

Evaluation of a Systematic Method for Risk Stratification and Management of Gastrointestinal Endoscopy Patients

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Abstract

Evaluation of a Systematic Method for Risk Stratification and Management of Gastrointestinal Endoscopy Patients

The goal of this study was to assess outcomes with respect to significant cardiopulmonary complications following endoscopy. Post-procedural cardiopulmonary complications were chosen as a marker for preprocedural preparedness. This study compares annual data before and after a systematic approach to preprocedural risk stratification and management was instituted at the Carilion Clinic, a large integrated health care system with a medical draw area of over 1 million patients serving a wide geographic area. Procedures were performed by gastroenterologist, surgeons and trainee physicians under the supervision of staff physicians at 8 endoscopy facilities. The management algorithms used for this study were developed by a multi-disciplinary task force that included gastroenterologist, anesthesiologists, Carilion Registration and Education for Surgery (CARES) nurses, appointment schedulers and information technology specialists.

Study hypothesis: A systematic approach to preprocedural risk stratification and management will not increase the rate of postprocedural cardiopulmonary events.

Results:

There were 14,358 cases performed between September 1, 2013 and August 31, 2014 which represents baseline annual data before the systemic approach to risk stratification and management was initiated (group 1). Of these cases, 53 had cardiopulmonary complications or a complication rate of 0.37%. There were 13,685 cases performed between September 1, 2015 and August 31, 2016, which represents annual data after the systemic approach was started (group 2). There were 41 cardiopulmonary complications, or a complication rate of 0.30%. There were no significant differences between these two groups with respect to cardiopulmonary complications with p value of 0.1571, thus confirming the study hypothesis.

Group 1 patient had 53 cardiopulmonary complications with most of these seen with esophagogastroduodenoscopy (EGD) 40, colonoscopy accounted for 9 and endoscopic retrograde cholangiopancreatography (ERCP) 4. A similar pattern for cardiopulmonary complications was seen for group 2 patients with 30 of 41 patients having EGD, colonoscopy 9 and ERCP 2.

Discussion

Our results confirm the hypothesis that a systematic approach to endoscopic preprocedural risk stratification and management will not increase postprocedural cardiopulmonary complications and in fact there was a trend toward improvement.

Additionally, this systematic method reduced costs by eliminating preprocedural testing and CARES office nursing visits for ASA I and II patients undergoing colonoscopy and EGD.

The pattern of cardiopulmonary complications suggests that EGD carries the greatest risk. The risk for ERCP is very low in our experience compared to historical data and may be related to our practice of intubated general anesthesia for all ERCP patients.

We hope the methods developed by this task force and presented in this article will be useful to other institutions interested in developing a systematic approach to preprocedural preparedness

Introduction

It is difficult to get a good estimate for the number of endoscopic procedures performed per year in the United States but it is clearly a very large number. The best data we found comes from 2009, which estimates that 6.9 million upper endoscopies (EGD), 11.5 million colonoscopies, and 228,000 biliary endoscopies were performed per year in the United States.(1). One suspects that the number is higher in 2017. Despite the large number of endoscopic procedures performed, there is little literature that informs best practices for preprocedural risk stratification, evaluation and management. What follows is an evaluation of a systematic approach to preprocedural preparedness. To develop this approach available literature was reviewed and expert opinion was sought. Extensive multi-disciplinary meetings were conducted that resulted in the methods articulated in this manuscript.

Prior to the systematic management approach we describe, we sought expert opinion from centers of endoscopic excellence. We were surprised to see a wide range of preprocedural evaluation and management practices ranging from open access with essentially no preprocedural risk stratification (especially in the case of open access screening colonoscopy) to a required nurse practitioner office visit by a nurse practitioner specializing in preprocedural evaluations. These preprocedural nurse practitioners were required to complete a one year mentorship under the anesthesiology department prior to seeing patients independently. While we laude the personalized care afforded by the nurse practitioner model, this is not practical for a large institution such as ours and would be cost prohibitive. Most importantly our survey failed to show a consistent (systematic) approach for risk stratification, preprocedural laboratory testing, colonoscopy preparation or medication management. Preprocedural medication management is particularly important for anticoagulant therapy, anti-platelet therapy, preprocedural antibiotics and colonoscopy preparation.

