



# REDUCING TIME FROM ACCEPTANCE TO INTENSIVE CARE UNIT ARRIVAL



Donna K, Berner, MSPAS PA-C

John Terrell, MS

Sharill Bernhard, RN

Lorraine Layton CVRN

Joseph L. Nates, MD MBA FCCM\*

\* PI- The University of Texas Engineering Grant

THE UNIVERSITY OF TEXAS

**MDAnderson  
Cancer Center**

Making Cancer History®

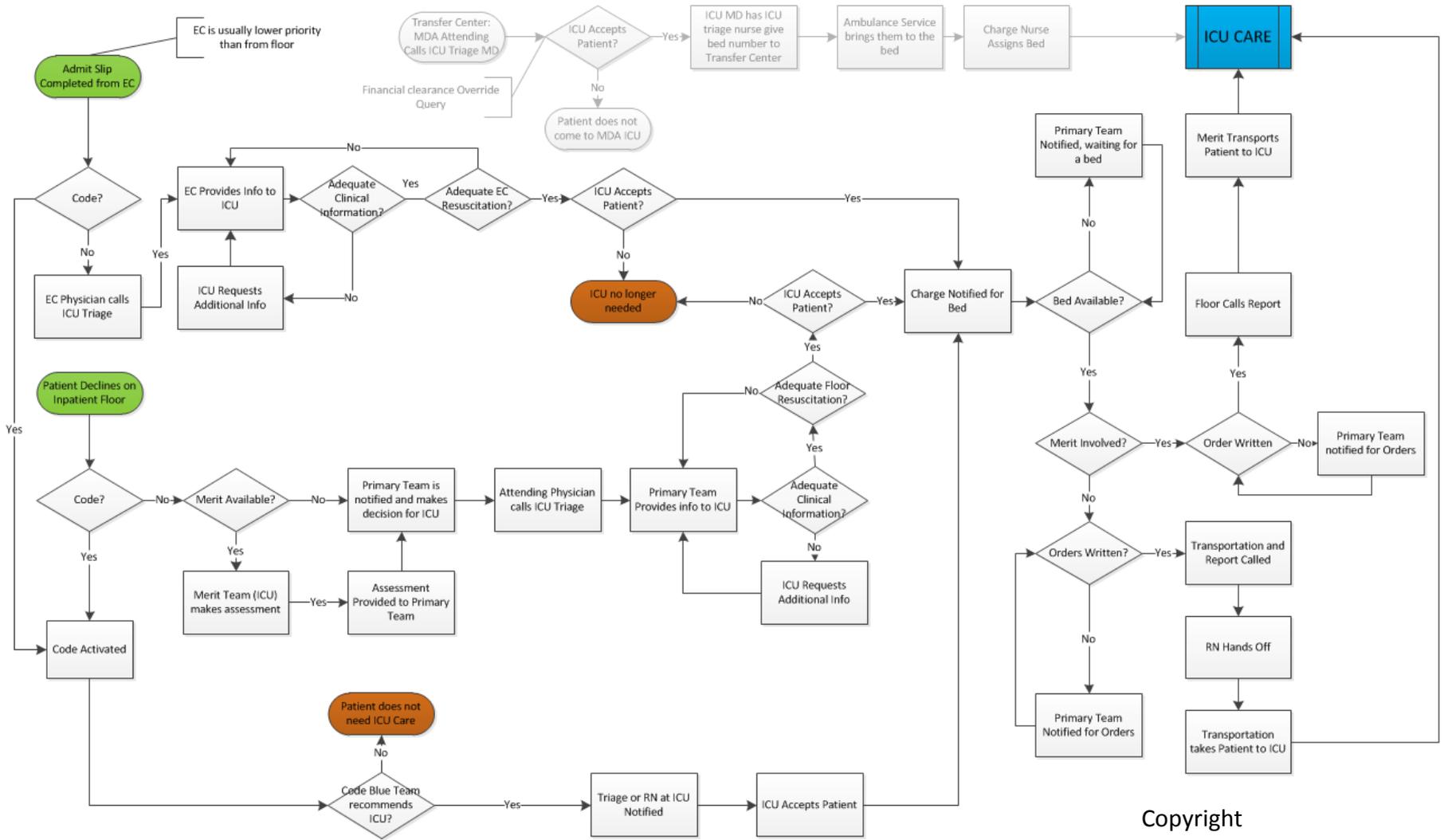
# Purpose

- As part of our institutional continuous improvement process we proposed to improve our intensive care unit (ICU) admission process by gaining a better understanding of the admission process through the use of industrial engineering tools
- Our aim was to identify those aspects of the admission process that leads to delayed admissions in order to expedite care interventions with the goal of improving:
  - Patients outcomes
  - Reducing morbidity and mortality
  - decreasing ICU length of stay and cost

