMC AUI was lowest for non-OR procedures and highest for the ambulatory surgery center. There was wide variability in AUI between the 2 ASCs associated with the LCH. DISCUSSION No prior measure compares the number of minutes of OR anesthesia time with available time. Although calculating total ASA units per case, per operating room (OR), or per full time equivalent (FTE) anesthesiologist have been described,[1] none of these measures are focused solely on time. The metric of hours/OR/day has also been described, but according to the methodology used in the article, nights, weekends, and holidays were included in the calculation.[1]

Accordingly that metric does not reflect time used as a function of time available and, if used as an indicator of utilization of available anesthesia time, it will provide a falsely elevated prime time utilization rate of ORs. The Association of Anesthesia Clinical Directors (AACD) Procedural Times Glossary includes Productivity Index, defined as the percentage of prime time hours that a patient is in the OR. This time eliminates Gap Time (the time between cases), Late Start (when a room is scheduled to start later than the beginning of block time), and End of Schedule Gap (when a room is finished before the end of block time). While determining the Productivity Index may be useful to the institution to determine what percentage of available OR time is used, it overlooks circumstances when a patient is in an OR but a bill cannot be submitted for anesthesia services, including a patient in the OR waiting for a PACU bed and patients having procedures under local anesthesia with no anesthesia provider present. Findings of a lower AUI for SCHs than for an AMC are consistent with a study which showed that 62% of community facilities completed the majority of their anesthesia workload by 1:00 PM compared to only 24% of university and large community hospitals.[2] AUI should prove useful in demonstrating that in some situations institutional support is necessary because of inefficiencies from the perspective of the anesthesia group. It is also useful to compare utilization between different facilities, e.g., the difference between LCH ASC #1 and LCH ASC #2 in this study. REFERENCES 1. Abouleish AE, Hudson ME, Whitten CW. Measuring clinical productivity of anesthesiology groups. Anesthesiology 2019; 130:336.2. Dexter F, Dutton RP, Kordylewski H, et al. Anesthesia workload nationally during regular workdays and weekends. Anesth Analg 2015; 121:1600-3.

Table 1. AUI for Different Institutions

Location	AUI
LCH ASC #2	26.2%
CH #1	44.0%
LCH ASC #1	47.6%
CH #2	48.3%
AMC Non-OR Locations	48.6%
AMC Main OR	60.1%
OBS	60.6%
LCH Main OR	65.4%
AMC ASC	73.3%

Abstract Body2:

A low utilization of available anesthesia time adversely affects finances for a group and may contribute to the need for institutional support. The Anesthesia Utilization Index (AUI) calculates percent of available time for which anesthesia charges are rendered. Use of AUI may be useful for comparing institutions, tracking changes over time within an institution, or assessing different services within an institution.

Session Number: P01

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM15

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: Application of an Anesthesia Utilization Index (AUI) for Non-Operating Room Anesthesia (NORA)

Author Block: J. T. Henderson[1], B. C. Sindelar[2], **E. A. Bowe**[3];
[1]University of Kentucky College of Medicine, Lexington, KY, [2]University of Kentucky, Lexington, KY, [3]Anesthesiology, University of Kentucky, Lexington, KY.

Abstract Body:

INTRODUCTION

Providing anesthesia services outside of the operating room (OR) is frequently less efficient than an OR setting. Our impression was that, in our institution, there was a significant difference in different services' utilization rates of available Non-Operating Room Anesthesia (NORA) time. We undertook a study to evaluate the percentage of time allocated to each service that actually generated bills (the Anesthesia Utilization Index, AUI).

METHODS

Utilizing OR management software (OR Manager™, Picis) we tracked the time from "wheels in" to "wheels out" for all cases performed during the time allocated to each service ("block time") from August 2015 to July 2019 in each of the NORA locations. We calculated the AUI by dividing the minutes used by the minutes available. [1] We used the AUI metric to compare utilization rates of NORA services that have allocated block time, including the Cardiac Catheterization Lab (Cath Lab), Diagnostic Radiology (Dx Rad), Endoscopy (Endo), Interventional Radiology (IR), and Radiation Medicine (RadMed), over a 4 year period at our institution. Procedures performed outside of allocated block time were not included in the calculations. The AUIs of each of the services studied were compared using a one-way ANOVA.

RESULTS

Results are shown in the tables and figure below. [Figure 1] Based on the results of the one-way ANOVA in Table 1, there were statistically significant differences at the $p<0.05$ level in anesthesia utilization rates between several of the services studied [$F(4,234) = 78.903$, $p<0.0001$].

Post hoc analysis results, shown in Table 2, show there are significant differences as defined by $q > q_{crit}$ (3.887, k=5, df=238, $\alpha=0.05$) in utilization rates between all services except comparisons between Cath Lab/Rad Med (q=2.031) and Endo/Dx Rad (q=0.384).

DISCUSSION

The AUI metric provides an objective basis for a department and/or hospital administration to respond to requests from NORA services for additional coverage. AUI is more appropriate than traditional OR utilization rate calculations, which track

the percentage of time a patient is in a procedure room regardless of whether anesthesia is being administered. AUI is more appropriate for measuring efficiency of utilization of anesthesia services.

The information can also be used to demonstrate the magnitude of inefficiencies in utilization of anesthesia services. (Ex: In our institution IR commonly schedules procedures performed under local anesthesia in their block time.)

REFERENCES

Bowe EA, Bowe MK, Findley KA. Anesthesia Utilization Index: A Measure of Operating Room Utilization. American Society of Anesthesiologists 2019 Annual Meeting. 2019. http://www.asaabstracts.com/strands/asaabstracts/abstract.htm?year=2019&index=15&absnum=1230

Table 1: ANOVA Results

Groups	*Mean AUI*	*STE*	*Variance*
IR	66.7%	0.020	0.018
Cath Lab	44.4%	0.023	0.025
ENDO	78.6%	0.009	0.004
RadMed	48.2%	0.021	0.021
Dx Rad	79.4%	0.018	0.015

ANOVA

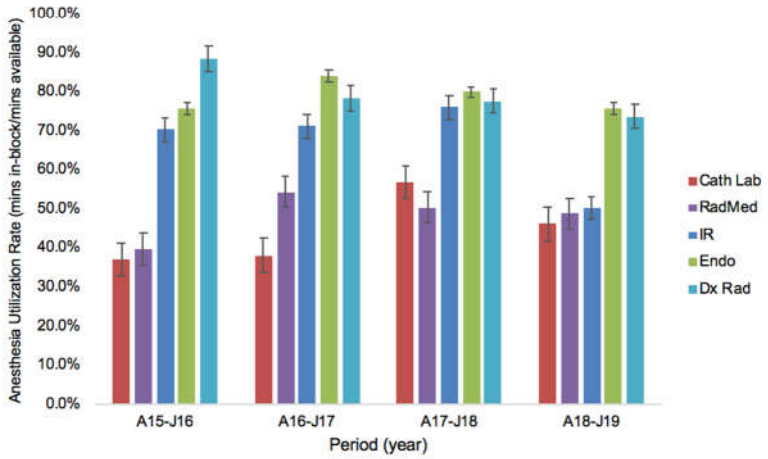
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	F_{crit}
Between Groups	5.227	4	1.307	78.903	0.000	2.410
Within Groups	3.875	234	0.017			
Total	9.103	238				

Table 2: Post-hoc Analysis Results

Groups	*q*
IR, Cath Lab	11.944*
IR, Endo	6.380*
IR, RadMed	9.924*
IR, Dx Rad	6.762*
Cath Lab, Endo	18.421*
Cath Lab, RadMed	2.031
Cath Lab, Dx Rad	18.806*
Endo, RadMed	16.391*
Endo, Dx Rad	0.384
RadMed, Dx Rad	16.775*

*$q > q_{crit}$, which indicates a significant difference between the variances of these groups. $q_{crit} = 3.887$ ($k=5$, $df=238$, $\alpha=0.05$)

Figure 1: Anesthesia Utilization Rate by NORA Type



Abstract Body2:

Providing anesthesia services outside of the operating room (OR) is frequently less efficient than services provided in an OR. We undertook a study to evaluate the percentage of time allocated to various Non-Operating Room Anesthesia (NORA) services that actually generated bills (the Anesthesia Utilization Index, AUI). We found statistical differences between the efficiencies of each of these services and intend for this information to be used to increase productivity.

Session Number:	P02
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM26
Topic 1:	1.1 Quality Improvement
Publishing Title:	Analysis of Medical Cannabis Certification in a Chronic Pain Division of a Large Academic Medical Center
Author Block:	**W. Yin**, T. D. Emerick; UPMC, Pittsburgh, PA.
Abstract Body:	Introduction: Chronic pain clinics continue to see an increase in medical cannabis requests and consultations as more states legalize medical cannabis. Private pain clinic models often charge a large cash fee to certify for medical cannabis. The financial implications of the influx of patients is less clear in a large academic chronic pain division where certification for medical cannabis is only part of each patient's multimodal treatment plan. The goal of this analysis is to quantify the initial experience of this large academic pain division with medical cannabis. Methods: After institutional Quality Improvement (QI) committee approval (#1814), a retrospective review of de-identified patient data was completed for all patients certified for medical cannabis across the chronic pain division from 5/2018 to 9/2018. Data was obtained through EPIC electronic medical record for the four physicians certifying patients for medical cannabis. Results: A total of 1057 patients were certified for medical cannabis. Of these patients, 641 (60.6%) were female while 416 (39.4%) were male. Average age of female patients was 58 (SD of 14.5 years) and male patients was 58 (SD of 13.5). A total of 1903 visits were recorded for patients related to medical cannabis. This included new (1057) and follow up visits (846). On average, 53% (562) of the certified patients had a follow up visit during the data collection period of 5/2018- 9/2018. The highest number of initial visits were in May with 393. Initial monthly visits steadily declined, with only 60 initial visits in 9/2018. Follow-up visits had the opposite pattern with only 58 in May and a peak of 291 in August. Assuming a level 4 outpatient billing for the initial visit, approximately 4624 wRVUs were generated from initial visits. Assuming a level 3 outpatient billing for follow up visits, approximately 820 wRVUs were generated from follow up visits. Discussion: Medical cannabis was legalized in Pennsylvania on April 6, 2016 and became available to purchase from dispensaries on February 15, 2018. Certifications for medical cannabis at this large academic institution began in May 2018. In total, 1057 patients were certified. There was an initial surge of patients in May and June followed by a steady decline in new certifications. This is perhaps due to a group of patients who were enthusiastic early medical cannabis adopters. The patient population itself tended to be female (60.6%) with an average age of 58. This is in line with the general population of chronic pain patients based on a 2016 chronic pain survey[1]. During this 5-month period an estimated 5445 RVUs were generated from medical cannabis. As more states continue to legalize medical

Abstract Body2:

cannabis and both providers and patients become more familiar with it, there may be in a steady increase in the number of certifications. Medical cannabis may certainly play a sizeable role in RVU generation in a chronic pain division as part of an overall multimodal office visit. Limitations: This was a retrospective study with only a five-month period of data collection. This study also does not capture a smaller percentage of patients that were evaluated for medical cannabis but the provider decided not to certify. In addition, the clinical indications for medical cannabis were not assessed. Conclusions: Initial data seems to suggest that there is a demand of medical cannabis among chronic pain patients. A total of 1057 patients were certified for medical cannabis at a large academic institution generating an estimated 5445 RVUs. Further studies are needed to determine the long-term value of medical cannabis to chronic pain clinics. References: 1. Dahlhamer J, Lucas J, Zelaya, C, et al. Prevalence of Chronic Pain and High-Impact Chronic Pain Among Adults — United States, 2016. MMWR Morb Mortal Wkly Rep 2018;67:1001-1006. DOI: http://dx.doi.org/10.15585/mmwr.mm6736a2external icon.

Medical cannabis is becoming more common as states legalize medical cannabis. The initial experience of this large academic pain division with medical cannabis shows strong patient interest. A total of 1057 patients were certified for medical cannabis at a large academic institution generating an estimated 5445 RVUs over a 5 month period.

Session Number: P01

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM12

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: Factors Influencing PACU Holds: A Single Institution Investigation

Author Block: **B. Barrett**[1], B. C. Sindelar[2], E. A. Bowe[2];
[1]Mayo Clinic Alix School of Medicine, Rochester, MN, [2]Anesthesiology, University of Kentucky College of Medicine, Lexington, KY.

Abstract Body: **Introduction:** We defined a "post-anesthesia care unit (PACU) hold" as a period of time spent in an operating room (OR) caring for a patient due to limitations of PACU bed availability. PACU holds can result in delays of future surgical cases, unnecessary use of hospital resources, worse patient and physician satisfaction scores, and increased hospital costs due to loss of high value OR time.[1] High rates of PACU holds (days with >20% of OR cases being placed on PACU Holds[2]) occur at our institution. Our study aimed to identify areas contributing to PACU holds. **Methods:** We reviewed OR and PACU census data over a 3-month period (04/01/2019 - 07/05/2019), excluding weekends and holidays. Utilizing a perioperative database (Operator Manager ™, Picis), for each day we determined the number of PACU Holds (#Holds); the number of PACU boarders (#Boarders), defined as patients who remained in the PACU awaiting a bed either on the floor or in an intensive care unit (ICU); duration of PACU Holds (Hold Duration); duration of time patients spent boarding in PACU (Boarder Duration); and the number of cases (#OR Cases). We also determined the number of hospital beds closed daily (#Closed) at 0800. Correlation coefficients (r) were calculated for each comparison. The frequency of PACU Holds over the 70-day dataset was calculated with 95% binomial confidence intervals. **Results:** Our calculations found a high rate (35.71%, CI: 24.6- 48.1) of PACU holds. Table 1 presents the correlation coefficients with the associated p value for each of the comparisons. As demonstrated in the table, the p value was less than .01 when comparing the #Boarders vs. #Holds, #Boarders vs. Hold Duration, #OR Cases vs. #Boarders and #OR Cases vs. Boarding Duration. We also compared #Closed vs. #Holds, #Closed vs. Hold Durations, #Closed vs. #Boarders, and #Closed vs. Boarding Duration but these correlations were not statistically significant. **Conclusions:** Our institution commonly experiences closures of hospital beds due to staffing. Since physical beds are essentially always available in the PACU when a patient is on PACU hold, it is evident that PACU staffing contributes to PACU holds. The high rate of PACU holds at our institution appears to be unrelated to the number of closed beds but still maintains a correlation with #Boarders. This indicates a need for further investigation into upstream obstacles to transferring patients from the PACU or increasing PACU bed availability by increasing nursing resources. Our study is limited in that data were not consistently available for the number of beds

closed at 1100, a time which has been used in other studies to reflect the availability of floor beds when patients are more likely to be transferred from PACU. Future studies should track if PACU Holds are more prevalent during specific times of the day in order to effectively schedule PACU nursing staff during those times to reduce the number of PACU Holds and their duration.

Table 1

Variables	Correlation Coefficient (r-value)	P value
# OR Cases vs. # Boarders	0.659	<.0001
# Boarders vs. Hold Durations	0.367	.0009
# Boarders vs. # Holds	0.356	.001
# OR Cases vs. Boarding Duration	0.284	.009
# Closed vs. # Boarders	-0.114	.173

Abstract Body2:

Post-anesthesia care units (PACU) holds, defined as a period of time spent in an operating room caring for a patient due to limitations of PACU bed availability, can result in delays of future surgical cases, unnecessary use of hospital resources, worse patient and physician satisfaction scores, and increased hospital costs due to loss of high value operating room (OR) time. For our study, we reviewed OR and PACU census data over a 3-month period and calculated correlation coefficients between multiple variables affecting PACU planning in order to identify areas contributing to the high rates of PACU holds at our institution. Our results, showed multiple statistically significant correlations that can be targets for future quality improvement projects.

Session Number:	P01
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM16
Topic 1:	1.4 Research in Perioperative Management
Publishing Title:	Outpatient Ketamine Infusion Program Cost Analysis in a Large Academic Medical Center Department of Anesthesiology
Author Block:	**D. Bintrim**, S. Morrissey, C. Law, M. Johnson, M. E. Hudson, A. D. Wasan, T. D. Emerick; UPMC, Pittsburgh, PA.
Abstract Body:	Introduction: Outpatient intravenous ketamine infusion programs have been gaining popularity as a treatment option for patients with specific chronic neuropathic pain diagnoses. These programs are often supported under private practice models and are variable in duration and in infusion parameters. While there is emerging evidence for the use of outpatient ketamine infusions, the financial aspects of the implementation of such a program at a large academic medical center are poorly described. Our institution began offering outpatient ketamine infusions to select chronic pain patients starting in January 2018. This analysis is designed to describe the financial impact of instituting a ketamine infusion program at an academic medical center. Methods: Patients included in our retrospective review were those who underwent a ketamine infusion from January 1, 2019 through August 12, 2019. Data obtained included reimbursement data from a variety of private and government based payers for services furnished from both hospital and physician based sources. Costs data reviewed included direct cost for supply items, pharmaceutical expenses, and salary expenses for running each infusion. Indirect costs, including infrastructure, facility, and support expenses were not evaluated. There were no known physician related opportunity costs associated with infusions at our institution. Results: Evaluation of accounts reviewed for the study period demonstrated a mean payment of $556 per patient infusion for both hospital and physician services rendered. This mean payment was enough to satisfy all direct costs evaluated for each infusion. Discussion: There is growing support for the use of outpatient ketamine infusion programs as a non-opioid treatment option for patients with chronic pain. While this study is limited by a small study population reviewed over a brief period of time, our analysis indicates that a ketamine infusion program with a diverse payer mix is able to provide a novel treatment modality for patient with chronic pain without being a financial burden on the performing organization. Furthermore, offering an additional treatment modality to patients with chronic pain can have added financial benefits related to improving patient pain outcomes and satisfaction, while also increasing patient censuses for academic pain clinics. Consideration should also be made for potential patient safety and

Abstract Body2:

cost-reducing benefits of reduced patient opioid consumption with the implementation of an outpatient ketamine infusion program, though further study is needed in this area.
Conclusion: Our data shows that establishment of an outpatient ketamine infusion program can offer patients an additional treatment option without negative financial impact on an academic medical center with potential downstream opportunities related to reduction in opioid consumption and improved patient satisfaction.
This study describes the financial implications of instituting an outpatient ketamine infusion program for chronic pain patients at an academic medical center. Payment data is described demonstrating that such a program can be created without being financially burdensome on the organization providing infusions.

