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Background
The Division of Gastroenterology and Hepatology (GIH) at Mayo Clinic Arizona (MCA) operates two endoscopy suites; one located on the Phoenix campus, the other on the Scottsdale campus. Early in 2016, the Phoenix campus opened a new endoscopy suite, which increased procedural capacity by 50% from the previous unit. In order to accommodate the increased capacity, physician staffing needed to increase by 60% from the previous staffing model. This was complicated by a reduction in the number of endoscopists available for procedures each day through the expansion of the GIH fellowship (needing increased staffing for fellows in clinic), increasing access to new evaluations and consultations, and increased time for physician leadership and scholarly activities. GIH leadership did not wish to reduce procedural capacity, so it became clear that a new model would be needed to maintain output, while reducing the number of procedural physicians needed each day.

Objective
To evaluate the current endoscopy model employed at the Scottsdale campus and develop an approach to enhancing provider efficiency, reducing downtime, maximizing patient throughput, and improving collaboration and teamwork within the unit. Original objectives of the project included the following:

- Increase efficiency in the Scottsdale endoscopy unit by 1 procedure per provider per half-day
- Improve turnaround time (TAT) between procedures
- Improve endoscopy unit efficiency metrics (specific metrics discussed in results)
- Reduce the number of physicians scheduled each day by 1, while maintaining current allied health FTE

Planning/Research Methods
Under the governance of the MCA Endoscopy Committee, a multi-disciplinary project team consisting of physicians, nurses, technicians, and various operations support staff was formed to review the current model and develop a charter. Utilizing the DMAIC method (Define, Measure, Analyze, Improve and Control), the project team mapped the current state through process maps and flowcharts. Robust reporting capabilities allowed the project team to better understand baseline data. These capabilities also provided real-time feedback during implementation. Before implementation, finance conducted an analysis to review NOI to determine financial feasibility. The results showed that the model would increase NOI by 17% per day if calendars remained full and payer mix targets were met. The project team also reviewed endoscopy models employed at other Mayo Clinic sites to gain insight into best practices. An assessment was done of the various models and a pilot model was developed to fit the needs for MCA. The project team also employed rapid tests of change (Plan, Do, Study, Act Cycles), as well as other Lean Six Sigma methodologies, to improve process variation and imbalances.

Implementation Methods
The pilot implementation was conducted between April 25, 2016 and May 6, 2016. Continuing to use one appointment calendar, patients were scheduled in an open access model (i.e. patients may have never met the performing endoscopist at the time of procedure). Physicians were assigned to teams of two prior to arrival in the endoscopy suite. Each team of physicians performed endoscopies out of three procedural rooms – a shift from the previous model where each physician was assigned to one room. This allowed for the physician to complete the procedure, complete their procedural note and walk to the next room where a patient was already waiting, eliminating the turnaround time between cases. Physicians were accountable to one another and were responsible for their team’s patient list. Procedural mix was closely monitored during scheduling to ensure optimal throughput. Virtual Desktop Infrastructure was utilized to allow physicians and technicians to seamlessly move between rooms without logging off of computers.

Results
With the exception of one metric, the results showed significant improvement in efficiency. TAT time was essentially eliminated. Since physicians no longer had downtime between cases, they needed extra time when entering the room to review the patient chart prior to procedure. This caused a slight increase from the time the physician entered the room to the time they inserted the scope. However, the endoscopy unit demonstrated that output could be maintained with one less endoscopist utilizing the new model. Counterbalance metrics revealed improved physician and allied health satisfaction due to the gained efficiencies. The following endoscopy unit efficiency metrics were realized:

- Total number of endoscopy cases remained unchanged compared to baseline
- Physician on-time starts increased by 40%
- Scope-Out to Scope-In of next case (TAT metric) decreased by 22%; no downtime for physicians between cases
- Scope-Out to Bedded/Recovery (allied health metric) went unchanged
- Average time of last case in morning went from 11:58 a.m. during baseline to 11:14 a.m. during pilot
- Average time of last case in afternoon went from 3:51 p.m. during baseline to 3:25 p.m. during pilot
- MD in Room to Scope-In increased by 8.84%

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