# Methods

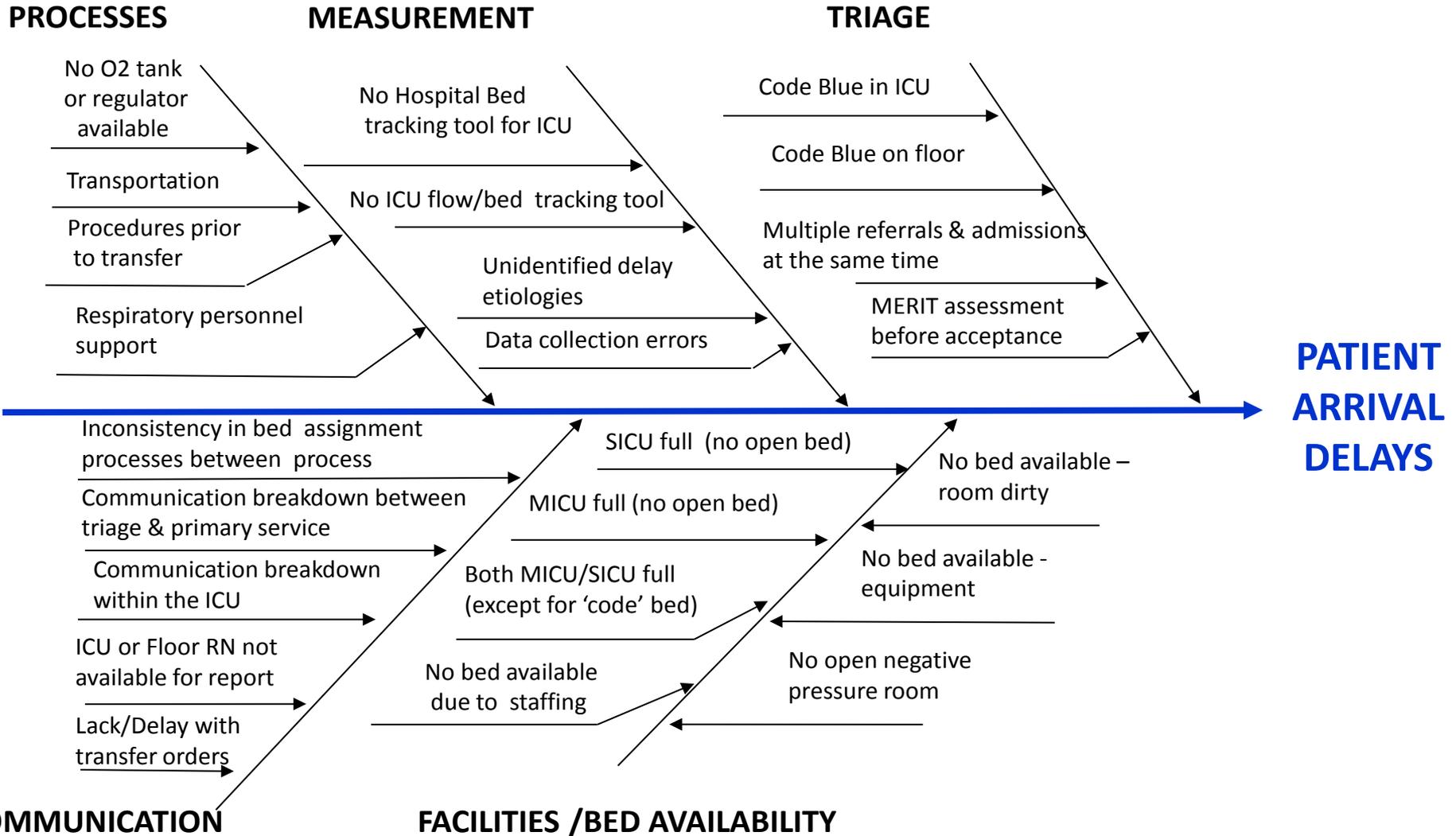
- Prospective Study
- Pilot Study: Fall 2013
- Industrial engineering methods used:
  - Process flow mapping
  - Ishikawa (fishbone mapping)
  - Plan-Do-Study-Act cycles (PSDA )
- Collection Period: 5/21/2014 through 12/31/2014
- All ICU admissions except for surgical and out of facility transfer patients
  - Date
  - Primary Service
  - Referral Location
  - Referral Time
  - Acceptance Time
  - Bed Assignment Time
  - Arrival Time
  - Type of Admission – Code, Merit (Rapid Response), Regular
  - Reasons for Delay in Transfer to the ICU