Session Number: P01

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM09

Topic 1: 1.3 Challenging Cases and their Innovative Solutions in Practice Management

Publishing Title: Using FaceTime for Preoperative Anesthesia Consultations for Office-Based Fertility Procedures

Author Block: **K. Cobb**;
Anesthesiology, UNC, Chapel Hill, NC.

Abstract Body:

Background: The patients who present at our office-based fertility clinic are generally healthy, working individuals. Some also travel long distances to reach these services. Fortunately, these patients tend to be of generations that readily use Smartphones.

Most patients undergo deep sedation or general anesthesia with native airway, and propofol as the main anesthetic for oocyte retrievals or sperm extractions. To best prepare for a safe anesthetic at this clinic, all patients with body mass index (BMI) >35 are evaluated by an anesthesiologist prior to their procedure. Typically, patients meet with an anesthesiologist and undergo a routine preoperative assessment. However, many would agree that a cardiopulmonary exam is not always necessary, and that visual inspection of the patient's airway and weight distribution are most useful in determining appropriateness of anesthesia for patients with an elevated BMI.

In order to obtain valuable information for our anesthesiologists and provide significant convenience to these patients, we started offering FaceTime (proprietary video-telephony by Apple[1]) consultations to patients with compatible technology.

Methods: ASA I or II patients with a BMI >35 and FaceTime capability are emailed about the option of doing their consultation remotely. The consultation is initiated on a healthcare system-owned, encrypted iPhone, and takes about 5-10 minutes.

Results: Over the past 8 months, 8 female patients were identified as having a BMI >35 and access to FaceTime. One of these 8 patients opted for an in-person consultation. One additional female patient was evaluated for a history of heavy snoring. One male patient was evaluated for snoring and presence of a beard, and another male for BMI =34. There were zero case cancellations or delays. There were no reports of dissatisfied patients, fertility physicians or anesthesiologists. Reasons for selecting the FaceTime option included distance from the clinic, job/childcare responsibilities, and general preference.

Discussion: Telemedicine is not widely used in anesthesiology, but it is not a new concept.[2] The first reported cases of its use date back to 2004.[3] Both patients and anesthesiologists reported high satisfaction with the experience. Of our patients offered a FaceTime consult, only one requested an in-person exam. Reasons for declining this option may be lack of familiarity with the technology or preference

for a tangible human interaction.[2]

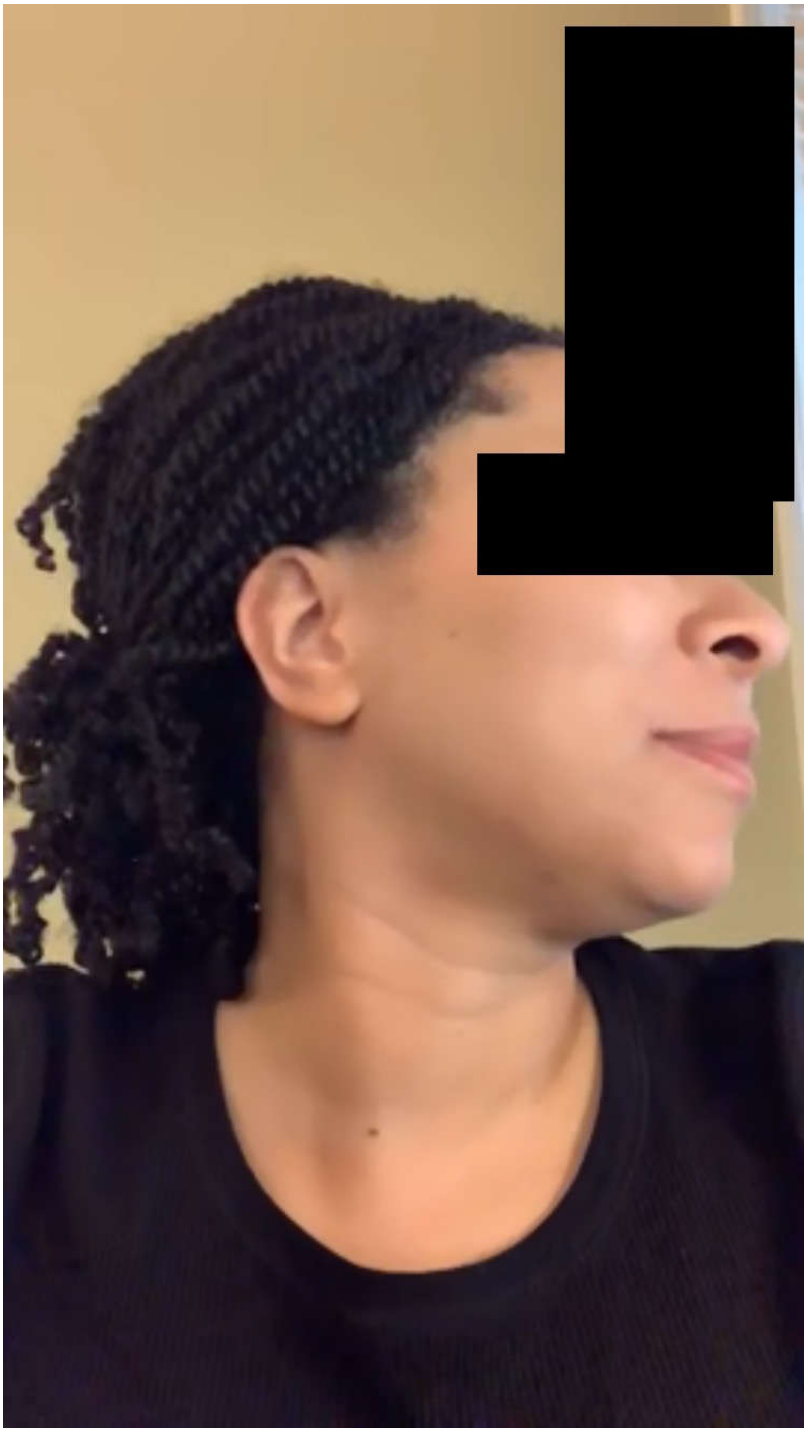
Video-telephony provides similar interaction capabilities to an in-person exam, including obtaining a history and visual evaluation of the patient's airway, discussion of the anesthetic plan, as well as time and cost savings to the patient. In the near future, we hope to expand our ability to offer this service to patients with other Smartphones.

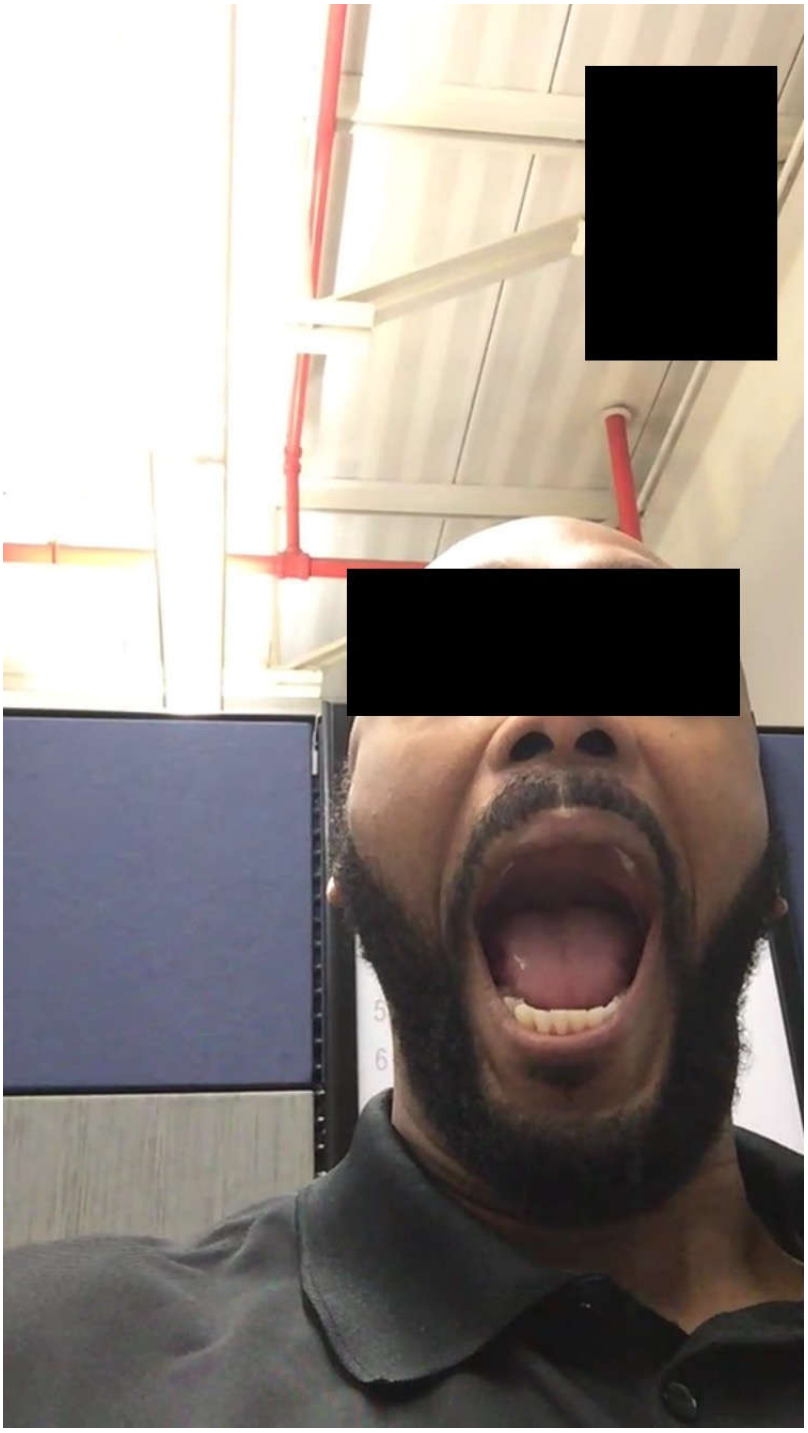
Photos produced with permission.

1.
"FaceTime." https://en.wikipedia.org/wiki/FaceTime

2.
Bridges KH1, McSwain JR, Wilson PR. To Infinity and Beyond: The Past, Present, and Future of Tele-Anesthesia. Anesth Analg. 2019 Aug 6

3.
Wong DT, Kamming D, Salenieks ME, Go K, Kohm C, Chung F. Preadmission anesthesia consultation using telemedicine technology: a pilot study. Anesthesiology. 2004;100:1605-1607





Abstract Body2: Smartphone video consultation for preoperative assessment of generally healthy patients undergoing minor procedures can provide an adequate evaluation for the anesthesiologist and significant convenience to the patient.

Session Number:	P00
Session Title:	Practice Management 2020 Poster Judging
Presentation Number:	PM03
Topic 1:	1.4 Research in Perioperative Management
Publishing Title:	Staffing and Surgical Anesthesia Productivity of Surgical Facilities in Academic Anesthesiology Departments: 2019 SAAAPM Report on Productivity
Author Block:	**M. Hudson**[1], A. E. Abouleish[2], C. W. Whitten[3]; [1]University of Pittsburgh, Pittsburgh, PA, [2]University of Texas Medical Branch, Galveston, TX, [3]UT Southwestern Medical Center, Dallas, TX.
Abstract Body:	Measuring clinical productivity of anesthesiology groups is challenging due to staffing model differences making "per FTE" measurements of limited or no use. Meaningful conclusions can only be done with measurements and data reported by facility.(1,2) Further benchmarking requires national survey data which is not readily available. In this study, we performed a survey of staffing and surgical anesthesia productivity to provide national benchmarking data. Methods. In conjunction with Society of Academic Associations of Anesthesiology and Perioperative Medicine (SAAAPM), an electronic survey was sent to academic anesthesiology department chairs in March 2019 and closed June 2019. The survey collected information at the facility level, including type of facility, staffing model, number and type of clinicians needed each weekday, and yearly number of anesthetizing sites, cases, billed total ASA units, and time units. Abbreviations and formulas can be found in the 2019 Review.(2) Results. Of the 135 SAAAPM members, 63 submitted surveys (47% response rate) for 156 facilities. 16 facilities were excluded due to incomplete data in the billing or cases done. Of the remaining 140 facilities, the median values are shown in Table 1 (by facility type) and Table 2 (by number of anesthetizing sites). Residents are working mostly in AMC and Children's hospitals. (Table 3) The prevalence of in-house call faculty is related to number of ORs with all facilities with 20 or more ORs having an in-house faculty. (Figure) Discussion. As has been previously reported, facility type and size (number of sites) impact the surgical anesthesia productivity. Further, surgical duration (h/case) is a major determinant of hourly productivity (tASA/h). Staffing ratio was lowest at Children's hospitals and highest among ASC and Community. References: 1. Anesth Analg 2003;96:802-812 2. Anesthesiology 2019;130:336-48

Table 1: Median Values: By Facility Type

	All Facilities	AMC	Community	Children	ASC
n	140	69	26	7	38
Total Anes Sites	15.1	39.0	7.5	17.0	3.0
% NORA non GI	8%	12%	0%	27%	0%
% NORA GI	7%	9%	10%	0%	0%
% NORA total	18%	21%	16%	29%	0%
DAY Anesthesiologist	8.0	21.0	4.0	10.0	1.8
sites/MD	1.9	1.8	2.0	1.6	2.0
tASA/case	13.9	15.9	12.0	13.9	8.8
Base/case	5.8	6.3	5.3	6.3	4.4
h/case	2.0	2.3	1.9	2.0	1.1
h/OR/d	6.5	7.3	5.8	6.3	4.4
case/OR/d	3.2	3.1	3.4	3.0	3.7
tASA/OR	11,546	12,592	11,164	12,364	8,911
tASA/h	7.0	6.8	7.2	7.3	7.8

For abbreviations and formulas, see Table 1 in Anesthesiology 2019;130:336-48

Table 2: Median Values: By Number of Anesthetizing Sites (ORs)

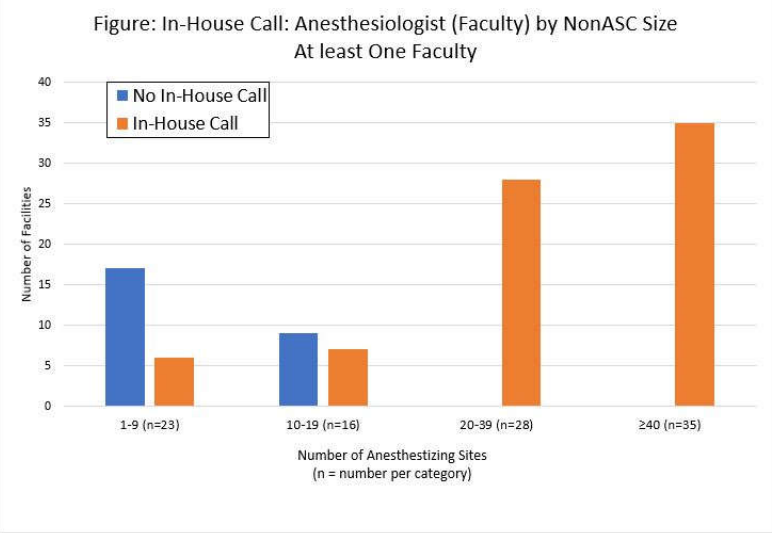
	All Facilities	ASC	ASC<10*	nonASC <10	nonASC 10-19	nonASC 20-39	nonASC ≥40
n	140	38	34	23	16	28	35
Total Anes Sites	15.1	3.0	3.0	7.0	13.5	30.0	57.8
% NORA non GI	8%	0%	0%	0%	17%	13%	13%
% NORA GI	7%	0%	0%	3%	6%	9%	9%
% NORA total	18%	0%	0%	11%	23%	21%	22%
DAY Anesthesiologist	8.0	1.8	1.0	3.0	7.5	16.4	31.0
sites/MD	1.9	2.0	2.0	2.0	1.8	1.8	1.9
tASA/case	13.9	8.8	8.7	12.8	14.6	14.5	16.1
Base/case	5.8	4.4	4.3	5.1	6.2	5.9	6.7
h/case	2.0	1.1	1.1	2.0	2.1	2.2	2.4
h/OR/d	6.5	4.4	4.5	5.7	7.0	7.5	7.1
case/OR/d	3.2	3.7	4.1	3.0	3.2	3.3	3.1
tASA/OR	11,546	8,911	9,019	11,452	12,746	12,719	12,290
tASA/h	7.0	7.8	7.6	7.2	7.2	6.7	6.9

For abbreviations and formulas, see Table 1 in Anesthesiology 2019;130:336-48

Table 3: Anesthesia Staffing at the Beginning of the Day (Day Staff)

	AMC n=69	ASC n=38	Children n=7	Community n=26
MD Only: No Resident or CRNA/CAA	0	7	0	3
Resident but no CRNA/CAA	0	0	0	2
CRNA/CAA but no Resident	2	24	0	14
Both Resident and CRNA/AA	67	7	7	7

CRNA =nurse anesthetist, CAA = anesthesiologist assistant



Abstract Body2:

The 2019 SAAAPM survey shows increases in number of facilities with > 40 sites, and number of facilities per department (ASC and Community). Compared to 2013 data, median value and overall productivity (tASA/OR) increased in almost all categories. Compared to community and ASC, AMC had the highest median base/case and surgical duration (tASA/h). Although ASC had the lowest base/case, the lowest h/case results in the highest tASA/h. Non-OR Anesthetizing locations make up over 20% of the total locations for AMC and Children's facilities. Anesthesiology residents are primarily working in AMC and Children's. 81% of ASC have no residents, and 67% of Community have no residents. Higher staffing ratios (>2.5) are utilized more frequently in ASC and Community as compared to AMC and Childrens.

