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## AIM Statement: By September 2022, we will increase endoscopy throughput by at least 1 procedure per day to reduce the utilization of on-call/weekend endoscopy

### PROBLEM DEFINITION

Currently, due to pandemic-related supply and personnel constraints, increased strain is being placed on inpatient endoscopic services. At our academic center, inpatient procedural throughput/efficiency is only 65%, which is leading to excess procedures being completed on-call or on weekends.

Our quality improvement study attempted to improve throughput of the inpatient endoscopy suite by 1 additional procedure completed per day, over a period of 12 months of study.

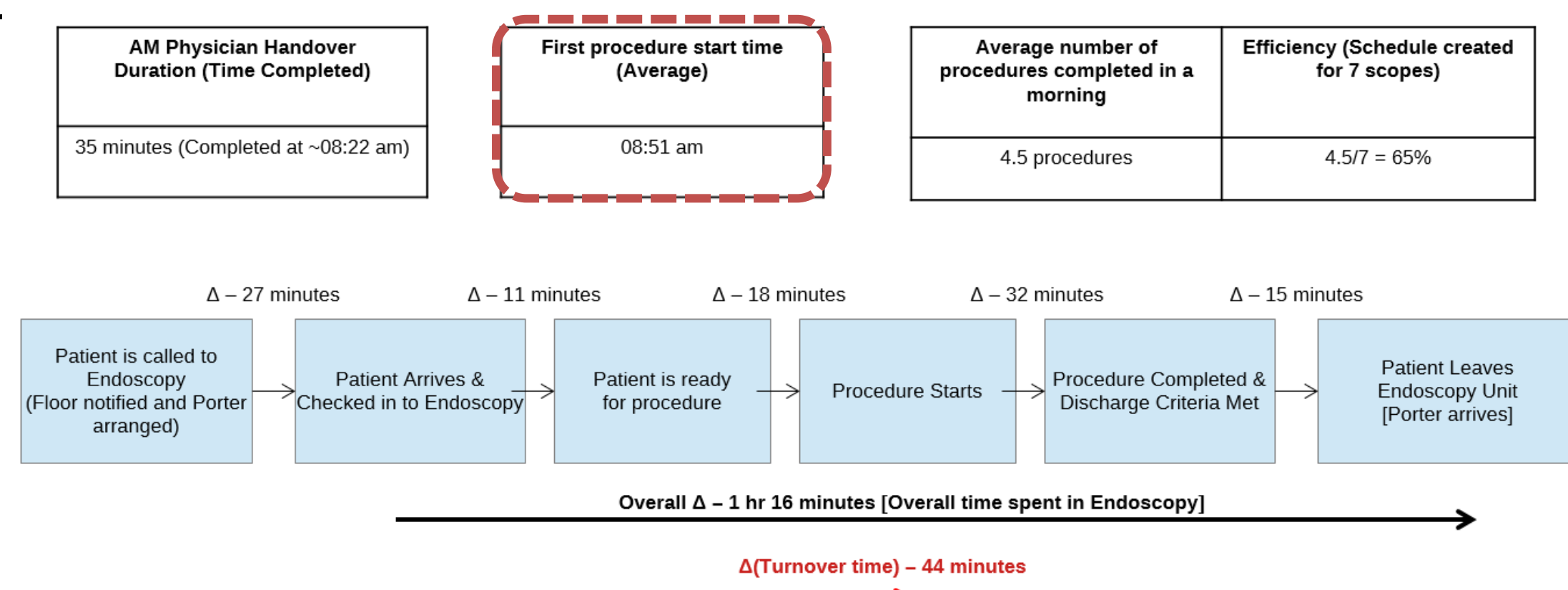


Figure 1: Baseline Time Study to obtain baseline data for Inpatient Endoscopy Significant concerns with endoscopy start time as causative agent for decreased throughput

### METHODS

An interprofessional team of gastroenterology fellows, attending physicians, nurses and nurse managers was created to investigate throughput concerns. Baseline data was collected via direct observation and completion of a time study over a period of 1-2 months (See Figure 1). Subsequently, a process flow diagram was completed (See Figure 2).

