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Original Contribution

Using an at-risk salary model to improve throughput in academic medical center operating rooms ☆,☆☆

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Rachel M. Kacmar MD[a,*], **Brian M. Davidson MD**[b,1], **Matthew Victor MD**[a,2], **Ken Bullard BS**[a,3], **Jose Melendez MD**[a,4]

[a]*Department of Anesthesiology, University of Colorado School of Medicine, 12401 E. 17th Ave, Mailstop B113, Aurora, CO 80045*
[b]*Department of Anesthesiology, St Mary's Medical Center, 2635 N 7th St, Grand Junction, CO 81501*

Abstract
Study objective: The objective was to analyze if an at-risk salary model for faculty anesthesiologists could improve on-time first case starts (FCSs) and case turnovers (TOs) in an academic hospital inpatient operating room (IOR) and ambulatory surgery center (ASC). Organizational goals were 65% and 70% on-time FCS and case TO times for IOR and ASC, respectively.
Design: This was a retrospective study.
Setting: Surgical cases performed at both the IORs and the ASCs at a large academic medical center were included.
Interventions: We converted 5% to 7% (academic rank dependent) of anesthesiologist salary from guaranteed to an at-risk salary model. Salary was earned back on a case-by-case basis by starting cases on time or by documenting a valid reason for case delay in the anesthesia record. On-time first case and goal TO times were determined using American Association of Clinical Directors standard definitions.
Measurements: Data were reviewed for 1 year prior to implementation of the at-risk salary model and for 1 year after the implementation. Monthly average on-time FCS and TO times were compared between the preimplementation and postimplementation time frames. Data were analyzed using analysis of variance for repeated measures.
Main Results: After the implementation of the at-risk salary model, the organization experienced a 33% and 86% improvement in on-time FCSs (*P* < .01) in the inpatient and ambulatory operating rooms, respectively. A 41% (IOR) and 44% (ASC) improvement in timely case TOs (*P* < .01) was also seen.
Conclusions: Anesthesiologists can drive efficiency in an operating room setting. By incentivizing on-time FCS and timely case TO with an at-risk salary model for faculty anesthesiologists, we were able to demonstrate a sustained significant improvement for these metrics. In both an inpatient and an ambulatory setting, operating room efficiency may be best served by aligning provider financial incentives with desired outcome metrics.
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1. Introduction

The operating room (OR) revenue is a key component of the financial success of a hospital. It is also one of the costliest portions for the institution. In addition, surgeon and patient satisfaction are inexorably tied to OR success through increased surgical volumes. Surgeon satisfaction is highly dependent on ease of throughput. Hence, OR efficiency is a priority for health systems [1,2]. Medical executive committees and C-suites equate operational OR efficiency with first case starts, turnovers (TOs), and room utilization. If routine delays occur, the entire OR staff is affected [3,4], and patient and surgeon satisfaction will suffer [5].

Numerous publications describe attempts to improve OR efficiency via reduction in TO time (TOT) and increases in first case on-time (OT) starts via process improvements such as Six Sigma, team training, and systematic design [1,2,4,6–8]. Little is known about whether simple individual financial incentive, as opposed to broad OR reorganization, or changes in case scheduling, could lead to improved OR efficiency. The objective of our study was to analyze whether creating an at-risk salary model (ARSM) for faculty anesthesiologists could improve the percentage of OT first case starts and case TOs in an academic hospital inpatient operating room (IOR) and ambulatory surgery center (ASC).

2. Materials and methods

2.1. OR organization

The University of Colorado Hospital is a large academic medical center with more than 30 anesthetizing locations. A medical direction model is used where each faculty attending anesthesiologist supervises 2 rooms staffed by resident anesthesiologists or 2 to 4 rooms staffed by certified resident nurse anesthetists (CRNAs) or anesthesia assistants. There are 2 distinct anesthetizing locations: the IORs and an ASC connected to the main hospital. The IOR includes electrophysiology and interventional radiology and the ASC included the gastrointestinal suites. In each setting, anesthesia providers are responsible for transporting patients from the preoperative setting to the OR. Transport cannot occur until all of the following elements occur: perioperative nursing intake, both surgical and anesthesia history and physical and consents, surgical site mark, and OR nurse check. All first cases (IOR and ASC) start at 7:30 AM (8:30 AM Mondays) and target room TOTs are 30 minutes for the IOR and 20 minutes for ASC ORs. OT first case and goal TOTs were determined using American Association of Clinical Directors standard definitions.

2.2. At-risk salary model

We converted 5% to 7% (academic rank dependent) of faculty anesthesiologist salary from guaranteed to an ARSM.

Salary could be earned back on a case-by-case basis by starting OR cases OT or by documenting a valid reason for a case delay in the anesthesia electronic health record. Valid reasons for delay included all delays not related to anesthesia care or evaluation (Table 1). Faculty at-risk salary incentive was further calculated to $13 for each OT first case and TO, or valid delay reason, in the ASC and $20 for each OT first case start and TO, or valid delay reason, in the IOR. The ARSM incentive is distributed monthly as part of each faculty member's overall incentive pay. The ARSM was initiated in January 2009.

2.3. Goals for OR efficiency

Our organizational goals were 65% average OT IOR first case OT start and TO and 70% for similar metrics in the ASC ORs. OT start was defined as "the patient in the room" at or before the scheduled start time. On-time TO was defined as "patient out of the room" to "next patient in the room" within the specified 20 (ASC) or 30 (IOR) minutes. All anesthesia providers received daily e-mails detailing individual performance on meeting OT first case starts and timely case TOs.

2.4. Data collection and analysis

The percentages of OT first case starts and TOTs are reported daily to all anesthesia providers at the University of Colorado. These data were collected and averaged monthly for 12 months

Table 1   Valid nonanesthesia delay codes for late case starts and/or delayed case turnovers

Delay category	Specific delay reason
Patient/family related delay	Patient arrived late
	Family, religion, etc
System delay	Last case ended early
	PACU hold
	Scheduled start time
	Laboratory tests delayed
	Insurance hold
	Transport delay
	Epic (EMR)
Surgical team delay	Notes, consent, marking not complete
	Surgeon unavailable (notes, consent, marking complete)
	Complex patient without preprocedural services evaluation
	Surgeon running 2 rooms
Perioperative nursing delay	Preoperative prep (IV, meds, etc) not complete
	Late bathroom needs
	OR not ready for patient

PACU = postanesthesia recovery unit; EMR = electronic medical record; IV = intravenous; OR = operating room.