Session Number: P02

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM25

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: Turnover Time is Longer for Patients Transported From an ICU

Author Block: **D. Dauer**[1], M. Krueger[2], B. Sindelar[2], E. A. Bowe[3];
[1]Anesthesiology, University of Kentucky, Lexington, KY, [2]University of Kentucky, Lexington, KY, [3]Nicholasville, KY.

Abstract Body:

INTRODUCTION

Efficiency is a significant consideration in operating room (OR) management. Minimizing the time between cases, turnover time (TT), is a frequent focus of attempts to improve OR efficiency. In the main ORs of our institution, a tertiary academic medical center with a Level I trauma designation, the majority of patients are transported to a Holding Area (HA) where routine preoperative preparation is completed before taking the patient into an OR. A patient coming from an intensive care unit (ICU), bypasses the HA and is transported by the team providing care from the ICU to the OR. The OR must be prepared to receive the patient (eg, anesthesia equipment prepared and the availability of all necessary surgical instruments documented) before the team goes to the ICU to retrieve the patient. In the ICU, the routine preoperative functions normally performed in the HA (eg, verifying the presence of a valid consent, confirming presence or absence of allergies) must be completed. Our impression was that TTs were longer for ICU patients.

METHODS

Utilizing OR management software (OR Manager ™, Picis) we tracked TTs for 21,645 cases in our main ORs from April, 2018 through April, 2019. ICU patients were identified as patients requiring care in an ICU immediately preop and immediately postop. Patients taken to PACU postop were included as non-ICU patients as they were likely occupying an ICU room, but not requiring ICU level of care. All first start cases were excluded. Also, all TTs >180 minutes were eliminated from the data; most of those occurrences involved add-on cases with difficulty coordinating availability of an OR and the surgeon.

RESULTS

Table One presents the results for ICU and non-ICU patients.
After exclusions, the data set was 11,357 non-ICU and 596 ICU patients.
The data show longer TTs for ICU patients than for non-ICU patients and a greater percentage of ICU patients with TTs in excess of 90 minutes. An independent samples T-test was used to compare TTs for ICU and non-ICU patients. There was a significant difference in TTs between ICU patients (mean = 71.9, SD = 28.2 min) and non-ICU patients (mean = 61.5, SD = 29.3); t (661) = -8.59, p =

0.0000000000000006. The percentage of patients with TTs in excess of 90 minutes was greater for ICU patients (X^2 (1, N = 11,953) = 8.06, p = .005).

DISCUSSION

Our data show significantly increased TTs for ICU patients being transported to the OR. Decreasing TT might be achieved with implementation of parallel processing; one team of OR nurses and anesthesia providers sets up the OR while a second team transports the patient from the ICU. This would be most helpful if patients with TTs in excess of 90 minutes could be predicted. This would mean the team caring for the patient in the OR would either not have performed a preoperative assessment (eg, talking to the patient's family, taking report from the nurse) or would not have prepared the OR (eg, verified sterility of the trays, counted instruments, checked the anesthesia machine).

Although the difference in mean TTs is statistically significantly different, even if the TTs for ICU patients were reduced to the times for non-ICU patients, it would have a minimal effect on OR efficiency and would not result in the ability to do an extra case in an OR.

REFERENCE

Bhatt AS, Carlson GW, Deckers PJ. Improving operating room turnover time: a systems based approach. J Med Syst 2014:38:148.

	TT (Mean ± SD)	Percent with TT > 90 min
ICU Patient	71.9 ± 28.2 min	17%
Non-ICU Patient	61.5 ± 29.3 min	13%

Abstract Body2:

We reviewed data from one year of OR cases at our institution to evaluate turnover times in ICU versus non-ICU patients. Our data show that turnover times are statistically significantly longer for ICU patients coming to the OR. Despite this statistically significant difference in turnover time for ICU patients, a reduction in turnover time to that of non-ICU patients would not result in enough time to do an extra case in the OR.

Session Number:	P01
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM18
Topic 1:	1.1 Quality Improvement
Publishing Title:	Utilization of Lean Methodology and Six Sigma Methodology in an Academic Chronic Pain Practice
Author Block:	**N. Shah**[1], T. D. Emerick[2]; [1]Department of Anesthesiology and Perioperative Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Pittsburgh, PA.
Abstract Body:	**Introduction:** As the practice of medicine evolves, there is greater emphasis on efficiency and patient outcomes. However, increasing productivity has to be counterbalanced against the impact on patient and staff satisfaction and patient safety[1]. An approach that unifies these constructs is the Lean Six Sigma methodology (LSS). Lean methodology prioritizes efficiency by reducing waste and non-value added activities[2]. Six Sigma methodology identifies and corrects causes of errors with the aim to reduce error rate to a six sigma level[2]. This approach has been used to reduce LOS after hip surgery[3], decrease discharge time[4], improve efficiency in ENT clinics[5], improve OR efficiency[1] and improve OR recovery room processes[6,7]. There have been no reports of LSS use in an academic outpatient chronic pain clinic. This descriptive study describes and demonstrates how Lean methodology principles can be applied to improve process in a chronic pain clinic. **Methods:** Attending physicians, nurses and administrative staff in chronic pain clinic evaluated clinic flow and efficiency. The goal was to reduce the seven key wastes (transport, inventory, motion, waiting, overproduction, over processing and defects) described in Lean Methodology. The conceptual framework model known as DMAIC was used to help guide process and improvement projects[4,8]. The group defined the process, measured performance, analyzed the process, implemented interventions and controlled to assure improvements were maintained. **Intervention:** Various adjustments were made to the chronic pain clinic to improve efficiency and patient and staff satisfaction. The structure of the office work area and computer workstations were optimized to improve communication. Additionally, only one staff member was in charge of ordering inventory to reduce excess supply and personnel were trained to perform various tasks in order to reduce wait times. Further details of interventions are highlighted in Table 1. **Discussion:** The Joint Commission Center for Transforming Healthcare advocates the use of Robust Process Improvement tools to improve the quality and safety of healthcare delivery in different practice settings. In the last decade, LSS methodology is increasingly used in healthcare divisions including finance, inventory management, outpatient clinics and the inpatient setting[1]. When used at the organizational level, LSS methodology can boost efficiency and reduce costs.

Increased efficiency results in increased productivity, decreased personnel costs, increased financial performance and reduced waste. Academic pain medicine is inherently inefficient due to processes that promote patient safety at the expense of efficiency, such as time out prior to procedures, vital sign checks and nursing documentation. Nonetheless, pain clinics are expected to be efficient and productive. There are limitations and barriers to this model. In order to improve staff satisfaction, leaders must engage all members of the clinic in the improvement process. These individuals are often the most suited to offer solutions to various problems. Another limitation is inability to statistically measure increased productivity from each intervention. This study described a simple yet effective way to work within the construct of an academic practice by using Lean and Six Sigma methodology to improve clinic flow and productivity.

Lean Methodology Sources of Waste	Description	Intervention
Transport	Wasted time, resources and costs when unnecessarily moving products and materials	• Exam rooms closer together in one hallway • Nursing and physician work room combined into one office to improve communication
Inventory	Wastes resulting from excess products and materials	• One staff member (senior nurse or medical assistant) in charge of ordering inventory • Display monitor in waiting room to show patients their wait time allowing them to plan their visit time appropriately
Motion	Wasted time and effort related to unnecessary movements by people	• Organizing work place effectively • Procedure door and break room door kept open
Waiting	Waste from time spent waiting for the next process step to occur	• Radiology technician drawing up medication, performing time out and help with ultrasound and rooming
Overproduction	Waste from making more product than customers demand	• Creation of reports that are not evaluated later • Minimize unnecessary surveys to patients
Over-processing	Wastes related to more work or higher quality than is required	• Duplication of material in EMR between nurses and physician
Defects	Waste from a product or service failure to meet customer expectations	• Standardizing time out procedure and check in process

Abstract Body2:

Lean and Six Sigma (LSS) methodology is a useful tool in order to improve efficiency and patient outcomes. This model has increasingly been used in healthcare in the last decade in various settings but to date there have been no reports of applying LSS methodology in an academic pain practice. This is a descriptive study highlighting the use of LSS to reduce seven key areas of waste in order to improve clinic productivity and patient and staff satisfaction.

Session Number:	P00
Session Title:	Practice Management 2020 Poster Judging
Presentation Number:	PM06
Topic 1:	1.4 Research in Perioperative Management
Publishing Title:	A Predictive Model for Readmission in Patients Discharged Within a Day Following Total Joint Arthroplasty
Author Block:	**M. Meyer**, R. A. Gabriel, S. Vig; University of California, San Diego, San Diego, CA.

Abstract Body:

Background:

For high-volume surgical procedures, like total joint arthroplasties (TJA), institutions stratify patients for inpatient "fast-track" vs. "standard" stays. The consequence when a patient is misdirected, however, is often hospital readmission. Cost reimbursement policy changes, including substantial financial penalties, have caused readmission to become an important pay-for-performance program.

As the role of the Anesthesiologist grows within the perioperative environment, it befits us to understand our part in this process and how utilization of the data we routinely obtain on perioperative evaluations can enhance this care system and help avoid readmission. In this study, we build a predictive model using perioperative data to determine a patient's odds of readmission within three days if discharged within a day following TJA.

Methods:

Data for all total knee and hip arthroplasty patients (TKA and THA, respectively) who were discharged within one day from 2014-2016 were obtained from the National Surgical Quality Improvement Program (NSQIP) data base. The primary outcome was readmission within three days. Data was split into a training set (2014-2015) and a validation set (2016). A predictive model was built on the training set using multivariable logistic regression. The final model was built via stepwise backwards elimination and forward selection based on the Akaike Information Criterion. Odds ratio (OR) and their 95% confidence interval (CI) were presented for each covariate. Model discrimination and goodness-of-fit were used to test model performance using area under the receiver operative curve (AUC) and Hosmer-Lemeshow (HL) test, respectively. This was first tested on the training set, then the validation set.

Results:

A total of 232,760 TJA cases were identified in NSQIP from 2014-2016. Of these, 32,058 patients were discharged within one day of TJA and had all available data regarding readmission. The training set (n = 13,671) and validation set (n = 18,387) had a total of 55 (0.4%) and 82 (0.4%) patients, respectively, requiring readmission within three days. The variables included in the final model were: TKA vs THA (OR 2.12, 95% CI 1.20 - 3.72, p = 0.009), use of general anesthesia (OR 2.11, 95% CI 1.22 - 3.67, p = 0.008), history of bleeding

Abstract Body2:

disorder (OR 2.89, 95% CI 0.87 - 9.58, p = 0.08), dependent functional status (OR 4.08, 95% CI 0.94 - 17.73, p = 0.06), age > 80 years old (OR 2.87, 95% CI 1.25 - 6.59, p = 0.01), preoperative anemia (OR 2.61, 95% CI 1.38 - 4.93), p = 0.003), and ASA PS class ≥ 3 (OR 1.68, 95% CI 0.96 - 2.92, p = 0.06). When tested on the training set, there was good discrimination (AUC 0.724, 95% CI 0.651 - 0.797) and calibration (HL test, p = 0.99). When tested on the validation set, there was good discrimination (AUC 0.657, 95% CI 0.596 - 0.718) and calibration (HL test, p = 0.11).

Conclusion:

Data analysis yielded a number of statistically significant predictors of readmission within three days if discharged within one postoperative day following TJA. Our predictive model demonstrated adequate discrimination and goodness-of-fit.

Discussion:

This model demonstrates that Anesthesiology preoperative evaluation data as well as the intra-operative mode of anesthesia can predict a patient's likelihood of readmission after discharge within one day following TJA. This information can be used to generate a risk calculator to help predict which of the currently "fast-tracked" patients should remain hospitalized for more than one day to avoid short-term readmission.

The model created here for TJA can be applied to other surgical procedures. In this way, the data routinely gathered by Anesthesiology in the perioperative period can play a significant role in optimizing postoperative hospital length of stay. Models of this nature can then be valuable in developing budgets, estimating hospital bed occupancy rates, and anticipating the overall administrative planning needs of the hospital in general.

As the role of the Anesthesiologist grows within the perioperative environment, it befits us to understand how utilization of the data routinely obtained on perioperative evaluations can help optimize postoperative length of stay and avoid readmission. Here, we build a predictive model using data from the National Surgical Quality Improvement Program to determine the odds of readmission within three days if discharged within one day following total joint arthroplasty. Models like this can be applied to other surgical procedures and can therefore be valuable in developing financial budgets, estimating hospital bed occupancy rates, and anticipating the overall administrative planning needs of the hospital in general.

Session Number: P02

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM30

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: Operating Room Turnover Time is Not Longer for ICU Patients After Implementation of an Anesthesia Consent

Author Block: **D. Dauer**[1], M. Krueger[1], B. Sindelar[1], E. A. Bowe[2];
[1]University of Kentucky, Lexington, KY, [2]Nicholasville, KY.

Abstract Body:

INTRODUCTION

In 2019 our Risk Management mandated a Consent for Anesthesia. We were concerned that this would prolong turnover times (TT) for intensive care unit (ICU) patients.

METHODS

Utilizing OR management software (OR Manager ™, Picis) we tracked TT for ICU patients in our main ORs for 12 months before implementing anesthesia consent (PRE) and for 2 months after implementation (POST). ICU patients were identified as patients requiring care in an ICU immediately preop and immediately postop. Patients in an ICU bed preop but taken to PACU postop were excluded as they were likely in an ICU, but not actively requiring ICU-level of care. All first start cases were eliminated as there was no turnover time to measure. Also, all TTs >180 minutes were eliminated; most of those occurrences involved add-on cases with difficulty coordinating availability of an OR and surgeon. We used a two-tailed T-test to compare mean TTs for PRE versus POST groups. We also compared the percentage of patients in each group with TTs in excess of 90 minutes using the chi-squared statistic.

RESULTS

Our final data set was 596 PRE patients, and 100 POST patients.

Table One presents the turnover data.

An independent samples T-test was used to compare TTs for PRE and POST. There was no significant difference between TTs for PRE (mean = 71.9, SD = 28.2 min) and POST (mean = 73.5, SD = 28.8); t (661) = 0.50, p = 0.62. There was no difference in the percentage of patients with TTs in excess of 90 minutes (X^2 (1, N = 696) = 2.59, p = .11).

DISCUSSION

Prior to implementing a specific Consent for Anesthesia, the Operative Permit contained verbiage relating to the risks of anesthesia; effectively anesthesia consent was obtained at the time the patient signed the Operative Permit. The electronic preoperative assessment tool (Preop Manager™, Picis), signed by the attending anesthesiologist, included documentation that the patient had been counseled about risks of anesthesia. Although our institution had never had a malpractice suit based on lack of informed consent relating to anesthesia services, Risk Management wrote and mandated implementation of a specific Consent for

Anesthesia. This was to be signed by the patient, or the patient's legal guardian in all cases except for "emergencies" and is only valid for 24 hours.
We were concerned that this practice would result in prolonged turnover times for ICU patients. Although the data do not support this concern, we are aware of situations in which the attending anesthesiologist and the attending surgeon made a joint decision to proceed to the OR without obtaining Consent for Anesthesia even when the case was not posted as an emergency. This only occurred if consent could not be obtained in a timely manner. Accordingly, it is reasonable to assume that if these cases had been delayed until the Consent
for Anesthesia had been obtained, there would have been more cases with a turnover time in excess of 90 minutes and the mean turnover time would have increased.

REFERENCE

Bhatt AS, Carlson GW, Deckers PJ. Improving operating room turnover time: a systems based approach. J Med Syst 2014:38:148.

Table One.

	Turnover Time (Mean ± SD)	Percent More Than 90 Min
PRE	71.9 ± 28.2	24%
POST	73.5 ± 28.8	17%

Abstract Body2:

We were concerned that recently mandated implementation of a new dedicated Anesthesia Consent would lead to increased OR turnover times for ICU patients. We reviewed turnover times for ICU patients before and after implementation of the Anesthesia Consent. Our data shows no significant increase in OR turnover times after the Anesthesia Consent was implemented. However, there were known situations in which a joint decision was made to proceed to the OR without consent when consent was not easily obtained. If these cases where delayed to obtain consent every time, this may have resulted in more cases with extended turnover time.

Session Number: P00

Session Title: Practice Management 2020 Poster Judging

Presentation Number: PM07

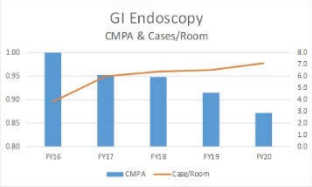
Topic 1: 1.1 Quality Improvement

Publishing Title: Cost per Minute of Provided Anesthesia: A New Metric to Measure the Actual Cost of Anesthesia Delivery Applied to Anesthesia in a GI Endoscopy Suite

Author Block: **T. Rahlfs**[1], R. Thompson[2], J. Incalcatetta[3], K. H. Mirza[2]; [1]Anesthesiology & Perioperative Medicine, UT MD Anderson Cancer Center, Houston, TX, [2]MD Anderson Cancer Center, Houston, TX, [3]UT MD Anderson Cancer Center, Houston, TX.

Abstract Body: **Introduction** Accurate knowledge and control over the costs of delivering anesthesia care is important for running an efficient practice. Presented here is a novel measure of the cost of providing anesthesia care, the Cost per Minute of Provided Anesthesia (CMPA). The concept is similar to Cost Per Available Seat Mile used in the airline industry. The cost of flying one seat one mile, calculated by dividing operating costs by available seat miles, takes into account all things that contribute to the costs associated with flying one seat one mile. The CMPA likewise takes into account all things contributing to a minute of provided anesthesia. TOTAL COST = DIRECT COST + INDIRECT COST Direct costs, divided between fixed and variable costs, are the expenses required to provide the anesthesia. Indirect costs include administration expenses, building expenses not including depreciation, and sponsored projects. These vary between institutions and can range from 25-40%. We will only focus on operating, or direct cost. The CMPA is calculated by dividing the total operating cost of anesthesia provided by the total number of anesthesia minutes delivered over the same period. While this is a useful metric for the overall practice, its application to the subunits of the practice are of more value. The calculation is easy to do as all of the values are obtained from the periodic financial reports from our CFO. **Method** We started our analysis with 2016 data from our GI endoscopy suite. At that time we were providing medical direction of CRNAs in a 1:2 ratio. In 2017 with the same staffing ratios, we increased our efficiency with improving on-time first starts, shorter turnover between cases and decreased cancellation rates related to better patient scheduling practices. This resulted in more cases being done per room per day. In 2018 staffing ratios increased to 1:3 when feasible along with further increases in center efficiency. **Results** This comparison uses the 2016 CMPA as the reference, when there was an average of 3.8 cases/room and 1:2 staffing ratio. In 2017, with the same 1:2 staffing and an increase of cases to 6 cases/room the CMPA dropped by 5%. By 2019 with staffing ratios at 1:3 when possible and 6.5 cases/room, the CMPA dropped by 9%. With improved efficiency, the CMPA decreased over three year period. This 9% drop in the CMPA from 2016 to 2019 is more notable given the fact that all employees received a 3% raise in two of those years. Employee expenses comprise 92% of our anesthesia practice's direct costs.