A combination of root cause analysis tools (ie. Stakeholder interviews, Pareto chart (See Figure 3) and Driver Diagram (See Figure 4) were then utilized to identify areas for improvement. A delay in procedural start time was identified as a strong culprit for reduced patient throughput.

Potential interventions proposed included: early physician handover start time, constructing a standardized patient procedure list, and improving timeliness of patient transfer to the endoscopy suite.

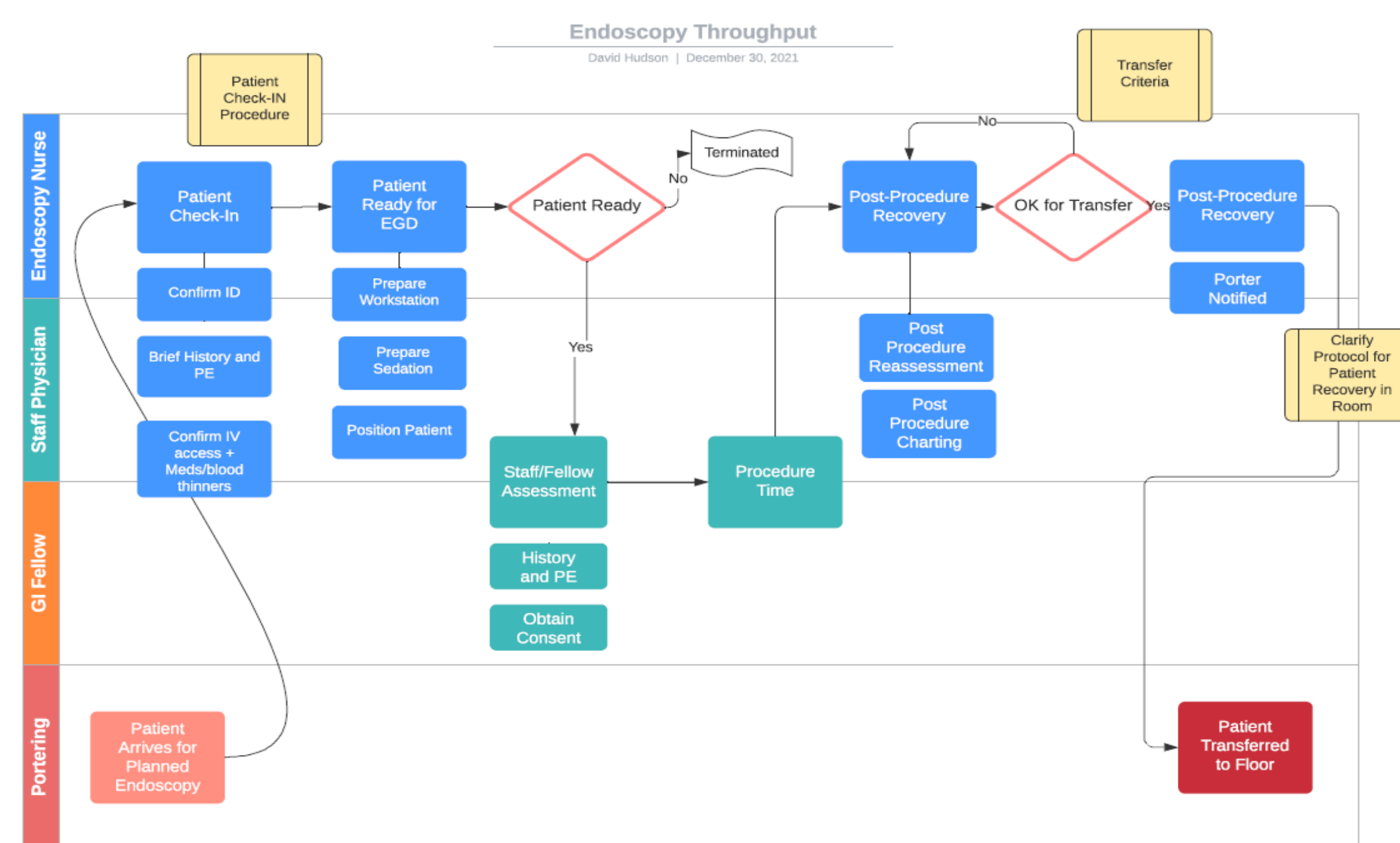


Figure 2: Process Flow Diagram for Inpatient Endoscopy (University Hospital)

### ROOT CAUSE ANALYSIS TOOLS

Stakeholder Interview(s): Completed via Anonymous Survey/Google Forms:

See: [https://docs.google.com/forms/d/e/1FAIpQLSe-PDL31CIU8g-BChdBoBYhPoBhGBZVmlToTTZJnYKIEHz-GQ/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSe-PDL31CIU8g-BChdBoBYhPoBhGBZVmlToTTZJnYKIEHz-GQ/viewform?usp=sf_link)

Concerns:

- Inpatient procedure list not consistently being completed prior to starting endoscopy
- Physician handover in the morning can cause significant delays in starting inpatient endoscopy
- Concern patient/porter transfer related delays