# Process Flow Map

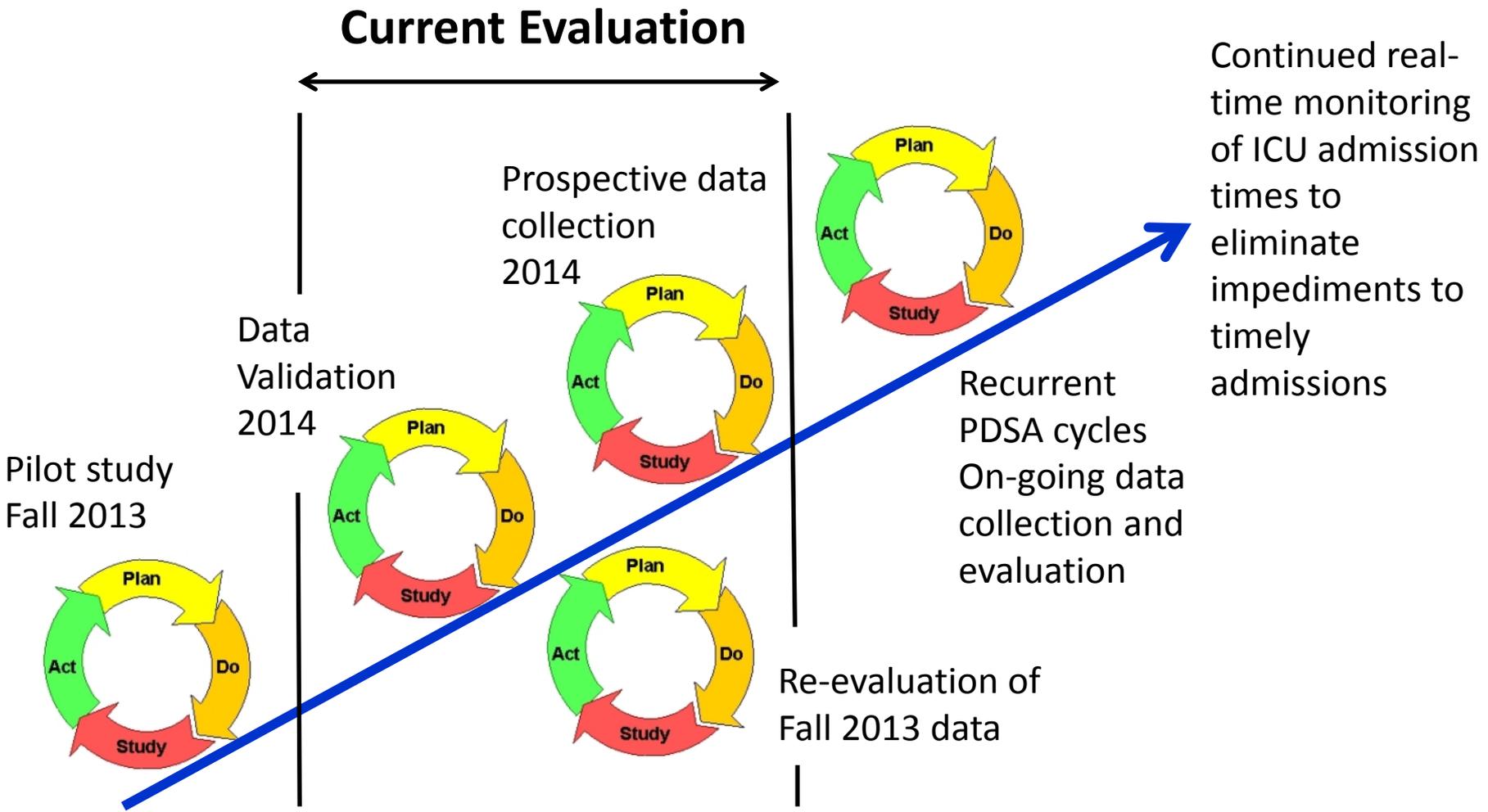


Copyright

# Cause and Effect Diagram



# Study Design



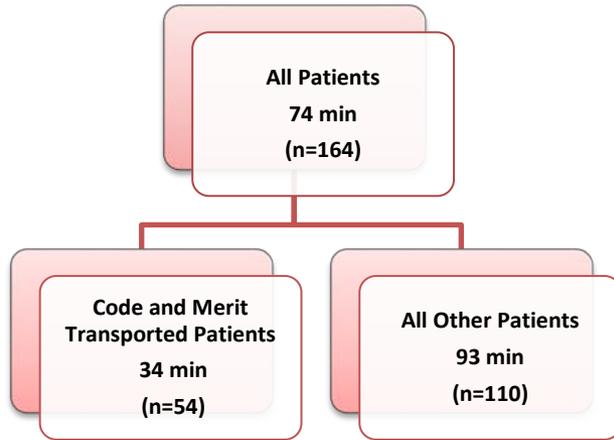
# Analysis - Variables Considered

- Pilot Study vs Current data collection (both prospective)
- Pulling patients (Code and Rapid Response Team patients) vs Pushing Patients (all others patients)