So far in the first 2.5 months of FY20, there has been a further reduction of CMPA in our GI Endo suite to 13% below the FY16 level. **Conclusion** We have described a simple costing metric for anesthesia, the Cost per Minute of Provided Anesthesia, similar in concept to the cost of available seat mile used in the commercial airline industry. As part of the financial analysis of an anesthesia practice, we have demonstrated its use as a measure of efficiency within the busy GI endo suite at a large comprehensive cancer center. In our model, efficiency gains were had by adjusting staffing ratios as well as improving on-time starts, room turnovers and patient scheduling processes. This cost data has been very useful in calculating our return on investment analysis for expansion of our endoscopy services into other locales.



Abstract Body2: A novel way to measure and monitor the costs associated with providing anesthesia care is presented. An example of its use is demonstrated by evaluating the relative costs of anesthesia delivered in a busy GI endoscopy suite in a large comprehensive cancer center.

Session Number: P01

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM13

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: Using Cost and Productivity Surveillance to Identify Variance in Surgical Services Efficiencies Across a Large Multihospital Health Care System

Author Block: **N. Shah**[1], S. Wang[2], C. M. Molzahn[1], E. E. Lebovitz[1], M. E. Hudson[1]; [1]Department of Anesthesiology and Perioperative Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]University of Pittsburgh School of Medicine, Pittsburgh, PA.

Abstract Body:

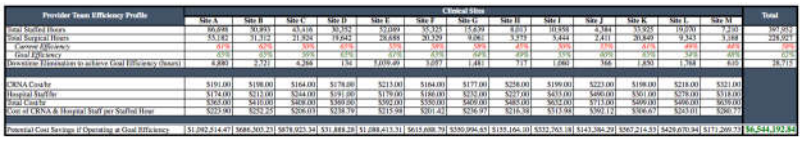
Introduction: In an era where one can obtain metrics on any clinical activity, anesthesiology practices are highly scrutinized to ensure adequate clinical productivity, efficiency and cost effectiveness. In order to derive the maximum benefit from daily activities, anesthesiology practices must ensure appropriate use of valuable personnel resources. In practices utilizing a physician-led care team model with hands-on providers consisting of CRNAs and residents, provider team efficiency and resource utilization can be evaluated as CRNA billed-to-staffed hours[1]. This metric represents the percentage of time that CRNAs are engaged in a billable activity and can be used as a surrogate of overall OR efficiency[2]. Provider team efficiency is limited by fixed downtime and variable downtime, defined broadly as necessary and unnecessary lapses in billing, respectively. At our institution, we generated a productivity surveillance report using the CRNA billed-to-staffed metric to identify areas that individual hospitals can focus on in order to improve utilization and minimize downtime. This report was then used to implement changes to improve provider team efficiency and produce cost savings.

Methods:

Provider team efficiency data was obtained for clinical year 2017 for 13 hospitals within our network. Specific data analyzed included total CRNA staffed and billed hours, total fixed and variable downtime, and gap time. Total CRNA billed time included personnel times from the anesthesia EMR and total CRNA staff time was obtained from Kronos data. The above data was compiled in Microsoft Excel and used to calculate the CRNA Billed/Staffed Ratio ("Current Efficiency"). The Goal Efficiency was set be to the lower value of either 65% or a 10% increase in the current efficiency. Once the goal efficiency was established, we calculated the amount of variable downtime elimination in hours required to meet the new efficiency goal. Using staffing cost data, we determined the total cost savings if all hospitals met their efficiency goal. **Results:**

In CY2017, CRNAs worked a total of 397,952 hours and billed 228,927 hours (Table 1). This represents a calculated provider team efficiency of 58% overall (Current Efficiency). Site A has a Current Efficiency of 61% with a goal efficiency of 65%. In order to achieve this goal, the site would have to eliminate 4,880 hours of downtime (Table 1). Based on Site A's per OR hour, cost savings would be

$1.09M per year. Performing similar analysis, the system would have to eliminate 28,715 hours of variable downtime leading to $6,544,192 in potential total cost savings (Table 1). **Discussion:** Using a Cost and Productivity Surveillance Analysis, we were able to identify significant cost savings opportunities at each of our 13 hospitals. Previous studies have cited using utilization of the operating room to determine efficiency of an anesthesiology practice. Productivity is subsequently determined by analyzing various components (total ASA units/h, h/case, h/operating room/d)[3]. This study highlights the use of provider staffing data to determine efficiency and areas of significant potential cost-savings. One significant advantage of using this surveillance metric is the ease of data collection from our EMR and interpretation, which allows for continuous monitoring of clinical efficiency. Further analysis of the components of variable downtime (gap time, start of day downtime and end of day downtime) and their variance at each clinical site will allow for targeted interventions to rapidly improve efficiency.



Provider Team Efficiency Profile	Clinical Sites													Total
	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H	Site I	Site J	Site K	Site L	Site M	
Total Staffed Hours	66,048	30,993	43,416	30,552	32,089	20,520	15,839	9,053	10,958	6,384	33,925	19,030	7,210	365,955
Total Surgical Hours	55,182	31,312	21,926	19,642	28,688	20,329	9,061	5,593	9,444	2,411	20,849	9,345	5,168	228,951
Current Efficiency	84%	62%	50%	65%	89%	99%	58%	62%	86%	38%	61%	49%	72%	63%
Goal Efficiency	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
Downtime Elimination to achieve Goal Efficiency (hours)	4,890	2,721	4,266	136	1,039.49	3,097	1,441	717	1,080	366	1,850	1,768	810	28,715
CRNA Cost/hr	$191.00	$198.00	$164.00	$178.00	$213.00	$164.00	$177.00	$228.00	$199.00	$223.00	$198.00	$218.00	$321.00	
Hospital Staff/hr	$174.00	$213.00	$244.00	$191.00	$179.00	$186.00	$252.00	$227.00	$453.00	$490.00	$501.00	$279.00	$518.00	
Total Cost/hr	$365.00	$410.00	$408.00	$369.00	$392.00	$350.00	$409.00	$485.00	$652.00	$713.00	$699.00	$496.00	$839.00	
Cost of CRNA & Hospital Staff per Staffed Hour	$225.90	$252.25	$306.03	$238.79	$215.94	$201.42	$256.97	$218.38	$313.94	$392.12	$300.67	$243.01	$280.75	
Potential Cost Savings if Operating at Goal Efficiency	$1,282,514.47	$686,303.23	$874,923.34	$31,888.28	$1,088,413.31	$615,688.79	$380,994.65	$155,164.10	$332,765.18	$143,384.29	$367,214.33	$429,670.94	$171,209.73	$6,544,192.84

Abstract Body2:

Healthcare is evolving into an era where data and metrics are increasingly relied upon to evaluate efficiency and productivity of providers and clinical operations. Using this data, administrators make decisions to improve operations at their clinical sites. To determine provider team efficiency, CRNA billed-to-staff hours can be measured. Our institution generated a provider team efficiency profile using this metric. The system would have to eliminate 28,715 hours of variable downtime leading to $6,544,192 in potential total cost savings. Further analysis of the components of variable downtime will allow for targeted interventions to rapidly improve efficiency.

Session Number:	P00
Session Title:	Practice Management 2020 Poster Judging
Presentation Number:	PM04
Topic 1:	1.1 Quality Improvement
Publishing Title:	A Novel Drug Diversion and Controlled Substance Variance Program at Mayo Clinic - Arizona
Author Block:	**T. Dunn**, S. R. Aikins, M. B. Kraus, V. A. Schettler, C. D'Amato, P. A. Mergens; Mayo Clinic, Phoenix, AZ.

Abstract Body:

Background:

Drug diversion involves the "redirection" of drugs, particularly controlled substances, from patient care to substance abuse or illegal sales. Types of diversion include substitution, theft of narcotics through charting techniques, theft of discarded medication, theft of narcotic delivery from pharmacy to floor, falsification of physician's verbal orders, or theft from surgical areas. Medication diversion and substance abuse among health care workers is estimated as high as 10-20% and the economic cost is estimated to exceed >$500 billion per year. Not only is the field of anesthesiology at an exceptionally high risk for diversion due to the ease of access, it also poses a great risk to patient safety.

Current Practice:

Mayo Clinic Arizona (MCA) has implemented a comprehensive drug diversion prevention program that incorporates a predictive analytics program called MAAP, invented by Charles D'Amato, R.Ph, Supervisor of the MCA Drug Diversion Prevention Program. MAAP Systems or the Medication Administration & Analysis Program integrates waste retrieval and waste assay monitoring with dispense and administration documentation. Data is retrieved from the automated dispensing cabinet (Pyxis®) and compared to the documented medications in the electronic medical record or EMAR (Epic®). A variance is created if there is a discrepancy between the net of dispensed medications versus the documented administration of medication. Once a variance is created, the respective staff members are instructed to complete a controlled substance discrepancy report explaining the reason for the variance. In parallel, clinicians submit narcotic waste through the waste retrieval program. Controlled substance waste is assayed in-house to confirm that the waste is the correct substance and concentration, minimizing risk of tampering. This system also has an advantage of allowing for one employee wasting system, eliminating the need for a witness. The process increases clinical efficiency and allows for disposal of controlled substances in an environmentally responsible manner. The data from both the MAAP Variance and Waste Retrieval program flow into a tracking database which has advanced surveillance, analytics, and detection algorithms, which is the foundation for a comprehensive, multi-dimensional diversion surveillance system. This system uses existing knowledge about

diversion mechanisms to identify users with frequent variances and practice suspicions including detecting controlled substances that are removed or documented at inappropriate times in excess of other users. As further data is gathered, the system adapts to build a statistical model for the relevant variables describing a user's medication practice and identify when a user is deviating significantly from his/her peers in a high-risk manner.

Discussion:

The Mayo Clinic Arizona drug diversion prevention model has many advantages over traditional approaches to drug diversion. This system is comprehensive in which multiple sources of data are received allowing for the elimination of practice noise as well as false positives and negatives. There is longitudinal tracking of all users which undergo multi-dimensional and algorithmic auditing. The system allows for automated monitoring and will continue to be scalable as practice evolves. Since implementation, there has been a significant improvement in overall identification of diversion, audit capability and use of resources. Practice improvement >99% have occurred in both Anesthesia and Nursing practice. Investigation time has been reduced from months to days and time spent gathering information has been reduced by 75-95%. Most importantly, having a comprehensive drug diversion program not only increases patient safety by deterring drug diversion, but also the wellbeing of staff. Controlled substance abuse among staff can be identified early, allowing for prompt and more successful intervention.

Abstract Body2:

Medication diversion and substance abuse among health care workers is estimated as high as 10-20% and the economic cost is estimated to exceed $500 billion per year. Mayo Clinic Arizona has implemented a comprehensive drug diversion prevention program that incorporates a predictive analytics program as well as waste assay monitoring. Since implementation, there has been a significant improvement in overall identification of diversion, audit capability and use of resources.

Session Number:	P00
Session Title:	Practice Management 2020 Poster Judging
Presentation Number:	PM05
Topic 1:	1.2 Leadership Development
Publishing Title:	Transition to Practice - A Residency Curriculum in Practice Management
Author Block:	**E. Bergersen**, S. Abouhassan, M. Helou, A. Plante; Department of Anesthesiology, University Hospitals - Cleveland Medical Center, Cleveland, OH.

Abstract Body:

Background: The Council on Medical Education of the American Medical Association has identified transitions into and out of residency as an area for growth in graduate medical education. In Anesthesiology, the transition from senior resident to practicing anesthesiologist can be abrupt, daunting, and stressful, especially when the transition involves many unknowns. Our need to develop an improved transition to practice curriculum at our own institution became apparent after analysis of feedback from outgoing resident exit interviews and postgraduate surveys. Results indicated that trainees 0 -3 years out of training felt ill-prepared for the transition from residency to clinical practice, specifically from a managerial standpoint.

Objectives: To develop an effective longitudinal course in transition to independent practice as evidenced by favorable end of rotation evaluations.

Methods: A literature search was unable to reveal any anesthesiology residencies that have published a formal, longitudinal, comprehensive curriculum in transition to practice with measured outcomes regarding perceived resident preparedness for practice. To fill this gap, the Anesthesiology Residency Program at University Hospitals Cleveland Medical Center developed a curriculum designed to immerse residents in practice management and daily OR direction for an academic anesthesiology department, with content pertinent to management in the private practice setting as well. In the course of daily operations, the rotating resident assists in the management and direction of a major academic tertiary care hospital (>20,000 operative cases per year, >4,000 obstetric deliveries per year) and 8 other community hospitals and ambulatory surgery centers including scheduling duties for all locations. The four week curriculum begins with didactics including lectures and modules on anesthesia care team roles and responsibilities, anesthesia models of care, and anesthesia practice improvement initiatives. As the course progresses, further lectures are given on infrastructure and organization of an anesthesia department, basics of anesthesia billing, and conflict resolution. During the Transition to Practice rotation, the residents have the opportunity to attend multidisciplinary staff meetings with OR coordinators and Vice Chairs to address OR block management, department staffing, OR coordination, budgetary items, quality review for all divisions, community practice management, OR operations, OR

Abstract Body2:

workflow, hospital wide quality improvement and quality assurance committees. Residents fill an end of rotation evaluation at the end of the four week block.
Results: End of rotation evaluations for all residents participating in the new curriculum were analyzed. Preliminary results demonstrated significant improvement in multiple areas including self-reported comfort with transition to practice, understanding of anesthesia models of care and billing, and desire to participate in managing their future practice. Final results will be available for reporting by Dec 2019.
Conclusion: A comprehensive, longitudinal rotation in Transition to Practice with a robust didactic curriculum increases resident self-perception of readiness for practice and potentially resident interest in management. Unique aspects of the rotation at our institution include the ability of residents to independently construct a daily schedule for all residents both at main campus and at community sites, as well as their ability to attend administrative meetings with the Vice Chairs of our operating rooms for a hands on understanding of administrative affairs.
The need to develop an improved transition to practice curriculum at our own institution became apparent after analysis of feedback from outgoing resident exit interviews and postgraduate surveys. We developed an effective longitudinal course in transition to independent practice as evidenced by favorable end of rotation evaluations. A comprehensive, longitudinal rotation in Transition to Practice with a robust didactic curriculum increases resident self-perception of readiness for practice and potentially resident interest in management.

Session Number: P01

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM19

Topic 1: 1.1 Quality Improvement

Publishing Title: A Comparison of Turnover Times Based on Distance from Supply Rooms: Does Distance Matter?

Author Block: **P. McAllister**[1], B. C. Sindelar[1], E. A. Bowe[2];
[1]Anesthesiology, University of Kentucky, Lexington, KY, [2]Nicholasville, KY.

Abstract Body:
Introduction: Measuring and assessing turnover time (TT) in operating rooms (ORs) allows institutions to assess cost effectiveness and perioperative efficiency. Many factors can influence turnover time and have been cited in various studies. One factor that might influence TT is the distance necessary to transport supply carts and patients to an OR. Our main OR facilities span 3 different regions, found in 3 immediately adjacent buildings but all located on the same floor. When the newest building was constructed, the plan was to close the 6 oldest ORs, which were geographically farthest from the new ORs. The new central sterile supply cart delivery area (CDA), the preoperative holding area (HA), and post anesthesia care unit (PACU) were built immediately adjacent to the new ORs. Initially, the 6 oldest rooms were closed. After a short period of time it became apparent that more ORs were needed for clinical volume. The most effective way to provide that capacity was to renovate and re-open 5 of the 6 closed ORs. However, these ORs were farther from the relocated CDA, HA, and PACU. A concern was raised that the longer distance necessary to transport carts and patients to the OR would result in longer TTs for ORs in that area. We decided to compare TTs for ORs 14 through 19, the ORs for which transit distance for carts and patients would be greatest ("Far ORs"), with TTs for ORs 1A – 9A, the rooms in closest proximity to CDA, HA, and PACU ("Near ORs").

Methods: The distances from CDA, HA, and PACU to the center of the Near ORs and Far ORs were measured using a pedometer and then converted to mileage using a step to distance equation. Data from our perioperative management system (OR Manager™, Picis) were collected and compiled in a spreadsheet including information on OR location and TT. Only scheduled cases where a turnover took place were included in the study. Exclusion criteria included cases with TT = 0 (i.e., first cases in each OR every day), cases with TT in excess of 180 minutes, cases performed on weekends and holidays, and cases starting after 7PM. TTs were determined for the Near ORs and Far ORs. An independent-samples t-test was conducted to compare TT in Near and Far ORs

Results: Table 1 shows the distances from CDA, HA, and PACU to Near ORs and Far ORs and corresponding mean TTs. There was a significant difference between TTs for Near ORs (53 minutes $\pm$ 22 minutes) and Far ORs (56 $\pm$ 22 minutes); t (3873), = 3.67, p = 0.0002.

Conclusion: Consistent with expectations, TT is longer for Far ORs than for Near

ORs.