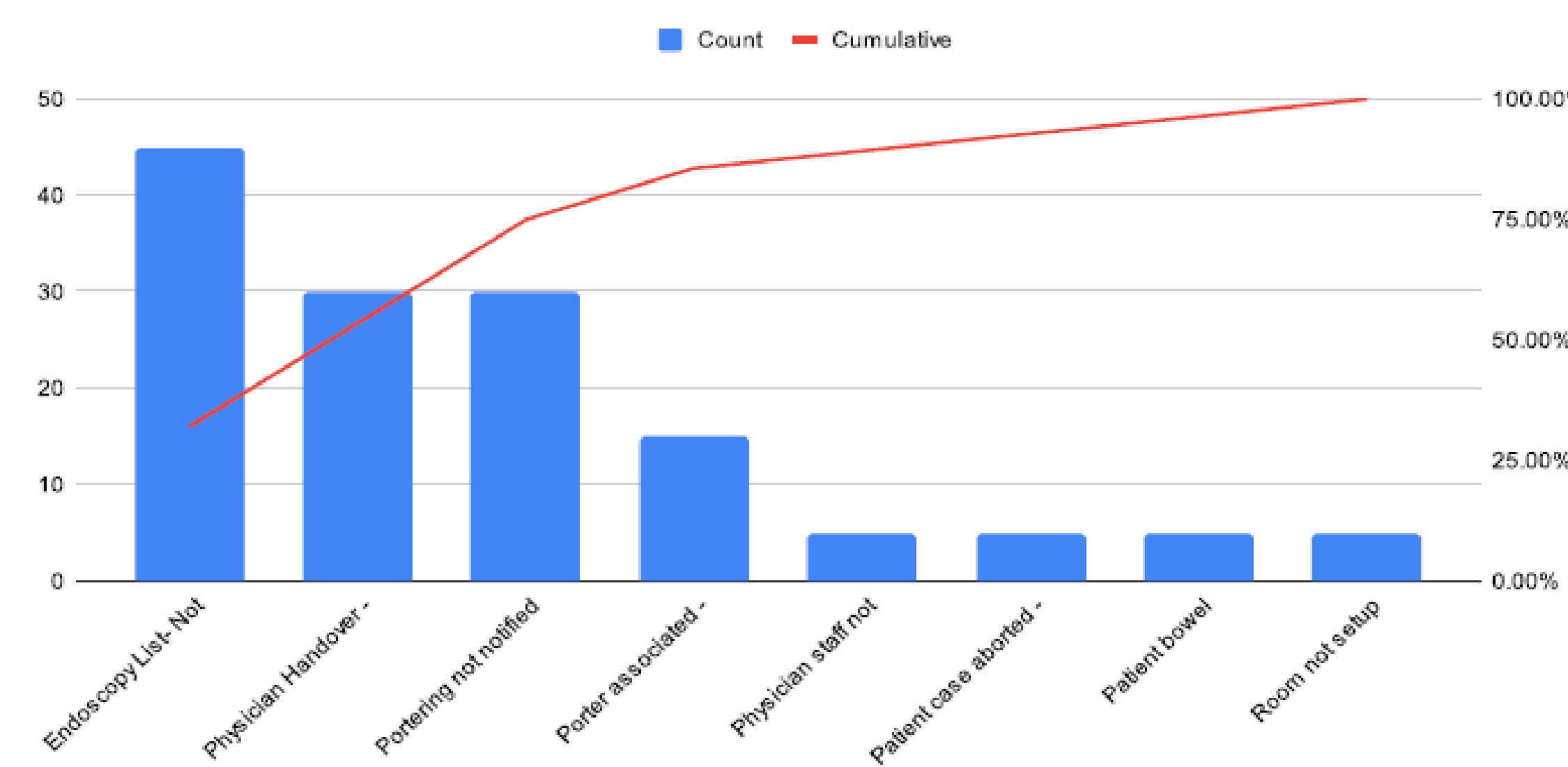


Figure 4: A Pareto Chart was utilized to identify and present the reported frequency of a concern/defect identified via stakeholder interviews

