

4-1-2019

Reducing Perioperative Phases of Care Durations through Improved Efficiency

Lawrence Fredendall
Clemson University

Yann Ferrand
Clemson University

Kevin Taaffe
Clemson University

Dee San
Medical University of South Carolina

Follow this and additional works at: https://tigerprints.clemson.edu/grads_symposium

Recommended Citation

Fredendall, Lawrence; Ferrand, Yann; Taaffe, Kevin; and San, Dee, "Reducing Perioperative Phases of Care Durations through Improved Efficiency" (2019). *Graduate Research and Discovery Symposium (GRADS)*. 260.
https://tigerprints.clemson.edu/grads_symposium/260

This Poster is brought to you for free and open access by the Student Works at TigerPrints. It has been accepted for inclusion in Graduate Research and Discovery Symposium (GRADS) by an authorized administrator of TigerPrints. For more information, please contact kokeefe@clemson.edu.



Reducing Perioperative Phases of Care Durations through Improved Efficiency

Dr. Lawrence Fredendall,¹ Dr. Yann Ferrand,¹ Dr. Kevin Taaffe,² Dee San,³ Seyed Amin Seyed Haeri,¹ Jaeyoung Kim,¹, RIPCHD.OR Study Group

1-Department of Management; 2-Department of Industrial Engineering; 3-Medical University of South Carolina



Motivation and Research Objective

- This study aims to reduce perioperative phases of care duration by understanding the factors that influence the case duration of each phase or entire duration across pre, intra, and post operative phases.

Perioperative Data

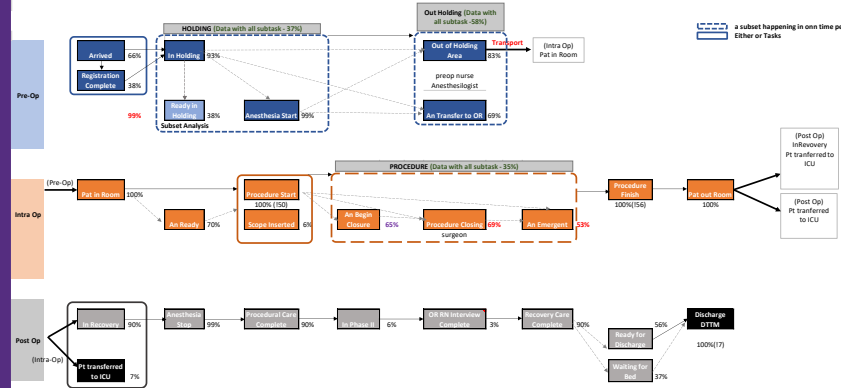
- This study used a patient-level dataset with over 32,000 surgical cases, where timestamps recorded specific start and end times of key activities. Time durations of each step within the pre-operative, intra-operative, and post-operative phases are analyzed to identify patterns to improve perioperative efficiency, and reduce phases of care durations.

Preliminary Analysis

- Timestamps relevant to key activities were identified and sequenced in a standard protocol. The sequence was validated by a practitioner.
- Unique cases with the data records that are out of standard protocol were eliminated for the generalizability of analysis.
- A flowchart that specifies the fractions of available records in each activity and the possible flow in each transition of activities was created.
- Hypotheses were formulated and are being tested.

Result Summary

Flowchart for Perioperative Phases



Study Rationale:

Increased proactive communication leads to increased coordination of the surgical team, which in turn leads to shorter procedure duration.

Hypothesis:

Recording Anesthesia Begin Closure (An Begin Closure) leads to shorter overall procedure time.

Note: Anesthesia Begin Closure timestamp indicates when the surgeon announces the beginning of the closure.

Table of Hierarchical Regression on Anesthesia Begin Closure

	Procedure Duration (ProcedureFinish - ProcedureStart)					
	All PrimarySurgeon					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
p-value	0.000	0.000	0.000	0.000	0.000	0.000
R ²	0.072	0.075	0.075	0.258	0.258	0.274
adj R ²	0.071	0.074	0.074	0.252	0.252	0.268
ABC coefficient	-	-	0.498	-0.845	-0.855	-1.862
ABC p-value	-	-	0.656	0.411	0.405	0.069
Collinearity issue				Yes (PS)	Yes (SS, PS)	Yes (SS, PS)
Control						
SurgicalService	Yes	Yes	Yes	Yes	Yes	Yes
DayofWeek		Yes	Yes	Yes	Yes	Yes
AnBeginClosure			Yes	Yes	Yes	Yes
PrimarySurgeon				Yes	Yes	Yes
PatientAge					Yes	Yes
AnesthesiaType						Yes

Conclusions

- There is moderate significance between procedure duration and Anesthesia Begin Closure.

Future Work

- We need more fine-grained data to be able to control for team familiarity.
- We need more fine-grained data control for on-time completion of procedure.
- We need additional timestamps about the progress of the surgeries.

Acknowledgement

- This research is in support of the multi-institution, multi-department AHRQ grant named RIPCHD.OR (Realizing Improved Patient Care through Human-Centered Design in the Operating Room), led by PI's Anjali Joseph (PhD, EDAC) and Scott Reeves (MD, MBA, FACC, FASE).
- We also thank our sponsoring organizations for the resources and supports for the implementation of this study.