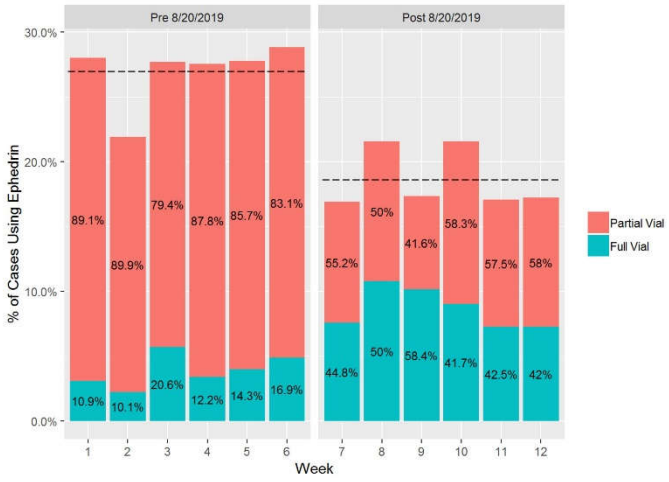
Table 1

Location (n)	Distance to Cart Delivery Area (CDA)	Distance to Preop Holding Area (HA)	Distance to PACU	Average Turnover Time (SD)
Near ORs (2316 cases)	59 Steps (0.03 Miles)	155 steps (0.08 Miles)	94 steps (0.05 Miles)	53 min (22.2)
Far ORs (1559 cases)	272 Steps (0.15 Miles)	275 steps (0.15 Miles)	332 steps (0.18 Miles)	56 min (22.1)

Abstract Body2: Turnover Time (TT) is a means for assessing efficiency and cost-effectiveness for healthcare institutions. We investigated the effect that distance from key perioperative areas to operating rooms had on TT at our institution.

Session Number:	P02
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM23
Topic 1:	1.1 Quality Improvement
Publishing Title:	Controlled Substance Monitoring of Ephedrine Impacts Use
Author Block:	**M. Seman**[1], R. C. Craner[2], M. B. Kraus[3]; [1]Anesthesiology, Mayo Clinic in Arizona, Phoenix, AZ, [2]Phoenix, AZ, [3]Mayo Clinic Hospital, Phoenix, AZ.
Abstract Body:	**Background:** The implementation of a controlled substance monitoring program for medications is important to reduce the potential diversion of medications with abuse potential. Ephedrine when administered intravenously is an important vasoactive medication in anesthetic practice, it is also identified as a List 1 chemical by the DEA meaning it can be used in the manufacturing of illegal drugs. Availability and accessibility of medications has significant impact on medication administration. The objective of this study was to determine the effect that implementation of controlled substance monitoring had on ephedrine use intraoperatively at our institution. **Materials and Methods:** Retrospective data was obtained from our EMR on intraoperative ephedrine administration. Ephedrine use was analyzed 6 weeks prior and 6 weeks after implementation of department wide controlled substance monitoring for ephedrine. We computed the proportion of cases using ephedrine weekly as well as overall pre and post-implementation. Among the cases that received ephedrine, we computed the proportion utilizing full vials of ephedrine weekly as well as pre and post-implementation. Changes in proportions from pre to post- implementation were assessed via Pearson's Chi-squared tests. P-values less than 0.05 were considered significant. Data was analyzed using R version 3.6. **Results:** A total of 5,876 cases (2913 Pre and 2963 Post) were included in the study. In the 6 weeks prior to implementation of controlled substance monitoring, the percentage of cases that utilized ephedrine ranged from 22%-29%. The 6 weeks post controlled substance implementation data showed the percentage of cases that utilized ephedrine ranged from 17-22%. Overall ephedrine use was significantly lower post- implementation (18% vs 27%, $p<0.001$). Finally, when analyzing the number of cases that utilized the full vial of ephedrine pre and post implementation, full vial utilization was significantly higher post-implementation (47% vs 14%, $p<0.001$). **Conclusions:** Implementation of controlled substance monitoring significantly affected the intraoperative use of ephedrine at our institution. Use of ephedrine post implementation decreased significantly when compared to its use prior to controlled substance monitoring. Additionally, it was found that when the drug was used post-implementation, close to 50% of cases utilized the entire vial of ephedrine during the case. This could potentially be explained by the intraoperative provider's desire to avoid the complex process of controlled

substance waste disposal, which is necessary if the entire vial was not used during the case.

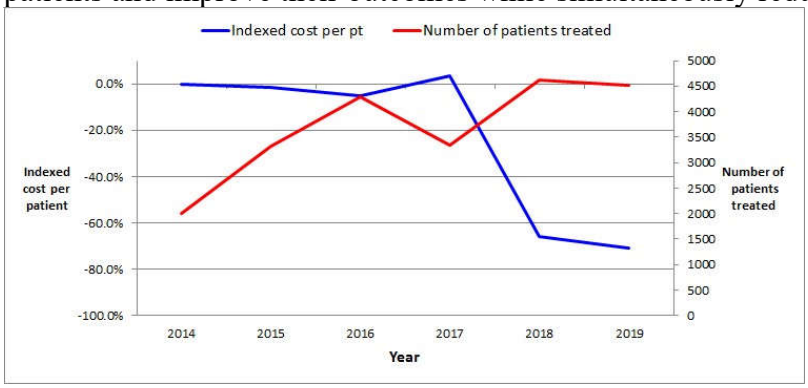


Abstract Body2:

The effect of controlled substance monitoring implementation on the intraoperative use of ephedrine. 6 weeks of data was analyzed pre and post implementation which showed a significant decrease in the intraoperative use of ephedrine, and an increase in the percentage of full ephedrine vials utilized after implementation of controlled substance monitoring at our institution.

Session Number:	P01
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM10
Topic 1:	1.1 Quality Improvement
Publishing Title:	A Novel Marketing Strategy of Hemodynamic Monitoring: Enhancing Both Components of the Value Equation
Author Block:	**T. Rahlfs**, J. M. Soliz, P. Brown, R. Thompson, A. Holmes; UT MD Anderson Cancer Center, Houston, TX.
Abstract Body:	**Introduction** We have developed Enhanced Recovery After Surgery (ERAS) pathways for all of our surgical lines. The intraoperative portion of our ERAS pathways incorporates non-invasive hemodynamic monitoring with goal-directed fluid therapy algorithms that were developed by our team. Within our ERAS programs we have experienced improvements in patient outcomes, including decreased patient stays and complications, and more patients proceeding to their intended oncologic therapies. However, the use of hemodynamic monitoring in our ERAS patients contributed to a significant increase in the cost of providing care. We describe our novel approach to decrease the cost of hemodynamic monitoring, while increasing the access of this technology to our patients. **Methods** At the time, we were using equipment from multiple manufacturers, with minimal difference in acquisition cost between them. This resulted in increased per-patient variable cost for each device use. To ensure we were getting the maximum value from our choice of hemodynamic monitoring equipment, we worked with our Procurement Department to reassess our choices of monitoring technology and look for a value-added solution to decrease our total expenses as well as enhance its access to more patients. **Results** The result was a partnership with one of the manufacturers in an innovative marketing approach, a risk-free payment model which incorporated unlimited patient monitoring for a fixed annual fee. This option was most flexible, increased access by providing the opportunity to use the technology with more patients and it included monitors at all of our anesthetizing locations with unlimited upgrades as they became available. We were also able to incorporate our own perioperative treatment protocols in the monitoring software. With the new licensing agreement, we have experienced a 68% reduction in our hemodynamic monitoring expense as well as an expansion of patient coverage with hemodynamic monitoring by 5%. As a result, our per-patient cost of hemodynamic monitoring decreased by 71%. **Discussion** While standard with other equipment such as physiologic monitors, the option for obtaining unlimited use of a medical technology for a fixed annual fee is the first of this kind of marketing in the world of specialized hemodynamic monitoring. This fixed expense is without the need for additional purchase of software or disposables. With our arrangement we have experienced gains in both the numerator and denominator of our value equation. There is more access for patients to the technology, as the application of goal-directed therapy to more patients will result

in more appropriate fluid therapy, associated with improved rates of acute kidney injury, myocardial events, etc., all of which can have positive impacts on long term survival. On the denominator side of the equation, we have experienced a 68% decrease in cost. This fixed cost for the department is irrespective of the number of patients benefiting from the use of the monitors. Lastly, this has resulted in a net increase in operating margin for the department, as the large drop in costs were greater than the net revenue we were experiencing given our rates of deductions from gross technical revenues. In summary, applying this value-based marketing strategy to provide our protocolized hemodynamic monitoring within our ERAS pathways has enabled greater access of the technology to our surgical patients and improve their outcomes while simultaneously reducing costs.



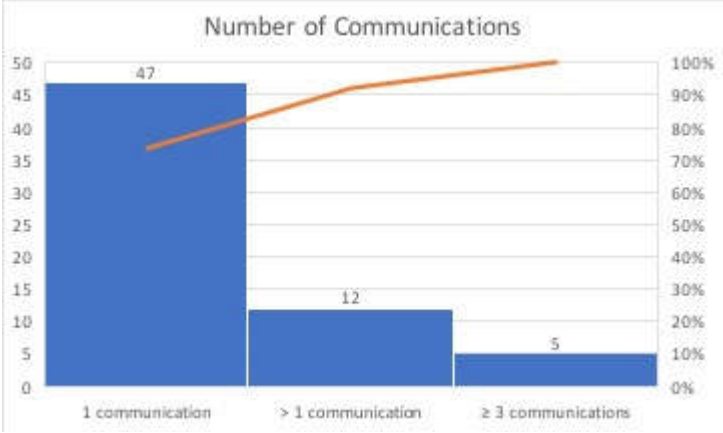
Abstract Body2:

Application of a value-based marketing strategy to the acquisition of hemodynamic monitoring in a novel manner has enabled the provision of specialized monitoring within our Enhanced Recovery pathways. This has resulted in greater access of the technology to surgical patients and improve their outcomes while simultaneously reducing costs.

Session Number:	P02
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM31
Topic 1:	1.1 Quality Improvement
Publishing Title:	An Academic Chronic Pain Clinic's Phone Call and Email Communication Volume as a Demonstration of The Six Sigma Methodology Pareto Principle
Author Block:	**R. Holden**, T. Flemming, S. Morrissey, T. D. Emerick; Department of Anesthesiology and Perioperative Medicine, Division of Chronic Pain, University of Pittsburgh Medical Center (UPMC), Pittsburgh, PA.
Abstract Body:	Introduction Chronic pain clinics are inundated with an increasing volume of patient communications daily that exploit staff resources. Due to the sheer volume of patient phone calls and e-mails, clinic staff are often unable to properly manage incoming patient communications in addition to their other duties. This overextension of resources may prevent patients and families' concerns from being addressed in a timely manner, an essential component of high quality care. The Pareto Principle, also known as the 80/20 rule, states that 20 percent of the causes lead to 80 percent of the effects. The purpose of this study is to see if the Pareto Principle applies to patient communications in the chronic pain clinic, or if 20 percent of patients that e-mail or call the clinic lead to 80 percent of the call volume. Understanding the patient population that communicates with the clinic the most will help clinics to better triage these communications, allocate staff resources more efficiently, and, ultimately, provide higher quality patient care. Methods The project overview and methodology were approved by the UPMC Quality Improvement Committee. Patient phone messages and e-mails were recorded over five clinic days in November 2019 and analyzed prospectively. The following features were quantified: total volume of calls/emails, total number of unique patients, total volume of e-mails, average age of patients with the most calls, and gender of patients with the most calls. Results 26% (n=17) of the communications were part of the repeat communications group. These 26% were responsible for 46% (n=47) of the total communication volume. Although this does not follow the Pareto Principle directly, this still shows that a relatively small percentage of patients comprise a large percentage of the office communication volume. Significantly more females called than males in both the repeat (82%) and nonrepeat communications groups (78%). The average age of the repeat group was 55 while the average age of the non-repeat group was 51. A Pareto chart is shown in Figure 1. Discussion Although the data in our study did not directly mirror the Pareto principle, the study showed that a relatively small percentage of patients were responsible for

about half of the communication volume. Using this data, we can implement a process to manage high utilizing patients more efficiently. Possible aspects of this process could include promoting patient messaging through the UPMC communication internet portal as opposed to through the phone and creation of triage protocols geared specifically toward repeat communicators. These changes will facilitate increased patient satisfaction, attenuated call volume, and less burden to staff. Limitations of this study include a potential lack of generalizability to other pain clinics, and the short duration of study. With physicians spending about 27% of their total time on direct clinical face time with patients and about 49% of their time on HER and desk work (1), finding a better way to triage patient communications with the clinic is vital to improving patient care.

1.
Sinsky C, Colligan L, Li L, et al. Allocation of Physician Time in Ambulatory Practice: A Time and Motion Study in 4 Specialties. Ann Intern Med. 2016;165:753-760. [Epub ahead of print 6 September 2016].



Abstract Body2:

The purpose of this study is to see if the Pareto Principle (20 percent of causes lead to 80 percent of the effects) applies to patient communications in the chronic pain clinic. In summary, the study showed that a relatively small percentage of patients were responsible for about half of the communication volume. Using this data, we can implement a process to manage high utilizing patients more efficiently.

Session Number:	P02
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM24
Topic 1:	1.1 Quality Improvement
Publishing Title:	Implementation of Preoperative Clinic Phone Appointments to Decrease Patient Clinic Time
Author Block:	**M. Romej**[1], R. Zeidan[1], D. Caughman[1], G. C. Lynde[2]; [1]Emory University, Atlanta, GA, [2]Atlanta, GA.
Abstract Body:	**Background** A thorough preoperative assessment of the surgical patient is an important component of a patient's anesthetic management. The preoperative clinic has been shown to decrease surgical cancellations and reduce in-hospital mortality. [1-3] While there is a demonstrable benefit to outpatient preoperative assessment of patients, these clinics are usually cost centers for the hospital. Patients spend 1 hour, 49 minutes in their preoperative clinic appointment. Nursing assessment including medication list reconciliation, allergy verification, surgical history, and basic medical history takes on average 28 minutes. Patients are then interviewed by a nurse practitioner (NP) or anesthesiology resident. Based on this interview, the NP or resident writes an anesthesia consult summary for the anesthesiologist the day of surgery. On average, these interviews take 23 minutes. The NP or resident then reviews the patient with an attending anesthesiologist on average for 10 minutes. We hypothesized that low-risk patients undergoing low-risk procedures could undergo telephone screening while maintaining the value of the preoperative clinic appointment. **Methods** We block 90 minutes for each in-person preoperative assessment. To accommodate phone screens, we took one 90-minute appointment and created two 45 minutes phone appointments. We started our preoperative phone screens with three surgeons. Patients undergoing procedures not requiring hospital admission, or patients who have undergone a similar, or more major, procedure without complication within the hospital system in the last three months without change to clinical condition were included. Patients with significant medical morbidity were excluded. Exclusion table 1. The attending anesthesiologist reviewed the patient's chart and complete the anesthesia consult note. A nurse completed their regular nursing assessment via phone. The anesthesiologist for the case was sent a survey after the patient's surgery to determine their satisfaction with the phone preoperative assessment. **Results** After our initial three-month trial period, we found that we could decrease the total patient time spent for their preoperative assessment to be 24 minutes for their nursing phone assessment. The attending review of the chart took nine minutes, for

a total of 31 minutes of work per surgical case. No cases cancelled due to insufficient assessment. Of the anesthesiologists surveyed, 20% did not notice that the patient was not seen in person, 100% felt the documentation was sufficient, and 10% felt that they would have ordered additional labs prior to the day of surgery.

Conclusions

Preoperative phone assessments save patient time and are not inferior to in person assessments for the right patient population. We increased our clinic capacity by doubling the number of patients we can screen in the same 90-minute appointment block. Our clinic is currently expanding this service to other surgeons with similar results.

References

1. Hepner DL, Bader AM, Hurwitz S, Gustafson M, Tsen LC: Patient satisfaction with preoperative assessment in a preoperative assessment testing clinic. Anesth Analg 2004; 98:1099-105

2. Tsen LC, Segal S, Pothier M, Hartley LH, Bader AM: The effect of alterations in a preoperative assessment clinic on reducing the number and improving the yield of cardiology consultations. Anesth Analg 2002; 95:1563-8

3. Blitz JD, Kendale SM, Jain SK, Cuff GE, Kim JT: Preoperative Evaluation Clinic Visit Is Associated with Decreased Risk of In-hospital Postoperative Mortality. Anesthesiology 2017; 125: 280-29

General	□ BMI >50 □ Unable to walk 2 blocks on level ground without stopping □ Personal or family history of severe reaction to anesthesia (e.g. malignant hyperthermia) □ History of difficult airway/difficult intubation □ Hospitalized within the last 30 days (any reason) □ Chest pain, shortness of breath, passing out □ Genetic syndromes with facial abnormalities
Neuro	□ Amyotrophic lateral sclerosis (ALS) □ Multiple sclerosis (MS), myasthenia gravis (MG) □ Stroke within last 12 months
Cardiovascular	□ Heart attack, coronary stent, or hear surgery within last 12 months □ Pacemaker or Defibrillator □ Heart failure, cardiomyopathy □ LVAD □ Home infusion of dobutamine, milrinone, or Flo-lan □ Severe or symptomatic valvular heart disease □ Congenital heart disease □ Poorly controlled blood pressure (SBP>180 or DBP>110) □ Pulmonary hypertension
Pulmonary	□ Severe lung disease (COPD, emphysema, restrictive lung disease) □ On home oxygen
Renal	□ ESRD (creatinine ≥2) or on dialysis
Hematologic	□ Anticoagulation or antiplatelet medication other than low-dose aspirin □ Bleeding or clotting disorder □ Pulmonary embolism/DVT within 6 months
Hepatic	□ Cirrhotic liver disease (cirrhosis class B-C, MELD >10) □ Portal hypertension, hepatic encephalopathy
Infectious disease	□ HIV with CD4 count<250 □ Tuberculosis
Other	□ Transplant recipient (liver, kidney, heart, lung) □ Pregnant patients □ Requires interpreter

Abstract Body2:

Preoperative phone assessments can save patient time and are not inferior to in person assessments for the right patient population. We discuss how we developed a phone screening process which increased our clinic capacity by doubling the number of patients we can assess in the same 90-minute appointment block.

Session Number: P02

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM27

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: The Impact of Turnover Times Following ICU Disposition

Author Block: C. Kennon[1], B. C. Sindelar[1], **E. A. Bowe**[2];
[1]Department of Anesthesiology, University of Kentucky, Lexington, KY,
[2]University of Kentucky, Lexington, KY.