- Reasons for delays to the ICU (Delay code)
- Referring Location: EC vs Floor
- Liquid tumors vs solid tumor patients
- AM / PM Shift
- Day Of Week
- Statistical methods: 2 Sample T test, One Way ANOVA, Box Plots

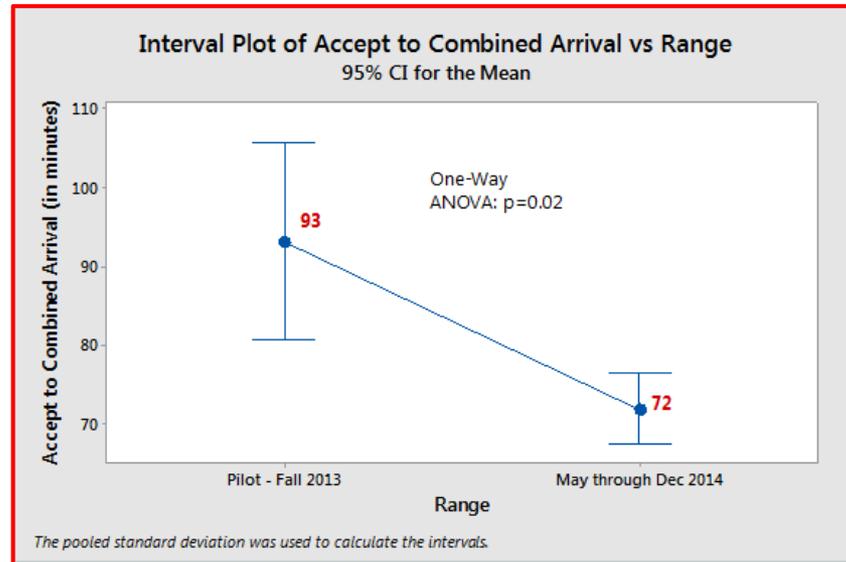
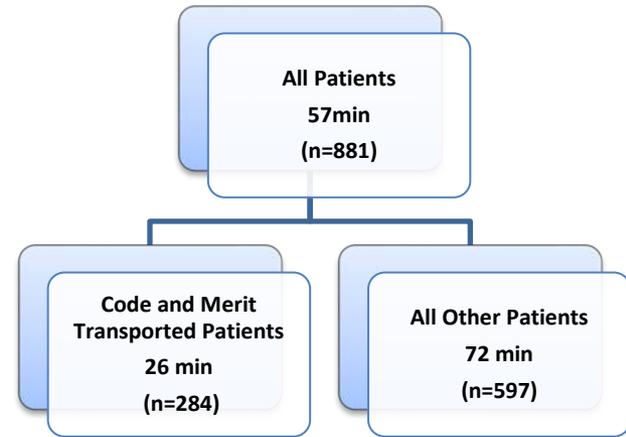
## Data Validation

