

**Antihypertensive Education to Improve Patient Outcomes: A Quality Improvement
Project**

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March 2, 2022

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Abstract

Introduction/Purpose

The purpose of this quality improvement project was to improve compliance with the 2014 American College of Cardiologists/ American Heart Association (ACC/AHA) Joint Task Force Clinical Practice Guidelines recommendation regarding the continuation of prescribed antihypertensive medications throughout the perioperative period by implementing a patient education initiative, which used the teach-back method of instruction, and evaluated the effectiveness of the education as evidenced by the incidence of patients presenting for their endoscopy procedures with hypertension requiring pharmacological intervention, procedure delay, or procedure cancellation.

Methods

Data was collected from patients' electronic health records (EHR) using a retrospective cohort design. The preintervention group consisted of data from all endoscopy patients with the diagnosis of hypertension and taking at least one prescribed antihypertensive medication, and having procedures during the six weeks prior to implementation of the 2014 ACC/AHA Joint Task Force Clinical Practice Guidelines. The post intervention group consisted of data from all endoscopy patients with the diagnosis of hypertension and taking at least one prescribed antihypertensive medication, and having procedures during the six weeks following implementation of the guidelines.

Results

A chi squared analysis was utilized to compare the data from preintervention and postintervention groups regarding the incidence of hypertension significant enough to require pharmacological intervention, case delay, or case cancellation, both before and after

implementation of the education intervention. The P-value was also calculated using the chi squared analysis, $X^2(1, N=1044) = 7.71, p = .00548$. No incidence of case delay or cancellation were experienced in either test group. A 70.5% decrease was experienced in the incidence of patients requiring pharmacological intervention during the 6 weeks period when patients were provided the antihypertensive patient teaching via the teach-back method, compared to the previous 6 weeks. The calculated P-value was .00548, indicating a statistically significant improvement.

Conclusion

The statistically significant decrease in the incidence of patients requiring pharmacological intervention for hypertension supported the need for permanent inclusion of the antihypertensive patient teaching, via the teach-back method, in the preoperative procedures at the project site. The GI clinic has continued to include this patient teaching method in their preoperative patient contacts after completion of the project.

Keywords: ACC/AHA Joint Task Force Clinical Practice Guidelines, antihypertensive medication, elevated blood pressure, hypertension, endoscopy, antihypertensive medication

Antihypertensive Quality Improvement Proposal

Improved patient outcomes have been supported by numerous studies when patients remain normotensive throughout the perioperative period (Fleisher, L. et al, 2014). Hypertension increases a surgical or procedural patient's risk of untoward hypertensive sequelae, and this risk may be minimized by adequately controlling the patient's blood pressure (Fleisher, L. et al, 2014). Sequelae of perioperative hypertension may include myocardial ischemia, myocardial infarction, stroke, and increased surgical blood loss (Howell, S., 2018). Significant case delays

and cancellations are also a concern when patients have extremely elevated blood pressure, greater than 180/120 mmHg upon arrival to the perioperative area (Howell, S., 2018).

Background

Initiation of this quality improvement project was based on anecdotal observations of the five Certified Registered Nurse Anesthetists (CRNAs) at the subject gastroenterology (GI) clinic, hereafter referred to as the project site. It was the opinion of the CRNAs that ineffective or absent patient teaching with regard to the taking of their prescribed antihypertensive medications on the day of their procedure contributed to this problem. To date, no empirical data to support this assumption had been collected. Preintervention data was to be collected, following IRB approval, utilizing a retrospective EHR review. Data was collected for a six weeks period to determine the frequency of patients presenting for GI procedures at the facility with elevated blood pressure requiring either pharmacological intervention, case delay, or case cancellation.