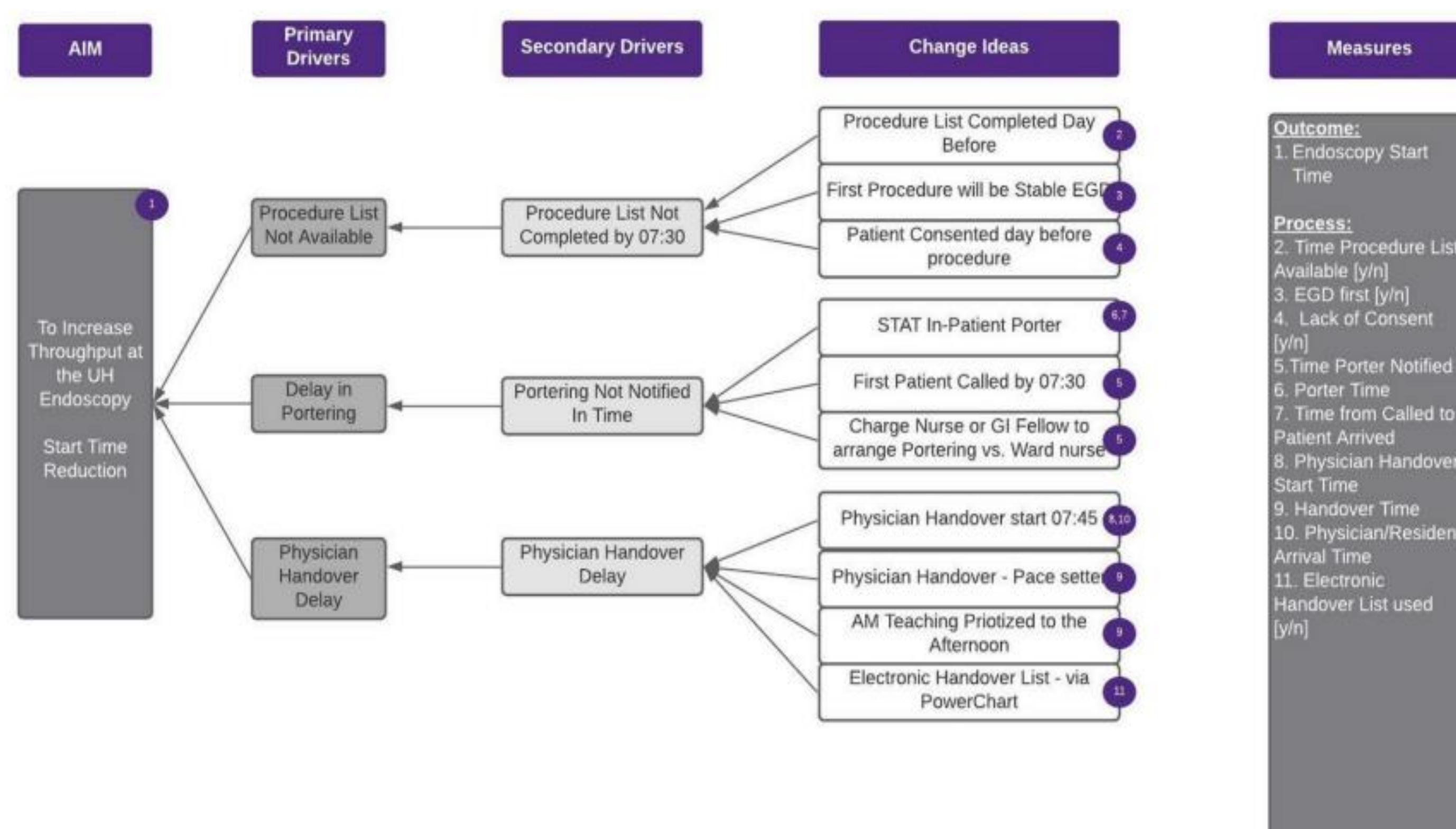


Figure 5: Driver Diagram was utilized to identify primary and secondary drivers of endoscopy throughput delay and develop associated change ideas

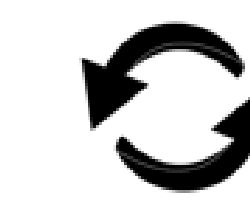
### PLANNED INTERVENTIONS Plan – Do- Study- Act [PDSA]



PDSA Cycle 1: Earlier Physician Handover Start Time (07:45 am)

Outcome:

- Endoscopy Start Time reduced to 08:49 am [UCL 104 minutes; LCL -5.4 minutes]



PDSA Cycle 2: Developing a standardized planned procedure list and mandating the first procedure to be completed is esophagogastroduodenoscopy (EGD)

Outcome:

- Endoscopy Start Time reduced to 08:29 am [UCL 69.6 minutes; LCL -12.4 minutes]



PDSA Cycle 3: Utilize the standardized procedural list to pre-emptively organize timely patient transfer to account for delays secondary to hospital portering services.

Outcome:

- Endoscopy Start Time reduced to 08:22 am [UCL 52.0 minutes; LCL -8.0 minutes]

Acronyms: Upper Control Limit (UCL); Lower Control limit (LCL)