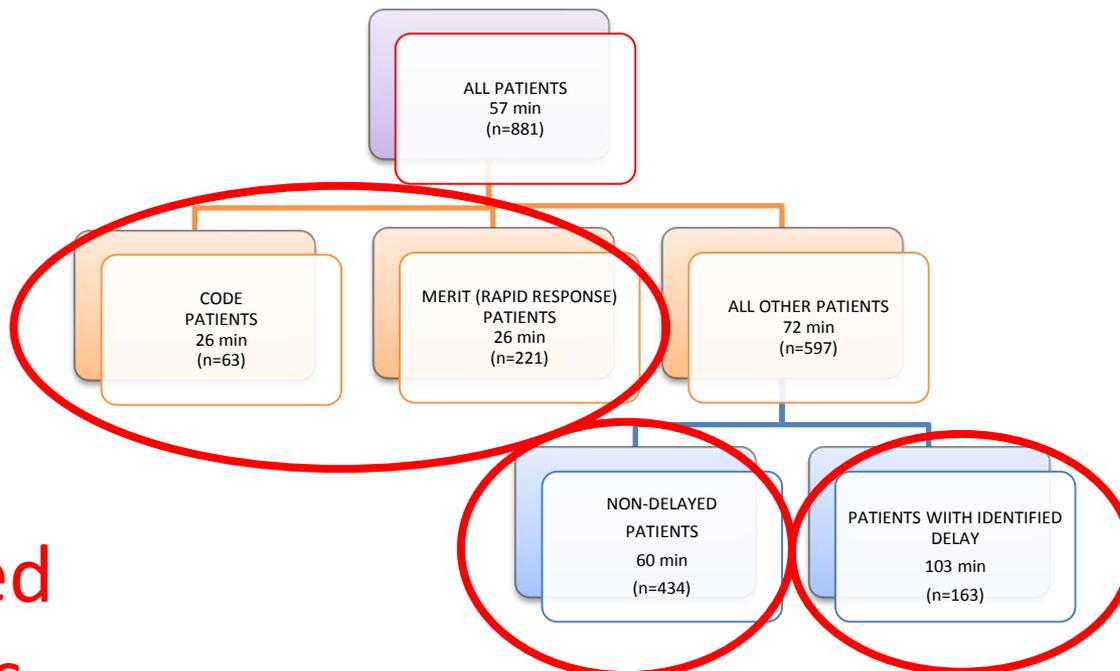
- We compared our admission data to an ICU database which collects per calendar day the name, MRN, referral location, bed assignment and primary service and arrival time.
- During the first 3 weeks of our study both the charge nurse and the ICU Triage Advance Practice Provider completed a data collection form independently for all admissions and the two forms were compared.