Problem Statement

Recently, the project site had experienced a perceived increase in incidence of patients presenting with hypertension requiring either pharmacological intervention in the form of intravenous antihypertensives, procedure delay of greater than 30 minutes, or procedure cancellation. The ACC/AHA revised their definition of hypertension in 2017 to include patients with systolic blood pressure of 130 mmHg or greater, or diastolic blood pressure of 80 mmHg or greater (Ritchey, M., et al, 2018). The AHA/AHA further defined hypertensive crisis as a systolic blood pressure greater than 180 mmHg or diastolic blood pressure of greater than 120 mmHg (Ritchey, M., et al, 2018). Each of the five CRNAs treated blood pressure levels, meeting the criteria for hypertensive crisis, with pharmacological intervention. The incidence information was based on anecdotal reports from the five anesthesia providers. The goal of this project was to

improve patient outcomes by decreasing the incidence of perioperative hypertension requiring pharmacological intervention, procedure delay, or procedure cancellation. The aim of this project was to reduce the incidence of pre-procedural hypertension, by implementing the ACC/AHA guidelines, and improving patient compliance with continuation of their prescribed antihypertensive medications on the day of their procedure by employing the teach-back method of patient education.

Organizational Analysis of Project Site

An increased incidence of pre-endoscopy hypertension had been verbalized by the facility's anesthesia providers. Prior to the project, there had not been any data collection to determine if an evidence-based guideline could mitigate the incidence of hypertension. Current clinical practice guidelines published by the 2014 ACC/AHA Task Force recommends that all patients who have been diagnosed with hypertension, and are prescribed antihypertensive medications, should continue taking their antihypertensive medications throughout the perioperative period for routine non-cardiac surgeries or procedures (Fleisher, L. et al, 2014). The ACC/AHA Task Force recommendations include continuing angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs) throughout the perioperative period. The project site had no policy or procedure in place to ensure patient compliance with this recommendation. The goal of this project was to improve compliance with the ACC/AHA guidelines by implementing a patient education initiative, which used the teach-back method of instruction, and evaluating the effectiveness of the education as evidenced by the incidence of patients presenting for their procedures with hypertension requiring pharmacological intervention, procedure delay, or procedure cancellation.

Review of the Literature

Multiple search term combinations were used for the review of literature, with few applicable results. Using the Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus and PubMed databases, a search was conducted using MeSH terms: ACC/AHA Joint Task Force Clinical Practice Guidelines, antihypertensive medication, elevated blood pressure. Inclusion criteria for this project consisted of: peer reviewed articles, published since 2016, in English, and random control trials or meta analyses. The search returned one result on CINAHL Plus. The result was excluded because the information did not apply to the identified clinical problem. The same MeSH terms were entered in to the PubMed database using the same inclusion criteria. The search returned four results. The four results were excluded because the information did not apply to the identified clinical problem.

A second group of search terms was attempted. The MeSH terms included: antihypertensive medication, hypertension, endoscopy. These search terms were entered in to the CINAHL Plus database using the same inclusion criteria. This search yielded one result. The one result was excluded because the information did not apply to the identified clinical problem. The same MeSH terms were entered in to the PubMed database with the same inclusion criteria. The search returned 182 results. The 182 results were excluded because the information did not apply to the identified clinical problem. One study, from 2001, found that facilities in Britain reported deferring from 1% to 27% of scheduled cases due to hypertension (Dix, P. & Howell, S., 2001).

Although no endoscopy specific data was found, there are numerous studies that have identified improved patient outcomes when patients remain normotensive throughout the perioperative period (Fleisher, L. et al, 2014). Hypertension increases a surgical or procedural patient's risk of untoward hypertensive sequelae, and this risk may be minimized by adequately

controlling the patient's blood pressure (Fleisher, L. et al, 2014). Sequelae of perioperative hypertension may include myocardial ischemia, myocardial infarction, stroke, and increased surgical blood loss (Howell, S., 2018). Significant case delays and cancellations are also a concern when patients have extremely elevated blood pressure, greater than 180/120 mmHg upon arrival to the perioperative area (Howell, S., 2018).

The lack of available literature that would be applicable to this project was indicative of a need for research in this area. This quality improvement project had the potential to focus on the gap in available research, and to provide direction for future research.

Verification of Chosen Option

The review of literature revealed no evidence-based interventions to improve patient compliance with the taking of prescribed antihypertensive medications on the day of their endoscopy procedure. In general, patients learn and retain information better using repetition and by applying the teach-back method when providing instructions. Slater, B., et al, (2017) experienced a 15% increase in patient information recall when employing the teach-back method to their delivery of emergency department discharge instructions. Teach-back methodology was employed for this project, for use in patient instruction by schedulers via telephone and by MAs during appointment confirmation telephone calls made one to three days prior to the procedure. PICOT: The purpose of this quality improvement project was to determine if in adult patients with hypertension and prescribed at least one antihypertensive medication, did the integration of the 2014 ACC/AHA guidelines, via the teach-back patient education method, improve client compliance regarding their prescribed antihypertensive medications on the day of their endoscopy procedure, thus reducing the need for pharmacological interventions, case delays, or case cancellations?