Abstract Body:

INTRODUCTION

Turnover time (TT) is a metric commonly used to evaluate the efficiency of operating room (OR) suites. Working with a group of nurses in our ORs, we have identified several parameters that are perceived to have an impact on TT. One of the factors perceived to have an impact on turnover time is the need to transport a patient from the OR directly to an Intensive Care Unit (ICU). While the Postanesthesia Care Unit (PACU) is immediately adjacent to the OR area, the ICUs are farther removed, are in different areas of the hospital, and require use of an elevator for transport. We performed a study to determine if ICU disposition results in a longer TT compared to PACU disposition at the conclusion of an operation.

METHODS

Using our OR tracking program (OR Manager™, Picis), TT was calculated for the period of 1 June 2018 through 30 June 2019. The data were separated between those patients requiring disposition to the ICU and those taken directly to the PACU. Exclusion criteria included emergency operations, cases performed on weekends and holidays, cases finishing after 7:00 PM and cases with TT greater than 180 minutes. A two-tailed t-test was used to calculate the statistical significance.

RESULTS

Refer to the attached table for data.

There was a significant difference in the TTs for patients transported directly to the ICU (65 + 29 minutes) and patients transported to the PACU (mean = 61 + 28 minutes); $t(11659) = 2.09$, $p = 0.036$.

DISCUSSION

TT is is touted as an indicator of OR efficiency. Increased TT may result in increased costs by resulting in portions of cases that should have been performed during regular operating hours being done after hours, therefore incurring overtime expenses. Furthermore, delayed completion of a procedure adversely impacts satisfaction of patients and their families, anesthesia providers, and surgeons. TT is a function of multiple factors relating to the patient (eg, on-time arrival in the HA, adherence to NPO and other preoperative instructions), Holding Area (eg, availability of beds and nurses), anesthesia services (eg, preparation of the OR,

completion of the preoperative evaluation and discussion of the anesthetic plan with the patient), OR (eg, room turnover, availability of equipment and supplies), surgeon (eg, availability, completion of updated history and physical exam), and postoperative care (eg, availability of a bed in PACU or ICU, transport of patient to area for recovery). We chose to focus our study on the impact of TT when transporting a patient from an OR to an ICU. Our PACU is immediately adjacent to the OR suite, so transport time is relatively short. In contrast, transport to an ICU may involve taking a patient to a different building and up 6 or 8 floors. In addition, logically the time necessary to give report on an ICU patient is longer than that necessary to give report on a non-ICU patient going to the PACU.
As expected, our study documented longer TT when a patient was transported from an OR to an ICU. Based on these results, the "standard" for TT should be longer if a patient is being transported from an OR to an ICU. This would have an impact on assessments that use TT as an indicator of OR efficiency and scheduling times for subsequent patients. We were surprised at the relatively small increment in TT; <10% of TT for patients transported to PACU. Factors contributing to this may include the fact that an elevator was summoned before the patient left the OR and that report had been called to the ICU nurse by the OR circulator. We plan a followup study to determine if there is a correlation between TT and the distance to the respective ICU locations.

	Number of Patients	TT (Mean + SD)
To ICU	187	65 + 29 minutes
To PACU	11,472	61 + 28 minutes

Abstract Body2:

Turnover Time (TT) is a common metric when evaluating the efficiency of an OR and is affected by multiple factors. In this study, we analyzed TT following disposition to the ICU and compared our results with TT following disposition to the PACU. We found a significant increase in TT when transporting a patient to the ICU at the conclusion of an operation.

Session Number:	P01
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM11
Topic 1:	1.2 Leadership Development
Publishing Title:	Resident Wellness and Diversity: Can International Rotations Make a Dent?
Author Block:	**V. Gilbride**[1], M. M. Salloum[2], M. Helou[3], N. L. Pesa[4]; [1]Department of Anesthesiology and Perioperative Medicine, University Hospitals Cleveland Medical Center/Case Western Reserve University, Cleveland, OH, [2]University Medical Center Anes. Dept., Shaker Heights, OH, [3]Lyndhurst, OH, [4]Chagrin Falls, OH.
Abstract Body:	**Background:** It has been well documented that residents across all specialties have shown an interest in participating in global health of some form. Opportunity to engage in such practice has not only been linked to better recruitment in many residency training programs, but also contributed to positive changes in current practices and reduced waste of supplies and resources[2,3]. Specific to Anesthesiology, there is a growing body of evidence that global health electives in Anesthesiology produce positive effects on ACGME core competencies, cultural proficiency, improvement in teaching, and system assessment skills[4]. Although, the impact of international rotations on resident wellness, perception of diversity in the workplace, and leadership development has not yet been the focus of prior studies. **Objective:** Our primary objective is to correlate international rotation participation with improvements in resident wellness, inclusion of diversity in the workplace, and in turn promote more well-rounded leaders in medical practice. **Methods:** We conducted a retrospective online survey that was distributed to senior residents in Anesthesiology and Otolaryngology at one large US-based academic center, who participated in an international elective in Uganda between January 2014 and April 2020. Inclusion criteria included any current or former Anesthesiology or Otolaryngology resident who participated in the elective in the above-mentioned time frame. Notably, the defined elective is ACGME approved for Anesthesiology participants, whereas it has yet to be approved for Otolaryngology residents, whom elected to use vacation time to participate. Survey items were based on literature review, current ACGME Faculty and Resident Well-Being Surveys[5], the AAMC Diversity Engagement Survey[5], and reports from current residents in the program who completed the elective. A total of 6 Anesthesiology residents and 18 Otolaryngology residents were identified. At the present time, 4 Anesthesiology residents and 16 Otolaryngology residents have completed the elective. An additional 4 residents are scheduled to complete the rotation by April 2020, and data analysis will be complete at that time. **Results:** The data obtained from the survey has shown multiple positive outcomes after preliminary statistical analysis. Residents participating in the

Abstract Body2:

international rotation were able to perform their own cases under attending supervision and expressed professional growth and enhanced leadership skills. Residents noted an increased sense of pride in their work upon returning from the elective. They also reported feeling a deeper connection to their work, along with their work feeling more meaningful. During their international rotation, residents enjoyed going to work each day with an increased vitality as compared to working back home. Residents reported being more comfortable in different cultural situations as a result of their work abroad, and also felt they became more conscious of diversity and the value of it. Final aggregate statistical analysis as well as subgroup analysis will be available December 2019.

Significance: Global outreach to underserved populations changes the world for the better. It solidifies and enhances the core values of medicine, which include compassion, healing, and benevolence to all mankind. Residents participating in global health rotations show a positive impact on their well-being, inclusion and understanding of diversity, and become better leaders. Future prospective and longitudinal studies will be needed to validate these findings.

References: 1. 2016 medical school graduation questionnaire. www.aamc.org. Updated 2016. 2. McCunn M, et al. J Clin Anesth. 2012;24: 38-43. 3. Evans FM, et al. Can J Anaesth. 2016;63:674-681. 4. Dohlman L, et al. J Med Ed and Cur Dev. 2019; 6: 1-7. 5. Perfect Compliance. Annals of Internal Medicine. 2019; 170 (4): 257-258. 6. The Diversity Engagement Survey. www.aamc.org. 2019

International rotations integrated into residency programs can lead to an overall increase in resident wellness, a better appreciation and understanding of the need for diversity, and growth of residents to become better leaders in the healthcare field. The retrospective survey conducted shows these positive outcomes through preliminary statistical outcomes.

Session Number: P02

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM28

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: Using Cost and Productivity Surveillance to Identify Unjustified Provider Underutilization Stemming from Gap Time and Delayed First Starts

Author Block: **S. Wang**[1], N. K. Shah[2], C. M. Molzahn[2], E. E. Lebovitz[2], M. E. Hudson[2]; [1]University of Pittsburgh School of Medicine, Pittsburgh, PA, [2]Anesthesiology and Perioperative Medicine, University of Pittsburgh, Pittsburgh, PA.

Abstract Body:

Introduction:

Operating rooms are the most resource intensive areas of the hospital and often drives hospital profitability. Historically, the operating room schedules often were based on block scheduling for surgeon convenience instead of OR efficiency.[1] Such designs are ill equipped to accommodate changes in the case load, resulting in variable downtime from late first starts and gap time. To tailor productivity improving measures to each individual clinical site, we generated a productivity surveillance report to identify opportunity for improvement in the variable downtime for each individual hospital in the University of Pittsburgh Medical Center (UPMC).

Method:

All data was collected from the UPMC across 11 hospitals and 2 ambulatory surgery centers for FY2018. Total staffed hours were compiled from the Kronos System while the total surgical time was derived from the electronic medical record (Cerner Surginet). Elements of downtime were categorized as fixed downtime and variable downtime. Fixed downtime represented contracted CRNA ready-time, CRNA breaks, and a set turnover time. Opportunities for workflow optimization, variable downtime represented delayed first starts and gap time. Cost per OR hour was calculated from the total CRNA salaries and hospital salaries per hour divided by total surgical hours.

Results:

Total staffed hours across the system were 397,952 hours and the total surgical hours were 228,928 hours. (Table 1) Total utilization of staff was 57.5%. Total underutilized OR hour per total staffed time was 10.8%. Total underutilized OR hour per total surgical time was 18.8%. Total variable downtime was 42,961 hours. Downtime from late first starts ranged from 5.7-12.3% while downtime from gap time ranged from 87.7-94.3% at our sites. Comparatively, hospitals in our system had a slightly higher percentage of late first starts compared to ASCs ($p>0.05$). With the goal of achieving 10% underutilized OR hours/total staffed hours in all sites, the total reduction in hours amounted to 5,452 hours across the system and a potential $1.4M in savings.

Discussion:

Anesthesia group productivity is often difficult to externalize for comparison

between clinical sites.[2] Using cost and productivity surveillance, we aimed to identify inefficiencies in the clinical sites from unjustified provider underutilization. Variable downtime comprised of late first starts and gap time attribute to provider underutilization resulting in unjustified cost. The majority of variable downtime in the OR is due to gap time excluding contracted and anticipated downtime. Further studies are needed to assess the cause of the late first starts and gap time to identify the delay in the OR workflow and increase work efficiency and allow for targeted interventions.

References:

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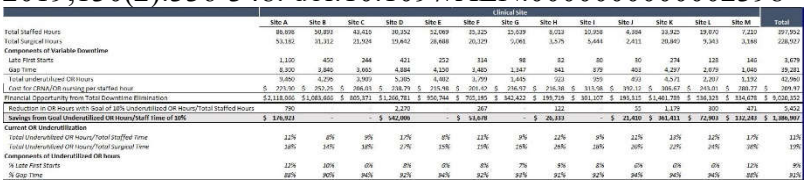
2. Abouleish AE, Hudson ME, Whitten CW. Measuring Clinical Productivity of Anesthesiology Groups: Surgical Anesthesia at the Facility Level. *Anesthesiology*. 2019;130(2):336-348. doi:10.1097/ALN.0000000000002398



	Clinical Site													
	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H	Site I	Site J	Site K	Site L	Site M	Total
Total Staffed Hours	86,698	50,893	42,419	30,352	32,089	35,225	22,629	8,033	10,958	4,394	23,925	19,870	7,220	397,992
Total Surgical Hours	53,182	31,312	21,924	19,462	28,688	20,129	9,081	3,575	5,444	2,411	20,949	9,343	3,388	228,507
Components of Variable Downtime														
Late First Starts	1,120	450	244	421	252	334	98	82	80	30	274	128	146	3,679
Gap Time	8,300	3,846	3,660	4,884	4,150	2,465	1,347	841	879	402	4,297	2,879	1,040	39,281
Total underutilized OR Hours	9,420	4,296	3,903	5,305	4,402	2,799	1,445	923	959	433	4,571	3,007	1,186	42,960
Cost for CRNA/OR nursing per staffed hour	$ 225.90	$ 252.25	$ 266.81	$ 238.79	$ 215.98	$ 201.42	$ 236.92	$ 216.38	$ 313.98	$ 392.12	$ 306.67	$ 243.01	$ 288.77	$ 269.47
Financial Opportunity from Total Downtime Elimination	$2,118,666	$1,083,666	$ 805,371	$1,266,781	$ 950,744	$ 705,195	$ 342,422	$ 199,719	$ 301,107	$ 169,915	$1,401,793	$ 734,323	$ 334,678	$ 9,026,352
Reduction in OR Hours with Goal of 10% Underutilized OR Hours/Total Staffed Hours	790	-	-	2,279	-	267	-	122	-	72	1,179	300	471	5,452
Savings from Goal Underutilized OR Hours/Staff Time of 10%	$ 178,521	-	-	$ 542,006	-	$ 53,678	-	$ 26,333	-	$ 21,410	$ 361,411	$ 72,903	$ 132,243	$ 1,386,967
Current OR Underutilization														
Total Underutilized OR Hours/Total Staffed Time	11%	8%	9%	17%	8%	11%	9%	11%	9%	11%	18%	12%	17%	11%
Total Underutilized OR Hours/Total Surgical Time	18%	14%	18%	27%	15%	19%	16%	26%	18%	20%	22%	24%	35%	19%
Components of Underutilized OR hours														
% Late First Starts	12%	10%	6%	8%	6%	8%	7%	9%	8%	6%	6%	4%	12%	9%
% Gap Time	88%	90%	94%	92%	94%	92%	93%	91%	92%	94%	94%	96%	88%	91%

Abstract Body2:

Operating rooms are one of most resource intensive areas of the hospital and often drive hospital profitability. Historically, the operating room schedule was based on block scheduling for surgeon convenience instead of OR efficiency. Such designs are ill equipped to accommodate changes in the caseload, resulting in variable downtime from late first starts and non-contracted gap time. Using these metrics across our 13 sites, the total variable downtime was 42,961 hours. Of the total, 8% was attributed to delayed first starts while the remaining was attributed to gap time. With the goal of 10% OR underutilization per staffed hours, the total systemwide opportunity from goal variable downtime elimination was $1.4M.

Session Number:	P01
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM17
Topic 1:	1.4 Research in Perioperative Management
Publishing Title:	Cost Analysis of Anesthesia Type Variation Between Hospitals within a Large Academic Medical Center
Author Block:	**E. Lebovitz**[1], R. D. Ball[2], N. K. Shah[3], M. E. Hudson[4]; [1]Anesthesiology and Perioperative Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Gibsonia, PA, [3]Pittsburgh, PA, [4]Finleyville, PA.

Abstract Body:

Introduction:

Anesthesiologists have a wide range of techniques and medications at their disposal to limit the amount of pain and suffering a patient experiences in the perioperative period. The choice of anesthetic technique depends on a variety of factors including the surgical procedure, the general condition of the patient, and resource availability. Regional anesthesia has a multitude of benefits for the patient for total hip and knee arthroplasty and AV fistula surgery[1,2]. The aim of this study is to analyze the variation in regional anesthesia use throughout different facilities within our institution and assess the impact on cost and clinical outcomes.

Methods:

Data were collected from the EMR for CY2018 for various procedures performed at 10 different hospitals in the UPMC system. These procedures included knee and hip arthroplasty and arteriovenous fistula surgery. Cases that received a spinal anesthetic were classified as spinal, regardless of the type of anesthesia used for maintenance. Cases performed under surgical block were classified as nerve blocks in the same manner. All other cases were documented as general anesthetics or monitored anesthetic care with or without the use of an endotracheal tube or laryngeal mask airway.

Results:

In CY2018, 543 surgeries for total knee arthroplasty were performed of which the use of spinal anesthesia ranged from 0 - 97.6%, mean = 62.9%. Nerve blocks were used as the primary anesthetic 0 - 50.0% of the time, mean = 10.87%. GA was utilized from 2.4 - 100%, mean = 27.3%. Costs were reported as follows; GA ($284.76 ± 84.32), Spinal ($312.73 ± 115.85), Block ($343.27 ± 96.70).

For AV fistula surgery, 473 cases were performed in CY2018. Of those, 19 (4.02%) were performed under regional anesthesia, all at one site. Of the remaining cases, 176 (37.21%) were performed under GA, 278 (58.77%) were performed under MAC. MAC resulted in the lowest cost ($225.33 ± $27.39) followed by GA ($270.25 ± $61.63), then regional ($342.52 ± $8.29).

Discussion:

Previous studies examining variation in the use of regional anesthesia for total hip arthroplasty, total knee arthroplasty, and arteriovenous fistula surgery have

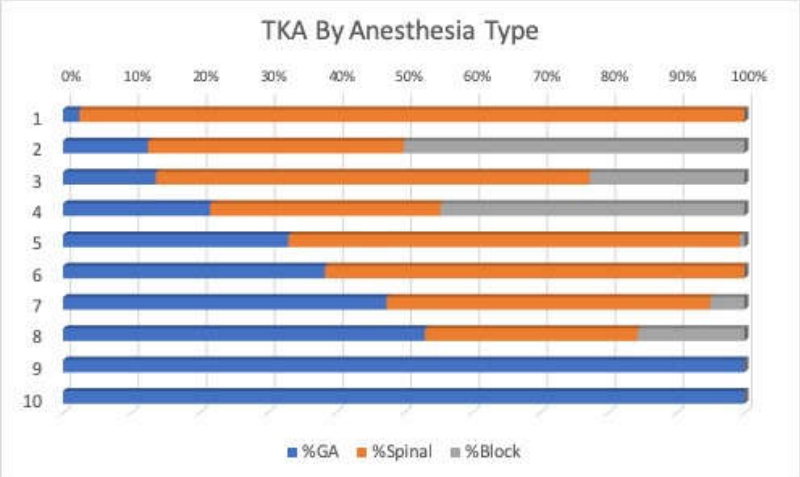
demonstrated numerous benefits for patients[2]. In our study, we observed a significant difference in regional anesthesia usage in different hospitals. There are likely several reasons for this. First, coverage by acute pain teams varies between our hospitals and each has a different preference for performing acute pain procedures. It is important to note that reimbursement is not tied to performance of these pain procedures for providers. Physicians are therefore not financially incentivized to perform extra procedures and in fact the converse may be true; that they may choose to decrease their medico-legal risk of nerve or vascular injury/damage, pneumothorax, etc., in exchange for improved care for their patients. This study aims to shed light on practice pattern variation in our institution in the hope that as anesthesia practice patterns evolve and healthcare transitions to a value-based payment system, care techniques including regional anesthesia that satisfy the triple aim in healthcare can be more widely and consistently adopted.