# Pilot Study Fall 2013

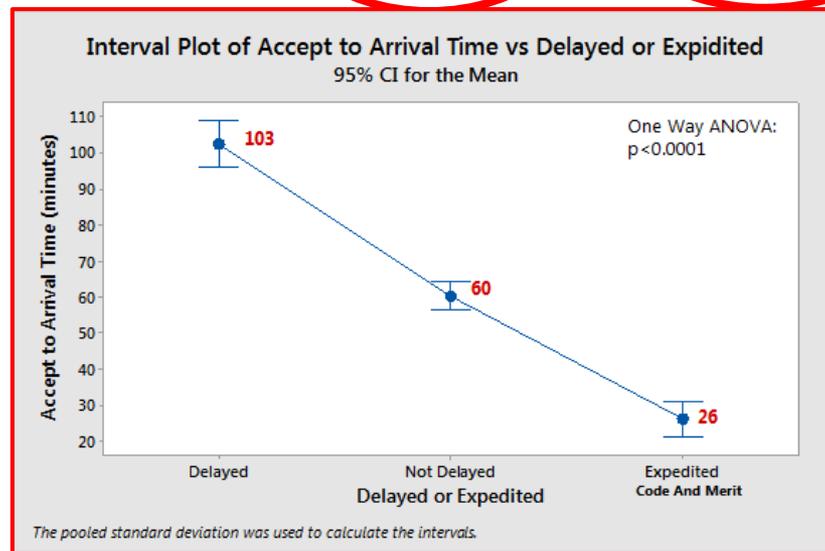


# 5 to 12/2014

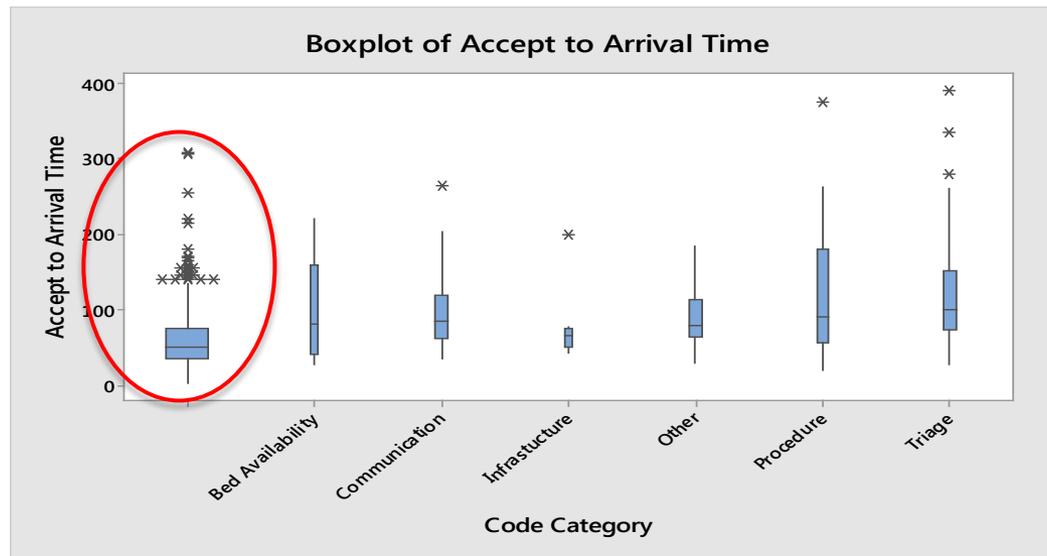
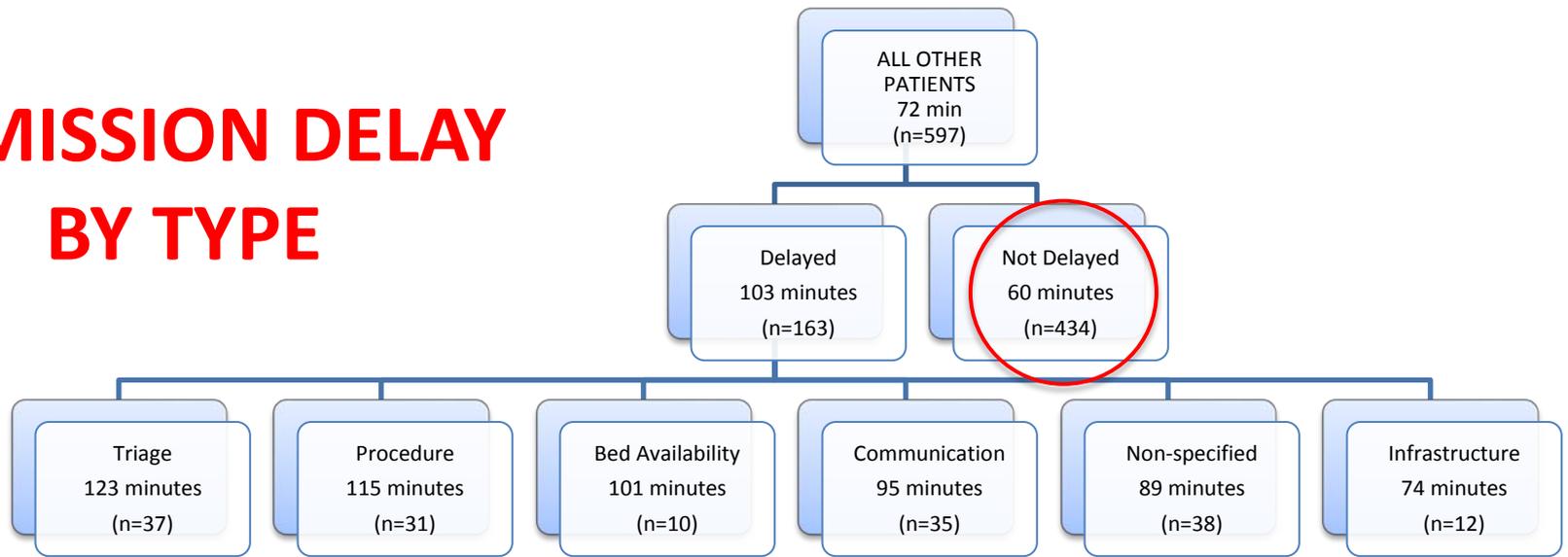