Goals, Objectives and Expected Outcomes

The goal of this quality improvement project was to improve patient compliance regarding their prescribed antihypertensive medications on the day of their endoscopy procedure by implementing the teach-back method of patient education based on the ACC/AHA 2014 guidelines. Data was collected by EHR review to determine the incidence of patients presenting with elevated blood pressure, which met or exceeded the ACC/AHA definition of hypertensive crisis, requiring pharmacological intervention, case delay, or case cancellation for six weeks prior to implementation of the educational intervention. The same data was collected from EHRs for the six weeks period following the implementation of the education intervention. The expected outcome was a decrease in the instance of elevated blood pressure requiring pharmacological intervention, case delay, or case cancellation after the implementation of the intervention.

Methods

Project Design

Essential to implementing the teach-back patient education was providing tools and training to two groups of staff members at the project site. The first target group was the patient schedulers. Each scheduler received education and training regarding the structure and goals of this project, as well as training in the teach-back methodology used to ensure that each patient understood the instructions that they received regarding taking antihypertensive medications on the day of their scheduled endoscopy procedure. Because the schedulers have no formal medical or nursing training, they were provided with a list of currently prescribed antihypertensive medications that the patient should continue on the day of their procedure, and a list of

medications to withhold (see Appendices A and B), and be able to return demonstrate the teach-back method.

The second training group was the Medical Assistants (MAs) at the project site. These MAs rotate responsibilities each day, and are regularly assigned the responsibility of calling patients to confirm their scheduled appointments, and to ensure that they understand their preoperative instructions. The MA calls take place one to three days prior to the scheduled procedure. This group was also trained to remind hypertensive patients, who were currently prescribed antihypertensive medications, to take their medications on the day of their endoscopy, and to use the teach-back method to help ensure patient understanding. The same comprehensive lists of medications to take, and to withhold, on the day of their surgery was also provided to the MA group.

Upon completion of the teach-back patient education, the patient scheduler and MA indicated on each patient's call sheet that the patient received the antihypertensive information, and were able to demonstrate understanding by teaching back the information. Patients who were either unable or unwilling to teach back the information were excluded from the study. This was accomplished by the primary investigator verifying that each patient, who received pharmacological intervention, had demonstrated understanding of the patient teaching as indicated by their call sheets. Patient scheduler and CMA training occurred in a stepwise fashion as follows:

Step 1. To ensure that schedulers and CMAs understood their role in this project, each patient scheduler and CMA received copies of the blood pressure medications list, telephone script cards, and a PowerPoint presentation.

Step 2. A Lunch and Learn group training session was held for the six patient schedulers and two CMAs to cover the content of the PowerPoint presentation.

Step 3. Learning and competence in the teach-back method was evaluated by return demonstration from the schedulers and CMAs. Proficiency was demonstrated in the group session and evaluated by the primary investigator. Schedulers and CMAs were not allowed to contact patients until proficiency had been established.

Step 4. Schedulers and CMAs were educated in the names of commonly used antihypertensive medications and provided a list to be used as reference during patient calls.

Step 5. Each patient was asked, “Do you take blood pressure medication?” If the patient responded yes, they were to be further asked, “What is the name of your blood pressure medication?” They were also to be asked, “What time do you normally take your blood pressure medication?” If the patient normally took their blood pressure medication in the morning, the scheduler or CMA then instructed the patient, “We want you to take your blood pressure medication prior to coming for your appointment.” They then implemented the practiced teach-back method.

Step 6. The patient then demonstrated understanding of instructions by correctly restating the instructions regarding their blood pressure medications.

Step 7. Schedulers and CMAs then indicated successful or unsuccessful patient teach-back by marking the appropriate response to “Antihypertensive education complete Yes/ No” on the patient preop call sheet used by all schedulers and CMAs to organize their telephone calls.