This paper focuses on ambulatory endoscopy safety and preparedness. The treatment algorithms contained in this paper represents consensus opinion developed by a multi-disciplinary task force at the Carilion Clinic. The task force included gastroenterologists, anesthesiologists, registered nurses from the Carilion Assessment, Registration, and Education for Surgery (CARES) unit, appointment schedulers and information technology specialists. The group met monthly for 1 year to develop these practice guidelines.

Literature that focused on various aspects of preprocedural preparedness was reviewed prior to multidisciplinary team meetings. In many cases the available literature gives little guidance to inform best practice and therefore expert opinion was used to formulate some of these recommendations. Finally, input from clinical staff members directly involved with the preprocedural evaluation and management process was important in shaping these guidelines.

Patient safety was the primary focus of our recommendations. Reducing costs by eliminating unnecessary preprocedural testing and improving patient convenience and compliance were important secondary goals. Patient convenience and compliance were especially important considerations in developing standardized colonoscopy preparations.

The goal of this study was to assess outcomes with respect to significant cardiopulmonary complications following endoscopic procedures performed at the Carilion Clinic. The study compares annual data before and after an enterprise wide standardized program for preprocedural preparedness was started. This standardized program addressed preprocedural risk stratification, medication management, testing and colonoscopy preparations. The recommendations presented in this article have been implemented at the Carilion Clinic for the past 2 years.

The Carilion Clinic is a Roanoke, Virginia-based integrated health care organization with seven hospitals, 685 physicians and cares for more than 1 million patients over a wide geographic area including southwest Virginia and eastern West Virginia. The Virginia Tech Carilion School of medicine is an integral part of our organization. We have active post-graduate training programs in internal medicine and surgery including subspecialty fellowship training. Relevant to this article, surgical residents and gastroenterology fellows perform procedures under the direction of staff physicians. The Carilion Clinic performs approximately 14,000 endoscopies annually including advanced biliary procedures at 8 separate endoscopy facilities.

Study hypothesis: A systematic approach to preprocedural risk stratification and management will not increase the rate of postprocedural cardiopulmonary events.

Methods:

Table 1: ASA classification

- Class I – A normally healthy patient
- Class II – A patient with mild systemic disease (e.g., mild asthma, controlled diabetes mellitus)
- Class III – A patient with severe systemic disease (e.g., moderate-to-severe asthma, poorly controlled diabetes mellitus, pneumonia)
- Class IV – A patient with severe systemic disease that is a constant threat to life (e.g., severe bronchopulmonary dysplasia, advanced cardiac disease)
- Class V – A moribund patient who is not expected to survive without the operation (e.g., septic shock, severe trauma)

Risk stratification:

Risk stratification is particularly important for gastrointestinal endoscopy as many of these procedures can be performed safely and efficiently at an ambulatory surgical center (ASC). In the case of the Carilion Clinic, the Carilion Roanoke Community Hospital (CRCH) serves as our ASC. After review of the available literature we determined that the best method for preprocedural risk stratification was the American Society of Anesthesiologists (ASA) classification(2,3). We felt that most patients classified as ASA I-III could safely have gastrointestinal procedures performed safely at an ASC location with certain specific exclusions. These exclusions are esophageal band ligation for esophageal varices and endoscopic retrograde cholangiopancreatography (ERCP). These procedures carry a higher risk for immediate post-procedural complications (2,4,5), and as such these procedures are performed at one of our hospital based endoscopy facilities irrespective of ASA classification.

The ASA classification system is presented as table 1. The classification system is a bit subjective and there appears to be significant variation among anesthesiology providers, especially for ASA class III patients. One publication advocates specific patient examples to improve correct ASA classification assignments (6). It is important to note that all endoscopic procedures performed at the Carilion Clinic have an anesthesia provider in attendance, either an anesthesiologist or a nurse anesthetist under the direction of an anesthesiologist.