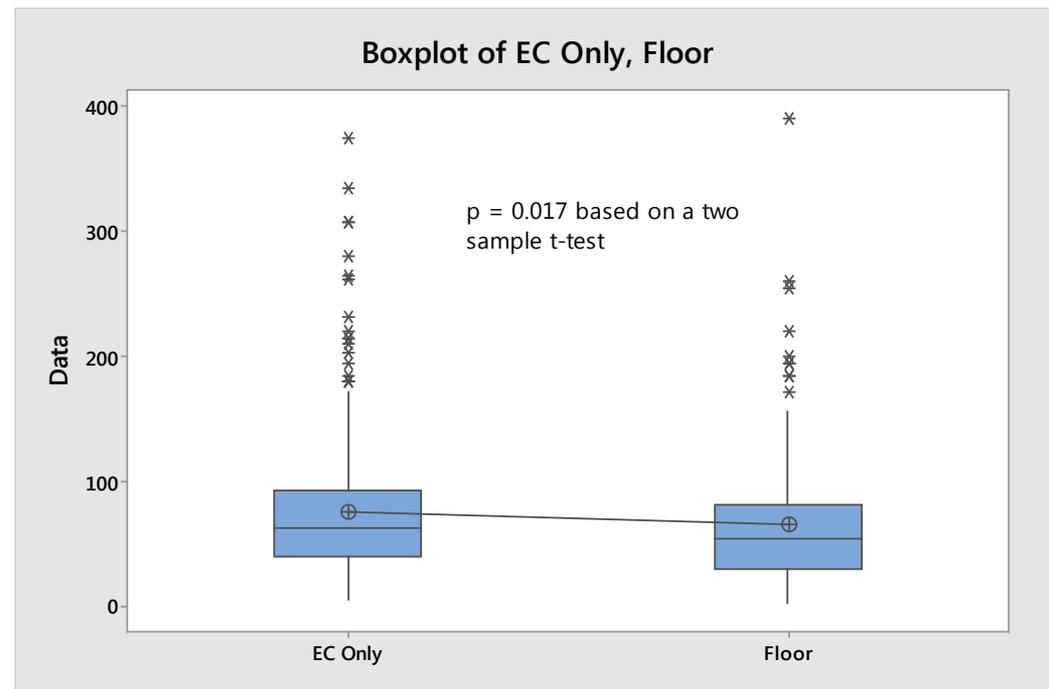
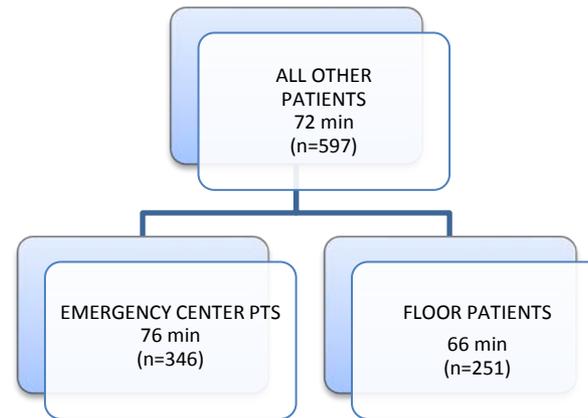
# Delayed versus Expedited Admissions