Project Site and Population

The site for this project was a freestanding, office-based, gastroenterology clinic located in a small suburban area of the southeast United States. The project site consisted of three gastroenterology procedure rooms. The target population consisted of adult patients, age 18 years or older, who were scheduled for endoscopic procedures at the project site, who had previously been diagnosed with hypertension and were prescribed antihypertensive medications. The patient population included adult patients presenting for colonoscopy, esophagogastroduodenoscopy (EGD), or a combined EGD/colonoscopy, at the project site. According to facility policy, all patients must meet criteria to qualify as American Society of Anesthesiologists (ASA) physical status I, II, or III in order to have their procedure at the project site. The ASA physical status is assigned by the CRNA during preoperative assessment. According to the ASA (2020), the ASA Physical Status Classification System is used to assess a patient's preoperative comorbidities, but should not be used as a predictor of perioperative risk. The project site allows procedures to be performed only on patients whom are determined to be: ASA I, a normal, healthy patient; ASA II, a patient with mild systemic disease; or ASA III, a patient with severe systemic disease. Procedures for patients who are assessed to be ASA IV or greater are referred to a local hospital for their procedure. Participating staff included patient schedulers and MAs, whose roles have been explained previously. Stakeholders included four gastroenterologists practicing at the project site, five Certified Registered Nurse Anesthetists contracted to provide anesthesia services to patients at the project site, and the gastroenterology practice manager. The primary function of the gastroenterologists was to serve in a supervisory role over the Certified Registered Nurse Anesthetists, and to provide consultation and medical guidance as needed. The role of the Certified Registered Nurse Anesthetists was to evaluate each patient, assess their blood pressure status, and provide pharmacological intervention, case delay, or case cancellation

as indicated. The gastroenterology practice manager served to coordinate the training schedule for the staff MAs and patient schedulers to facilitate training by the primary investigator.

Data Collection Procedures

Data was collected via retrospective EHR reviews to determine the incidence of patients presenting for endoscopy with elevated blood pressure requiring pharmacological intervention in the form of intravenous antihypertensives, case delay, or case cancellation for a six weeks period prior to implementation of the intervention. The same data was collected via retrospective chart review for a six weeks period following the implementation of the intervention. All data which was collected was part of the routine documentation for all procedures at the project site. Data were recorded on an Excel spreadsheet, without patient identifiers. Patient name, date of birth, and patient number was not recorded on the Excel spreadsheet. Each patient was assigned a numerical label, starting at one, and assigned in chronological order of their procedure date (e.g. 1_072521). After data collection, Excel spreadsheets were stored and edited in UA Box. UA Box is a password protected storage account accessible only by the primary investigator. All data collection was accomplished by the primary investigator. The project site did not have an Institutional Review Board and executed an Institutional Review Board deferral letter to the University of Alabama Institutional Review Board.

Data Analysis

In addition to incidence of pharmacological intervention, case delay, and case cancellation, demographic data related to gender, age, and procedure was collected. Pre-intervention and post-intervention data were analyzed using chi squared analysis.

Cost-Benefit Analysis/Budget

Financial cost for this project was negligible as all data points are being routinely recorded in the EHR. Training time for MAs and patient schedulers was approximately one hour for the session. Printing and laminating costs for educational materials was paid personally by the primary investigator, and was under \$10. No institutional or external funding was necessary.

Timeline

After approval from the University of Alabama Institutional Review Board, the primary investigator began collection of data for the six weeks period prior to implementation of the intervention. The primary investigator also concurrently developed and printed educational materials for staff training and implemented training of staff. Upon completion of staff training, implementation of the intervention began. These initial steps were completed during the period of August through September, 2021.

During the time period from October through December, 2021, the primary investigator began a retrospective chart review for the six weeks period in which all hypertensive patients received the Teach-back medication education. All data was transferred to the Excel spreadsheet and uploaded to UA Box. Data were compiled and analyzed using chi-squared analysis.

During the time period of January through February, 2022, dissemination of the report was accomplished by way of written report and presentation to the department. After approval, the final DNP project manuscript was uploaded on or before March 30, 2022. Detailed timeline information is available in a table labeled Appendix C.