References:

1.
Milosavljevic SB, et al. Med Sci Monit. 2014 Oct 6;20:1833-40. Influence of spinal and general anesthesia on the metabolic, hormonal, and hemodynamic response in elective surgical patients.

2.
Cole NM, et al. Regional Anesthesia for Arteriovenous Fistula Surgery May Reduce Hospital Length of Stay and Reoperation Rates. Vasc Endovascular Surg. 2018 Aug;52(6):418-426.

Abstract Body2:



The aim of this study was to analyze the variation in cost and outcomes of regional anesthesia use throughout 10 different facilities within our institution. In CY2018, 543 surgeries for TKA were performed of which spinal anesthesia ranged from 0 - 97.6%. Nerve blocks were used as the primary anesthetic 0 - 50.0% of the time. GA was utilized from 2.4 - 100%. Costs were reported as follows; GA ($284.76 ± 84.32), Spinal ($312.73 ± 115.85), Block ($343.27 ± 96.70). This variation may be due to financial and medico-legal disincentive to perform blocks. As anesthesia practices evolve to a value-based payment system, care techniques that satisfy the triple aim in healthcare may be more consistently adopted.

Session Number: P00

Session Title: Practice Management 2020 Poster Judging

Presentation Number: PM08

Topic 1: 1.4 Research in Perioperative Management

Publishing Title: Do Nursing Facilitators in the OR Help Reduce Turnover Time?

Author Block: **J. Chadha**[1], B. Sindelar[1], E. A. Bowe[2];
[1]University of Kentucky, Lexington, KY, [2]Nicholasville, KY.

Abstract Body:

INTRODUCTION

Opportunities continue to exist to improve OR efficiency. Our main hospital, a Level I Trauma Center, was inadequate to meet demand for elective cases in prime time (0700 - 1730). The reported Prime Time Utilization Rate (PTUR) in the main OR of our tertiary care Level 1 trauma center was consistently 81%-85%. In an effort to improve turnover time, from August 2019, 3 nursing registered nurse facilitators (RNs) were designated to help ORs prepare for the next case. Our hypothesis is that the introduction of nursing facilitators would reduce OR turnover time (TT).METHOD

Using our OR tracking program (OR Manager^{TM}, Picis), we calculated OR TT for 2 the months before (PRE) and 2 months after (POST) introduction of nursing facilitators. We eliminated first start cases with TT=0 , cases with TT >180 minutes, cases starting after 1730, emergency cases, and weekend/holiday cases, and calculated turnover times for scheduled cases. TT was defined as "time from prior patient out of room to succeeding patient in room time for sequentially scheduled cases."[1]. A t-test was conducted to compare the TT for PRE and POST. We also determined the percentage of cases with TT > 90 minutes and used a Chi square analysis to compare PRE and POST.

RESULTS

Data are presented in the Table 1 below. There was no significant difference in TTs before (62 $\pm$ 29 minutes) and after (60 + 26 minutes) implementation of facilitators; t (3337) = 1.28, p = 0.20. The proportion of cases with TT > 90 min did not differ between PRE and POST, X^2 (1,N = 3338) = 3.34, p = .07.

A 2-sample t-test was conducted to compare the TT before and after introduction of nursing facilitators in the OR. Before implementation of facilitators, TT was 62 +/- $\pm$ 29 min and 1% of cases had turnover times > 90 min. After implementation of facilitators TT was 60 +/- 26 min and 11% of cases had turnover times > 90 minutes. On Chi squared analysis, p value for these results was 0.67 (>0.05). There was no difference in mean TT or percentage of turnover times > 90 min.

DISCUSSION

The availability of RNs in the OR has been a significant problem in our OR. Each day we routinely have 20 add-on cases (25% of total daily cases). Predicated on other studies[2] which have demonstrated that RN facilitators have improved OR efficiency and decreased TT, the decision was made to allocate 3 RNs each day to

the role of facilitator instead of opening an additional OR.
Implementation of RN facilitators did not improve TTs. With only 1% of cases having TT more than 90 mins before their introduction, in an institution with many inpatient surgeries and PTUR >80%, efficiency was not increased with a nursing facilitator. Issues with Central Sterile Supply and Materials Management & delays in transporting patients to the Holding Area may contribute to some prolonged TTs. Nursing preparation for the OR do not appear to be the main factors causing delay in TT. The statistical power of this study is affected by analysis over a short period of 4 months, and analysis over a longer period to improve statistical significance is recommended. Having 3 facilitators over 32 ORs also means, they are involved in preparation of all cases, thus the effect of facilitators helping turnover in all ORs and over a longer period may be beneficial to re-study.
CONCLUSION
Nursing facilitators in the OR did not help to improve TT in our institution.
REFERENCES
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2.Panni MK, Shah SJ Improving operating room first start efficiency - value of both checklist and a pre-operative facilitator. Acta Anaesthesiol Scand 2013; 57:118-223.

	Number of Cases	Mean ± SD	TT > 90 min	
PRE	1725	62 ± 29 min	226	
POST	1613	60 ± 26 min	178	

Abstract Body2:

In an effort to improve turnover time, from August 2019, 3 nursing registered nurse facilitators (RNs) were designated to help ORs prepare for the next case. Our hypothesis is that the introduction of nursing facilitators would reduce OR turnover time (TT). We calculated OR TT for 2 the months before (PRE) and 2 months after (POST) introduction of nursing facilitators. There was no difference in mean TT or percentage of turnover times > 90 min on our statistical analysis. Nursing preparation for the OR do not appear to be the main factors causing delay in TT.

Session Number:	P00
Session Title:	Practice Management 2020 Poster Judging
Presentation Number:	PM02
Topic 1:	1.1 Quality Improvement
Publishing Title:	Development of the COBRA Score: A Novel Pre-Operative Venous Thromboembolism Risk Assessment Model
Author Block:	**R. Zeidan**[1], M. A. Romej[1], E. Mlaver[2], C. Gallion[3], J. Sharma[2], G. C. Lynde[1]; [1]Department of Anesthesiology, Emory University School of Medicine, Atlanta, GA, [2]Department of Surgery, Emory University School of Medicine, Atlanta, GA, [3]Birmingham-Southern College, Birmingham, AL.

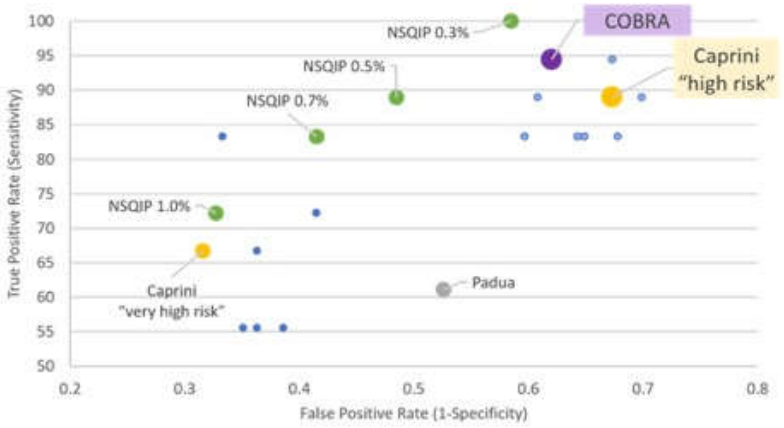
Abstract Body:

Objectives

Venous thromboembolism (VTE) remains a leading preventable cause of postoperative morbidity and mortality. The National Surgical Quality Improvement Program (NSQIP) recommends prophylaxis based on individualized risk stratification, but standardization remains challenging due to variation in risk assessment models (RAMs) and the cumbersome addition to workflow that most RAMs represent. To address recent worsening VTE rates at our hospital, we engaged in a comprehensive QI initiative. One central goal was to develop a RAM that is automatable and actionable within the pre-operative workflow. With operationalization in mind, we aimed to rule out low risk patients that do not need chemoprophylaxis such that the RAM can provide decision support without cumbersome data entry.

Methods We performed a review of 189 general surgery patients (18 VTE cases, 171 matched controls) from 2017-2018. To identify which risk factors would be included in our novel RAM, we compared variable definitions of the Caprini, Padua and NSQIP RAMs. We defined the impact of each variable by the prevalence of each risk factor in the study population, the ease of accessing data, and the reliability of documentation within the EMR, in addition to the score contribution within the RAMs. The COBRA score was developed using the five top-scoring variables from this process: cancer, (old) age, BMI, race, and ASA. In the study cohort, we compared the predictive ability of the Caprini, Padua, NSQIP, and COBRA models for VTE outcomes. We validated the COBRA score in a cohort of 5964 NSQIP-reported general surgery patients from 2014-2017, comparing risk stratification thresholds to NSQIP expected VTE risk.

Results The Caprini Score was found to be 88.9% sensitive and 32.7% specific using a threshold of 5. The Padua Score was found to be 61.1% sensitive and 47.4% specific using a threshold of 4. The COBRA Score was found to be 94.4% sensitive and 38.0% specific using a threshold of 4. At this threshold, the COBRA score labeled 34% of the NSQIP cohort as low risk. This low risk group had a mean risk of 0.57% (IQR 0.09-0.75%). The 66% of patients above the threshold had a mean VTE risk of 1.48% (IQR 0.24-2.15%).



Abstract Body2:

Barriers for VTE risk assessment include lack of concordance in factors that contribute to risk and difficulty with RAM automation due to cumbersome manual data entry. Focused on usability, we developed a novel VTE RAM for the pre-operative workflow. The COBRA model provides chemoprophylaxis decision support without cumbersome data entry.

Session Number: P00

Session Title: Practice Management 2020 Poster Judging

Presentation Number: PM01

Topic 1: 1.1 Quality Improvement

Publishing Title: Reducing Intra-Operative Transitions of Care through the Use of Data and an Electronic Physician Scheduling Program

Author Block: **G. Gilly**, J. C. Morello, T. Truxillo;
Ochsner Medical Center, New Orleans, LA.

Abstract Body:

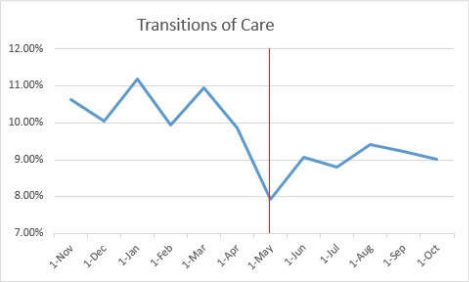
Several studies have shown that there is an association between postoperative complications and the number of anesthesiologists per case[2]. Baigan et al. states that "on average, for every 15 patients exposed to a [transition of care event], 1 additional patient would be expected to experience a primary outcome" of all-cause mortality, readmission, or major post-operative complication within 30 days of surgery[3]. Hyder et al.'s observational study of a single academic tertiary care center showed that "care by additional attending anesthesiologists and in-room providers was independently associated with an increased odds of postoperative complications" and "challenges the assumption that anesthesia transitions are care neutral and not contributory to surgical outcome"[2].

The Department of Anesthesiology at Ochsner Medical Center in New Orleans, LA transitioned from an old scheduling model to a new data driven system in March of 2019. The old model was based on a hierarchical relief system where the number of operating rooms running dictated staffing numbers and therefore the number of transitions of care that occurred. The newly implemented system uses a data driven assignment staffing model in which transitions of care were based on preset times. The transition of care times were chosen after analyzing operating room volume data over a 12 month period. An important goal of the new staffing model was to reduce the number of transitions of care events. In the first 6 months after implementation, the number of transitions of care events were reduced by 15% [Table 1].

This 15% reduction prevented a transition of care in 392 surgical cases over a 6 month period. Based on the work of Baigan et al. this change has potentially prevented 26 patients from having significant post-operative complications. In addition, if the estimated cost of an average surgical complication is $11,500 per case then this new staffing model has prevented $300,000 in complication costs[2].

Transitions of care events pose significant risks to patients and costs to healthcare systems. Often, errors that occur as a result of transition of care events are multifactorial[1]. Prevention of these errors will likely require multiple innovative solutions as the field of Anesthesiology evolves to meet the demands of patient care in the current health care climate. The focus of this research was to reduce the number of transitions of care events. We believe that we can further reduce transition of care events by using a data driven approach to continue to refine our new scheduling model.

	Pre-Change	Post-Change
Transitions of Care (%)	10.4%	8.89%
Transitions of Care (Total)	2,628	2,329
Total Cases	25,614	26,172



1-Nov	10.63%	
1-Dec	10.04%	
Jan-19	11.19%	
Feb-19	9.95%	
Mar-19	10.95%	6 Month Average
Apr-19	9.87%	10.44%
May-19	7.93%	
Jun-19	9.08%	
Jul-19	8.80%	
Aug-19	9.42%	
Sep-19	9.22%	6 Month Average
Oct-19	9.01%	8.91%

Works Cited

1. Bagian, James P., and Douglas E. Paull. "Handovers During Anesthesia Care." *Jama*, vol. 319, no. 2, 2018, p. 125., doi:10.1001/jama.2017.20602.
2. Hyder, Joseph A., et al. "Anesthesia Care Transitions and Risk of Postoperative Complications." *Anesthesia & Analgesia*, vol. 122, no. 1, 2016, pp. 134–144., doi:10.1213/ane.0000000000000692.
3. Jones, Philip M., et al. "Association Between Handover of Anesthesia Care and Adverse Postoperative Outcomes Among Patients Undergoing Major Surgery." *Jama*, vol. 319, no. 2, 2018, p. 143., doi:10.1001/jama.2017.20040.

Abstract Body2:

Transitioning care of patients between providers can pose significant risks to patients and costs to healthcare systems. Errors that occur as a result of transition of care events are multifactorial[1]. The Department of Anesthesiology at Ochsner Medical Center transitioned from a hierarchical scheduling model to a new data driven system in March of 2019. In the first 6 months after implementation the number of transitions of care events were reduced by 15%. This 15% reduction prevented a transition of care in 392 surgical cases over a 6 month period and potentially prevented 26 patients from having significant post-operative complications[1]. If the estimated cost of an average surgical complication is $11,500 per case then this new staffing model has prevented $300,000 in complication costs[2].

Session Number:	P01
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM20
Topic 1:	1.1 Quality Improvement
Publishing Title:	Burn Intensive Care Unit and Floor to Operating Room Transfers: A Preliminary, Multidisciplinary Analysis to Improve Resource Utilization in a High-Volume Service
Author Block:	**J. Williams**, C. G. Simmons, J. Brainard; Department of Anesthesiology, University of Colorado, School of Medicine, Aurora, CO.
Abstract Body:	**Introduction:** Operating rooms (ORs) account for approximately 40% of hospital costs while generating roughly 70% of revenue and OR utilization is linked to important outcomes such as care team and patient satisfaction; therefore, it is no surprise that efficient use of OR time is essential for the financial success of a healthcare organization. Historical institutional data for burn patients revealed a strong association between inpatient status and OR delays and also showed average first-case and turnover delays of ~ 25 minutes. To address these shortfalls in OR utilization, we undertook a comprehensive, multi-disciplinary quality improvement (QI) initiative to improve OR transfer efficiency in burn ICU and floor patients. **Methods**: We obtained grant funding from the University of Colorado Hospital/School of Medicine Clinical Effectiveness and Patient Safety Small Grants Program. A multidisciplinary committee—representing anesthesiology, burn surgery, OR and burn unit nursing leadership—convened to construct a process map and perform a root-cause analysis to identify inefficiencies in the current transfer process. A professional research assistant was also hired to gather real-time feedback and quantify the transfer process in a sample of burn patients requiring transfer to the OR. Descriptive statistics and multivariate logistic regression (significance set at a p-value of < 0.05) were used to analyze factors that may contribute to delays. **Results**: 16 first-case starts and 34 non-first-case starts were audited (n = 50). 72% of all cases were delayed with an average delay time of 26.5 (range 1-167) minutes. 50% of first-start cases were delayed, with an average delay time of 12.3 (range 1-48) minutes. 82% of non-first case starts were delayed, with an average delay time of 43.8 (range 2-167) minutes. For non-direct OR transfers, the average time spent in the pre-operative holding area was 56.6 (range 18-120) minutes. Regression analysis, examining multiple factors (Table 1), revealed a R-square of 0.30 and demonstrated that only a first-case start was significantly predictive of preventing OR delays (p value = 0.003). QI analysis (Figures 1 & 2) and qualitative feedback identified excessive handoffs and delayed communication as primary factors in

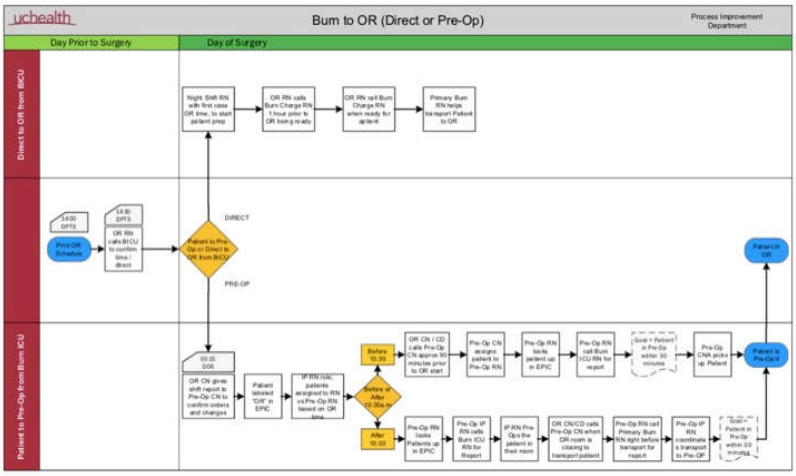
OR transfer delays.