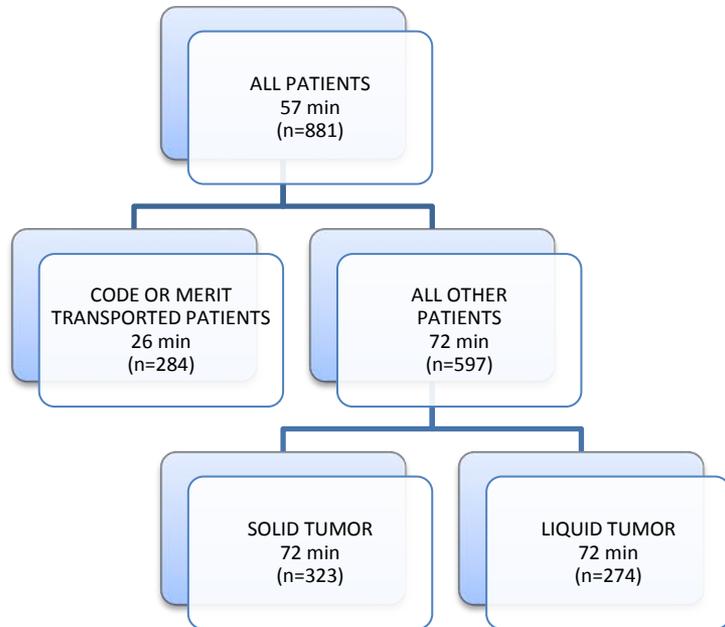
# ADMISSION DELAY BY TYPE



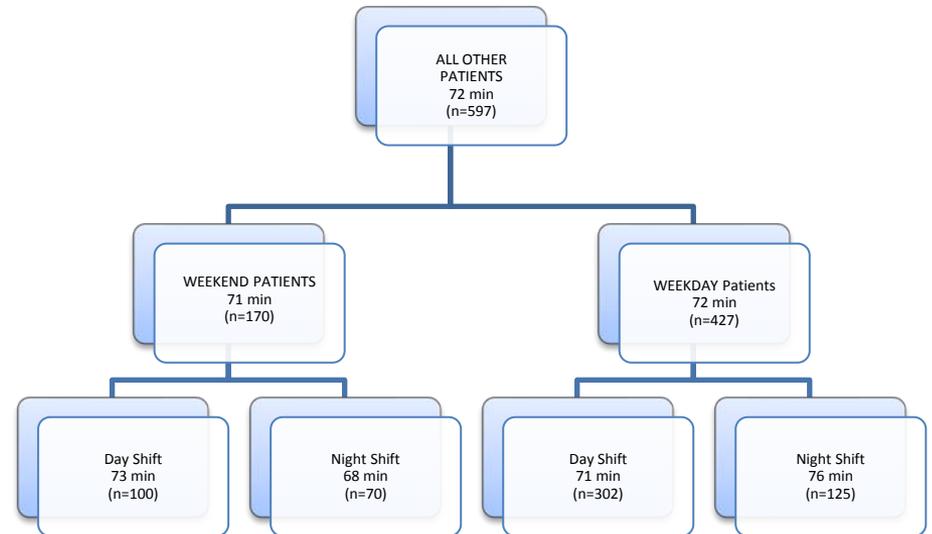
**NON EXPEDITED  
(NOT CODE OR  
MERIT)  
ADMISSIONS  
FROM THE  
EMERGENCY  
CENTER AND  
FLOOR**



## Effect of Cancer Type on ICU Admission



## Effect of Day of the Week and Shift On ICU Admission



# Discussion

- The interventions after the Pilot study (first PDSA cycle) were successful.
- Patients that are pulled to the ICU(Merit/Code) arrive in half the time as those patients without an identified delay.
- Delayed patients take four times as long as code and merit team patients.
- Triage accounted for significant admission delays, about one per week.
- Non-uniformity of communication about bed assignments caused delays.
- Procedures prior to ICU accounts for significant delays- this process is only partially amendable to interventions

# Discussion

- There was a lack of knowledge about how transportation services are allocated
  - The Transportation Services relies on the Bed Management program to assign transportation but the ICU admissions do not use the Bed Management program so our needs and requirement could not be recognized.
- Day vs. night shift arrival was not as significant as originally thought.
- There was no statistical difference between weekday and weekend in time of ICU admissions
- Floor patients arrive statistically faster than patient from the emergency center.

# Conclusions

- Standard industrial engineering techniques was a valuable tool in the intensive care unit continuous performance improvement process.
- Utilization of industrial engineering allows for a systematic review of a process to determine where change and improvements can be achieved.
- The use of the LEAN ‘pulling technique’ where movement is controlled by downstream processes was significantly more effective in the ICU admission flow than the ‘pushing technique’ where patient movement is controlled by the floor and emergency center.
- We propose that a dedicated ICU driven transport team could lead to more efficient and time sensitive ICU admission for non-code and non-rapid response critically ill patient admissions. This team would work independent of and in parallel to the rapid response team for a more efficient ICU admission process