Ethical Considerations/Protection of Human Subjects

The University of Alabama Institutional Review Board approval was obtained prior to initiating the project. All participants were protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). This act protects the privacy of all patients' health

information. Standards of Care for practice in a gastroenterology lab were also followed. Any electronic data was stored on UA Box. Personal health information, including name, date of birth, and patient number, were not recorded on the Excel spreadsheet. All data was transferred to the Excel spreadsheet and uploaded to UA Box. No hard or digital copies of patient charts were collected for this project.

Results

A chi squared analysis was utilized to compare the data from preintervention and postintervention groups regarding the incidence of hypertension significant enough to require pharmacological intervention, both before and after implementation of the medication teach-back intervention. The P-value was also calculated using the chi squared analysis, $X^2(1, N=1044) = 7.71, p = .00548$. No incidence of case delay or cancellation were experienced in either intervention group. During the 6 weeks prior to implementation of the antihypertensive medication patient teaching (teach-back), the project site performed procedures on 869 patients. Of those 869 patients, 491 (56.5%) had a diagnosis of hypertension and were prescribed at least one antihypertensive medication. Of the patients meeting those criteria 18 (3.67%) required pharmacological intervention for treatment of hypertension. During the 6 weeks after implementation of the antihypertensive medication teach-back intervention, the project site performed procedures on 1071 patients. Of those 1071 patients, 553 (51.0%) had a diagnosis of hypertension and were prescribed at least one antihypertensive medication. Of the patients meeting those criteria, six (1.1%) required pharmacological intervention for treatment of hypertension. These results represented a 70.5% decrease in the incidence of patients arriving for their GI procedures with elevated blood pressure requiring pharmacological intervention. The calculated P-value was .00548, indicating a statistically significant improvement.

Demographic data, including age, sex, and procedure was collected for each patient. Most patients were older, with a mean age of 65.4 years. Females were slightly more prevalent (53.3%) than males (46.7%). The case distribution included colonoscopies (66.2%), EGDs (27.0%), and combined EGD/colonoscopies (6.8%). Detailed demographic information is available in Appendix D.

Interpretation/Discussion

The results were significant ($p=.00548$), that preoperative patient teaching using the teach-back method decreased the incidence of patients undergoing GI procedures requiring pharmacological intervention for hypertension on the day of their procedures. Feedback from the patient schedulers and MAs indicated that the teach-back method was a sustainable method of preoperative patient education. The findings of this project are consistent with, and reinforce the findings of Slater, B., et al, (2017), that patient recall is improved when employing the teach-back method during patient education.

One limitation of this project was the limited time for data collection. Another limitation was the inclusion of only one clinical site. Additional research is needed at other free-standing outpatient settings to determine if they obtain similar results. The project site plans to continue using the teach-back method intervention, due to its demonstrated efficacy. Data will continue to be collected quarterly and tracked to identify changes or trends, and to guide future patient education efforts.

Another area of concern regarding this project was potential Hawthorne effect upon the participating CRNAs when determining hypertension intervention requirements. To minimize this effect, only the primary investigator was aware of the start and stop dates of each data collection period. To further minimize the potential for Hawthorne effect, a threshold for

administration of antihypertensive medications was established to reflect the ACC/AHA definition of hypertensive crisis. The AHA/AHA defined hypertensive crisis as a systolic blood pressure greater than 180 mmHg or diastolic blood pressure of greater than 120 mmHg (Ritchey, M., et al, 2018).

Conclusion

Prior to this project, the project site was experiencing a perceived increase in the incidence of patients arriving for GI procedures with elevated blood pressure requiring pharmacological intervention. The CRNAs at the site were frequently told by their patients that they were not instructed to take their prescribed blood pressure medication on the day of their procedure. A plan was formulated to ensure that all hypertensive patients, who had been prescribed antihypertensive medications, were instructed to do so by both the patient schedulers and the MAs during their preoperative phone calls. The teach-back method was chosen as the evidence-based, patient-centered approach to ensuring that each patient received instructions and understood what was expected of them.

After implementation of the teach-back patient education, the project site experienced a 70.5% decrease in the incidence of patients arriving for their GI procedures with elevated blood pressure requiring pharmacological intervention. On the basis of these findings, the project site has continued to use the teach-back patient teaching intervention for all hypertensive patients scheduled at their facility. The office manager will continue to monitor quarterly data to ensure continued efficacy of the intervention.