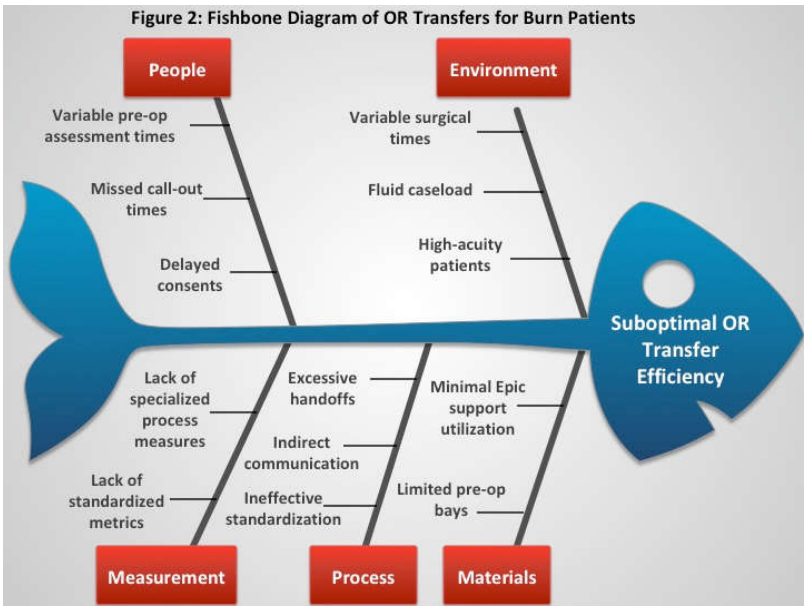
Conclusion:

Most patient and logistical factors were not predictive of delayed transfers for burn patients, which may be explained by the complex nature of OR transfers. However, feedback on communication deficiencies was highly informative. PDSA interventions are currently being implemented, focusing on streamlined communication (i.e. a dedicated "burn team phone" with an anesthesia-driven transfer team) as well as electronic health record prompts to address delays or lapses in communication.

Table 1: Factors Evaluated for OR Transfer Delays in Burn ICU and Floor Patients
First case start
ASA score
Surgical case code (surgical case difficulty)
Contact precaution status
Ventilator dependence
Vasopressor requirement
Tube feed requirement
Surgical consent completed prior to day-of-surgery
Anesthesia consent completed prior to day-of-surgery

Figure 1: Process Map of Burn ICU & Floor Transfers



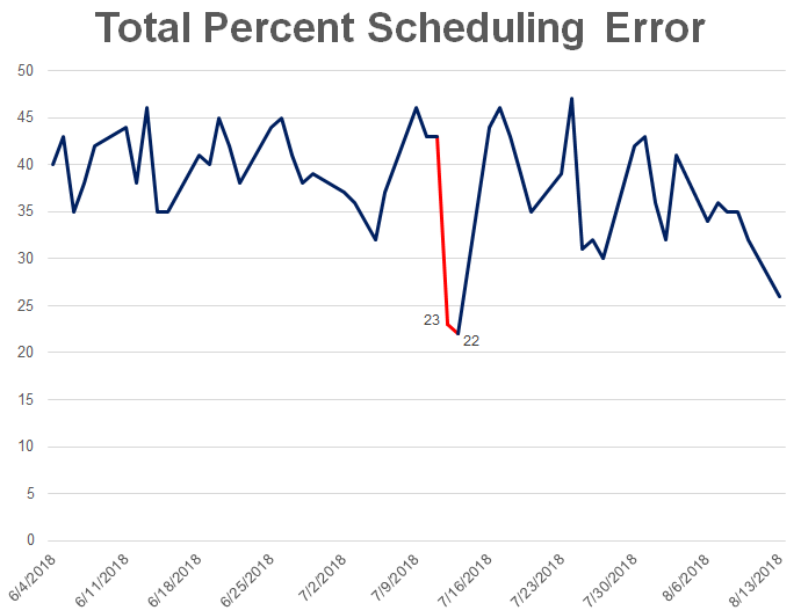


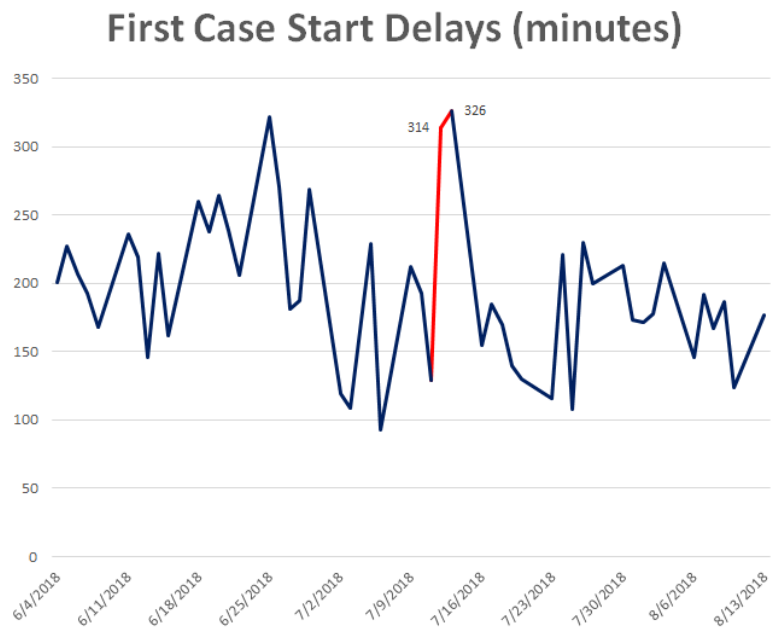
Abstract Body2: In order to improve OR transfer efficiency in burn ICU and floor patients, a multidisciplinary initiative revealed that communication deficiencies, and not specific patient or logistic factors, were responsible for excessive first-case and turnover delays. Based on a comprehensive QI analysis, PDSA interventions are being implemented with an emphasis on streamlined communication and the assistance of EHR prompts to improve OR utilization.

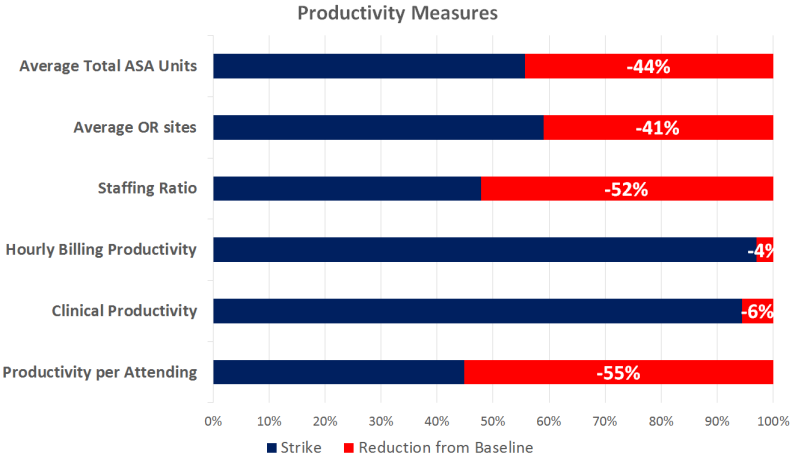
Session Number:	P02
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM21
Topic 1:	1.4 Research in Perioperative Management
Publishing Title:	Nursing Strikes Impact on OR Efficiency
Author Block:	**N. Patel**[1], C. Mayhew[2], M. H. Tsai[3], M. E. Hudson[4]; [1]Education, Training and Research, GME, National Capital Consortium, Bethesda, MD, [2]Anesthesia, University of Vermont, Burlington, VT, [3]Anesthesia, Orthopaedics and Surgery, University of Vermont, South Burlington, VT, [4]Anesthesia, University of Pittsburgh Medical Center, Pittsburgh, PA.
Abstract Body:	**Introduction:** Perioperative processes represent complex systems consisting of several working parts that rely on one another to function efficiently and effectively. Traveling staff decreases efficiency, increases costs and impacts safety. University of Vermont nurses' union went on strike for two days. The hospital hired 600 traveling nurses to continue normal operations and surgeons cancelled 68 scheduled cases. Study objective: To use operating room (OR) management and clinical productivity metrics to evaluate the realized and unrealized financial and operational impacts a nursing strike has on the perioperative services. **Methods:** Data was extracted from WiseOR® (Palo Alto, CA) at UVMMC from June 4, 2018 to August 13, 2018. Holidays and weekends were excluded. Operating Room Efficiency was analyzed with first-case start delays, prolonged turnover times, after-hours utilization, volume of cases, and scheduling error. Productivity calculations: Clinical Productivity = (base+time units)/(OR sites/day). Hourly Billing Productivity = (base+time units)/(time units/4). Clinical Productivity per Attending = (base+time units)/(OR FTE/d). Staffing Ratio = (OR sites/d)/(OR FTE/d). **Discussion:** The strike increased the administrative burden on OR directors and changed the workflow. The institution transitioned from a mixed-patient workload to an ambulatory surgical queue to maintain patient safety. The hospital still paid for fixed costs and missed chances to generate hospital revenue. 1:1 ratios are not viable for practice because departments cannot spread the expense of an anesthesiologist across multiple rooms. A nursing strike increases staffing costs, decreases OR efficiency, and it lowers the clinical productivity of a perioperative service. Improved operational efficiencies without compromising patient safety in this study may be attributed to fewer cases, decreased complexity of surgical cases, and a higher staffing ratio. **Conclusion:** There was a financial and operational impact of nurses on strike and hiring travelling nurses to maintain normal operations. Evaluating the realized and unrealized opportunity cost a nursing strike has can help perioperative managers and clinical directors understand the financial and operational impact for future

strikes. OR directors need to be part of discussions before hospital strikes to balance patient safety against long-term implications and unrealized costs.

	Average	Strike	% change
Volume	46.8 cases	30.5 cases	-35%
After Hours' Time (total)	636.0 min	193.5 min	-70%
Scheduling Error	38.8%	22.5%	-42%
Turnover Time	40.3 min	38.0 min	-6%
First Case Start Delay	194.8 min	320.0 min	+69%
Ambulatory Volume	17.3 cases	0 cases	-100%







Abstract Body2:

Little information is available about the impact of nursing strikes on perioperative services. We use operating room (OR) management and clinical productivity metrics to evaluate the realized and unrealized financial and operational impacts a nursing strike has on the perioperative services at the University of Vermont Medical Center.

Session Number: P02

Session Title: Practice Management 2020 e-Abstracts

Presentation Number: PM29

Topic 1: 1.1 Quality Improvement

Publishing Title: Opportunity Cost Due to Non-Surgical Time

Author Block: **H. Burke**, M. Morgan, C. Richardson, E. Lebovitz, M. E. Hudson; Department of Anesthesiology and Perioperative Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA.

Abstract Body:

Introduction: Secondary to rising surgical and health care costs, PTE in the operating room (OR) has become an increasingly important focus for value based care.[1] Recently, it has been estimated that surgical expenditures amount to nearly one third of total health care costs in the U.S.[2] The relationship between surgical time and total paid time has been used as a surrogate for improving PTE. While many studies have examined factors associated with provider team inefficiencies – such as case duration accuracy, procedure cancellation rate, and operating room turnover time – very few have accurately assessed the financial impact of non-surgical time inefficiency.[3] This study aims to define the opportunity cost of non-surgical time inefficiency by describing the relationship between PTE and the cost of non-surgical time within a large multi-hospital academic center.

Methods: To determine the statistical relationship between non-surgical portion of the cost per OR hour to the percentage of non-surgical time (*1 - PTE*), a linear regression analysis was performed on available PTE data from nine hospitals within a multi-hospital academic center. PTE, in this study, is defined as total surgical time per total paid time, per day, from 07:00 to 17:00, for the calendar year of 2018, within each hospital. To calculate the estimate of total cost per hospital, total OR volume in OR hours for the calendar year of 2018 was multiplied by the corresponding hospital's specific OR cost per hour. Finally, total cost was multiplied by the efficiency factor for each institution, designated as the equation *1 - PTE*, to calculate the total cost of non-surgical time. To evaluate the association between non-surgical time inefficiency and total cost per OR hour a linear regression model was used with weights assigned proportional to each site's volume in hours.

Results: The association between the non-surgical portion of the cost per OR hour to the percentage of non-surgical time (*1 - PTE*) is illustrated in Figure 1. This analysis assigns weight to each hospital proportional to the site's volume of hours. A linear regression indicates that every 1% increase in the percentage of non-surgical time is associated with a $9.92 increase in total cost per OR hour; $p = 0.002$ and $R^2 = 0.78$.

Discussion: Strategies to improve OR efficiency have become an area of increasing interest among medical institutions across the U.S.[4] Defining and comparing the opportunity cost of non-surgical time inefficiency among separate

hospitals within a large academic center may provide insight into potential areas of improvement. By comparing real-time PTE to current OR costs and volume, a more comprehensive and accurate snapshot of overall OR performance can be obtained. This data may then serve as a baseline to incentivize changes in practice management.

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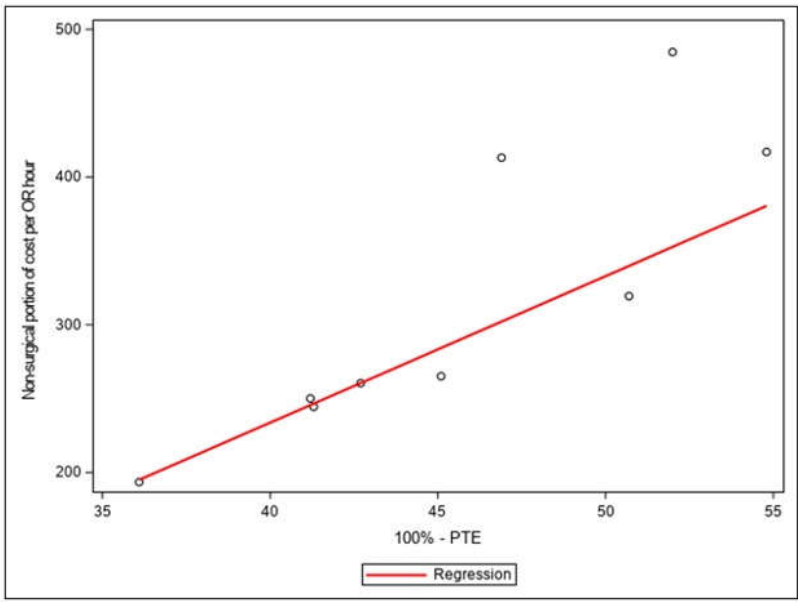

Abstract Body2:

As aggregate surgical health care expenditures grow, increased attention has been placed on improving provider team efficiency (PTE). This study examines the relationship between PTE and the cost of non-surgical time within a large multi-hospital academic center. Very few studies have accurately quantified the financial impact of non-surgical time inefficiencies. A simple linear regression indicates that every 1% increase in the percentage of non-surgical time is associated with a $9.92 increase in total cost per OR hour; $p = 0.002$ and $R^2 = 0.78$. These results may serve as a baseline for further investigation and potentially incentivize changes in future practice management within anesthesiology.

Session Number:	P01
Session Title:	Practice Management 2020 e-Abstracts
Presentation Number:	PM14
Topic 1:	1.1 Quality Improvement
Publishing Title:	Concurrency Ratios versus tASA per OR per Day in a Multi-center, Large Academic Institution
Author Block:	C. Richardson, M. C. Morgan, **H. Burke**, E. E. Lebovitz, M. E. Hudson; Department of Anesthesiology and Perioperative Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA.

Abstract Body:

Introduction: Concurrency is defined as the average number of staffed operating rooms divided by the total average staffed anesthesiologists.[4] Secondary to dynamic and evolving reimbursement policies over the past several decades, the effect of concurrency has often been a point of contention within intergroup comparisons of clinical productivity. It has previously been demonstrated that when no statistical difference was found between concurrency, academic institutions must work significantly more hours per OR site per day to make the same tASA per OR as private practice institutions.[1] Additionally, many academic institutions serve as tertiary or quaternary care facilities, where case complexity may limit high concurrency ratios and decreased number of cases per OR per day. Given this, it is hypothesized that increasing concurrency ratios will lead to an increase in tASA per OR per day.

Methods: OR billable hour efficiency and staffing efficiency data was reviewed for multiple hospitals within a large academic center.[4] Available data was subsequently ranked for nine separate divisions for both concurrency ratios and tASA per OR per day. A spearman correlation analysis was then used to compare concurrency ratios with tASA per OR per day.

Results:

Spearman correlation revealed very weak monotonic relationship between concurrency and tASA per OR per day with $r_s = -0.084$.

Table 1:

Spearman correlation analysis of Concurrency vs. tASA per OR per day

Discussion: Previous studies have demonstrated a positive correlation between productivity with concurrency. Additionally, most aspects of quality of anesthesia care appear to be unaffected by increased productivity and concurrency.[2] Several variables such as same-day cancellation rate, average operating room turnover time and excess staffing costs have been identified parameters impacting OR performance, specifically utilization and efficiency.[3] In these studies, however, concurrency was not specifically cited. Concurrency ratios in our study were very weakly

associated with the productivity metric that was selected for. This could be explained by, among many things, the different care team models used or small sample size. Further study is necessary to evaluate other markers of productivity

among both academic and private institutions to determine the true the financial impact of concurrency. Additional studies focusing on non-financial impact of concurrency on patient safety may be even more important regarding future hospital administration decision making related to concurrency.

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	Series 1		Series 3	
Division	Concurrency	Concurrency rank	tASA/OR/day	tASA/OR/day rank
1	2.1	7	51.8	4
2	1.4	9	58.9	2
3	2.2	5.5	50.8	6
4	2.4	4	38.2	9
5	2.6	3	54.3	3
6	2.7	1.5	75.9	1
7	2.7	1.5	50	7
8	2.2	5.5	49.1	8
9	2	8	51.1	5
				-0.084036581

Abstract Body2:

The effect of concurrency has been a point of contention within intergroup comparisons of clinical productivity. Historically, when no difference was found in concurrency, academic institutions must work significantly more hours per day to make the same tASA per OR as private practice institutions.[1] This study aims to describe the relationship between concurrency ratios with tASA per OR per day within a large academic center. A spearman correlation analysis found a very weak relationship between concurrency and tASA per OR per day with r_s = -0.084. This result is surprising given the available literature on factors impacting OR efficiency, prompting further study into other the relationship between concurrency and other productivity metrics.