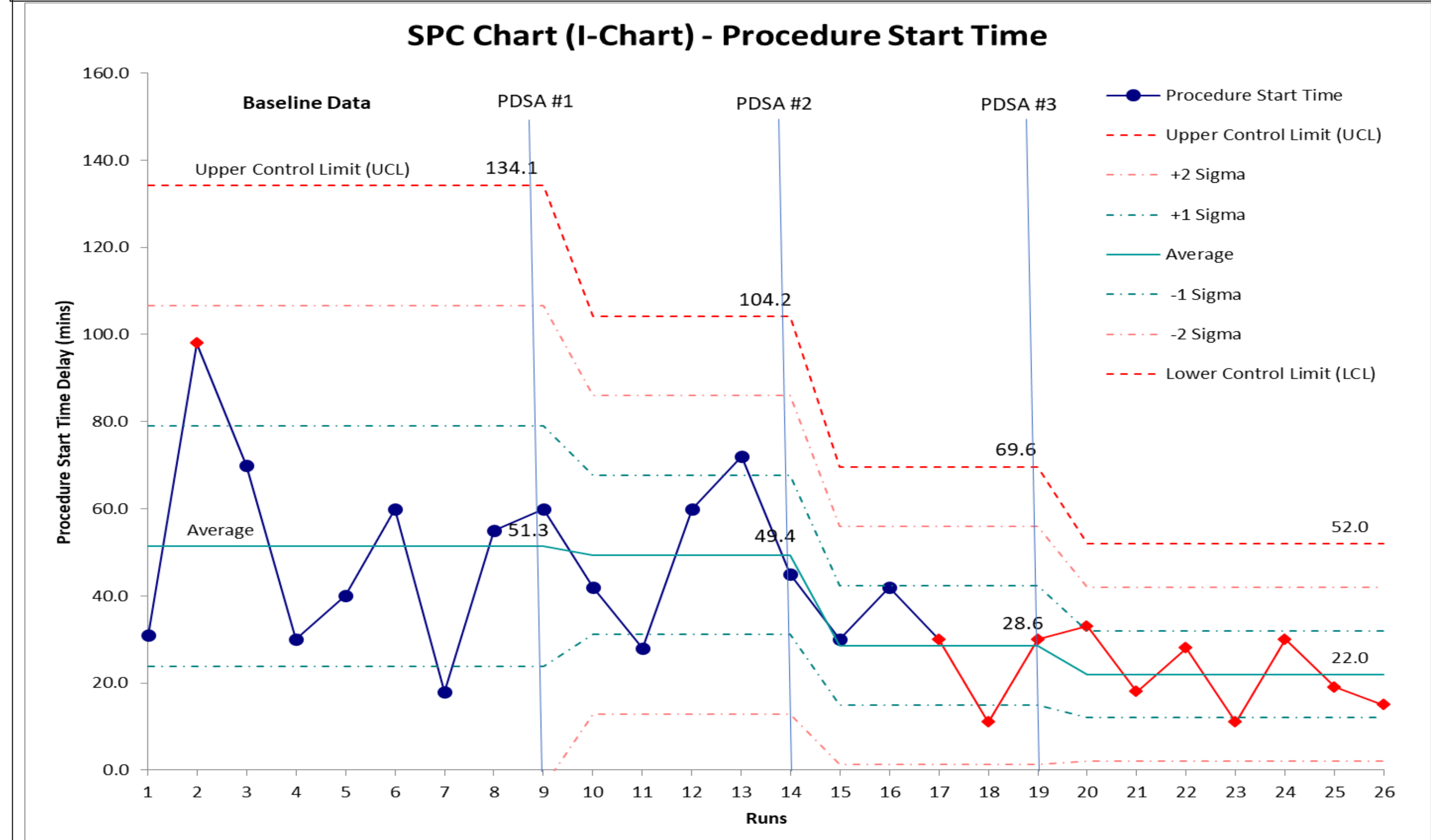


Figure 6 A statistical process control chart (SPC) demonstrating baseline data on endoscopy procedural start time and interventions (PDSA #1, PDSA#2, PDSA#3) that were effective in reducing the delay in procedure start time and resulted in a subsequent increase in endoscopy unit throughput.

### CONCLUSION:

Our current data identifies that the most effective intervention included developing a standardized procedure list and mandating the first case is an EGD, minimizing delay due to inadequate bowel preparation. Concordantly, arranging timely patient transfer to the endoscopy suite, thereby minimizing delays due to patient portering services, was also found to be effective.

Our average procedural time for completion of an EGD and associated recovery is approximately 25-30 minutes. After multiple interventions/PDSA cycles we obtained a more optimized procedural suite start time of 08:22 am, on average, which resulted in the completion of an additional procedure and increased the throughput of our endoscopy unit.