This intervention will help to ensure project site compliance with the 2014 American College of Cardiologists/ American Heart Association (ACC/AHA) Joint Task Force Clinical Practice Guidelines recommendation that all hypertensive patients continue to take their

antihypertensive medications throughout the perioperative period. This clinical guideline compliance will decrease the number of patients requiring pharmacological intervention, thereby improving patient outcomes.

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Appendix A

1

Medication List for Teach-back Patient Education

Instructions: If patient is diagnosed with hypertension, and is currently prescribed antihypertensive medications, use this list to determine which medications should be taken the day of procedure, and which should be held. Contact any Integra CRNA for questions.

Continue day of Procedure:

Beta blockers

acebutolol
atenolol
~~betaxolol~~
bisoprolol fumarate
~~carvedilol~~ hydrochloride
metoprolol tartrate
metoprolol succinate
nadolol
penbutolol sulfate
pindolol
propranolol hydrochloride
~~sotalol~~ hydrochloride
timolol maleate

ACE Inhibitors

benazepril hydrochloride
captopril
enalapril maleate
~~fosinopril~~ sodium
lisinopril
~~moexipril~~
perindopril
quinapril hydrochloride
~~ramipril~~
trandolapril

Angiotensin II Receptor Blockers

candesartan
~~eprosartan~~ mesylate
~~irbesartan~~
losartan potassium
telmisartan
valsartan

Calcium Channel Blockers

amlodipine besylate
bepridil
diltiazem hydrochloride
felodipine
~~isradipine~~
nicardipine
nifedipine
~~nisoldipine~~
verapamil hydrochloride

Alpha Blockers

doxazosin mesylate
prazosin hydrochloride
terazosin hydrochloride

Appendix B

2

Continue day of Procedure:

Alpha 2 Receptor Agonists

Methyldopa

Combined Alpha and Beta Blockers

carvedilol
labetalol hydrochloride

Central Agonists

alpha methyldopa
clonidine hydrochloride
~~guanabenz~~ acetate
guanfacine hydrochloride

Peripheral Adrenergic Receptors

guanadrel
guanethidine ~~monosulfate~~
reserpine

Vasodilators

hydralazine
minoxidil

Hold Day of Procedure:

Diuretics

chlorthalidone
chlorothiazide
hydrochlorothiazide
indapamide
metolazone
amiloride hydrochloride
spironolactone
triamterene
furosemide
bumetanide

Appendix C

Timeline of Project

<p>August-September 2021</p>	<p>Approval from Institutional Review Board for data collection received from university.</p> <p>Begin collection of data for the 6 weeks prior to implementation of Teach-back Medication Education project.</p> <p>Develop and print educational materials for staff, and implement staff training.</p> <p>After staff training, implement educational intervention.</p>
<p>October- December 2021</p>	<p>Begin a retrospective review of data from the six-week period in which all patients received the Teach-back Medication Education; document on Post-intervention form (whatever you make Appendix A); transfer all data to UA Box storage account.</p>
<p>November-December 2021</p>	<p>Conclusion of data collection; data entered UA Box storage account; all paper tools shredded; compile data and analyze using independent t-tests.</p>
<p>January-February 2022</p>	<p>Dissemination of data via written report/presentation to department.</p>
<p>January- March 2022</p>	<p>Final DNP project manuscript uploaded.</p>

Appendix D

Pre-Intervention		
Demographic Categories	Frequency	Valid Percentage
Gender		
Female	268	54.6
Male	223	45.4
Age		
≤ 39	0	0
40-49	14	2.9
50-59	121	24.6
60-69	158	32.2
70-79	177	36.0
≥ 80	21	4.3
Procedure		
EGD	140	28.5
Colonoscopy	322	65.6
EGD/Colonoscopy	29	5.9
Post-Intervention		
Demographic Categories	Frequency	Valid Percentage
Gender		
Female	288	52.0
Male	265	48.0
Age		
≤ 39	1	0.2
40-49	20	3.6
50-59	110	19.9
60-69	224	40.5
70-79	185	33.4
≥ 80	13	2.4
Procedure		
EGD	142	25.7
Colonoscopy	369	66.7
EGD/Colonoscopy	42	7.6