Initial procedural risk assessment is performed by the ordering endoscopist, who can be a surgeon or gastroenterologist. The endoscopist chooses a facility to perform the procedure understanding that procedures performed at an ASC are intended to carry a lower risk for complications. This risk assessment is complemented by the CARES department. CARES nurses review preprocedural risk in a systematic fashion including a standardized history which is incorporated into the electronic medical record (EMR). This standardized history form is presented in this article as “screenshots” taken directly from the EMR (appendix 6). If questions arise concerning appropriate facility selection, the CARES nurse can consult with an anesthesiologist specifically assigned to handle such inquiries. If the patient needs

to move to a higher acuity facility the CARES nurse will notify the endoscopist and their appointment scheduler.

At the time of the CARES nursing visit additional information can be requested to help stratify patient risk. Such information may include past cardiology evaluations, cardiac testing (i.e. electrocardiogram (ECG), echocardiogram) as well as past pulmonary and renal evaluations.

Endoscopy patients represent a unique case for the CARES evaluation process, specifically, patients that are felt to be ASA I and II undergoing colonoscopy or EGD do not require a CARES office visit but rather have a phone visit performed by a CARES nursing staff. This modification in the protocol is particularly important for patients undergoing screening and surveillance colonoscopy. This change has greatly improved patient satisfaction and compliance as many of our patients travel long distances to have procedures performed.

Preprocedural medication management

At the time of the physician office visit a careful medication history should be obtained. Specific recommendations concerning diabetic medications, anticoagulant medications, antiplatelet drugs, antihypertensive medication and preprocedural antibiotics should be addressed. In addition, appointment schedulers address these issues at the time of the office visit.

At the time of the CARES nursing visit preprocedural medications are again reviewed. Specific medication recommendations are addressed in our systematic management protocol. This management protocol is summarized as a color-coded chart (appendix 7). These recommendations have been formulated by the anesthesiology department with gastroenterology input and in the case of diabetic management with endocrinology input. The importance of not withholding aspirin used as an anti-platelet drug is emphasized. Other antiplatelet drugs such as clopidogrel (Plavix) and prasugrel (Effient) are intentionally not covered by the management algorithm. These more potent antiplatelet drugs are directed by the patient's endoscopist, cardiologist or primary care physician depending on the clinical situation. If management of these drugs is not clear to the patient at the time of their CARES nursing visit, the nurse will contact the appropriate physician for medication management orders. Anticoagulant medication management is directed in a similar manner.

Preprocedural testing

The endoscopy management protocol (appendix 7) specifically addresses preprocedural testing. Of note and specific to gastrointestinal endoscopy at our institution, patients undergoing colonoscopy and EGD that are ASA I or II do not require preprocedural laboratory testing or EKG unless the patient is diabetic, taking diuretics or is on long term corticosteroid therapy. These patients require a basic metabolic profile (BMP). ERCP at our institution is performed with intubated general anesthesia. Prior literature suggests an increase rate of immediate adverse events with ERCP compared to colonoscopy or EGD and as such ERCP patients undergo more extensive preprocedural testing (2).

Pre-procedural antibiotics

Recent literature gives clear guidance for preprocedural antibiotic use with gastrointestinal endoscopy (7,8). We have incorporated these recommendations into our treatment protocols. These guidelines have been formulated as a joint effort of the American Society of Gastrointestinal Endoscopy (ASGE) and

the American Heart Association (AHA). These recommendations are summarized in tabular format below (table 2). This table is taken from Khashab MA et. al. (8).

TABLE 2. Antibiotic prophylaxis and/or treatment to prevent local infections

Patient condition	Procedure contemplated	Goal of prophylaxis	Periprocedural antibiotic prophylaxis
Bile duct obstruction in absence of cholangitis	ERCP with complete drainage	Prevention of cholangitis	Not recommended 444
Bile duct obstruction in absence of cholangitis	ERCP with incomplete drainage	Prevention of cholangitis	Recommended; continue antibiotics after procedure 444 B
Solid lesion in upper GI tract	EUS-FNA	Prevention of local infection	Not recommended 444
Solid lesion in lower GI tract	EUS-FNA	Prevention of local infection	Not recommended 444 B
Mediastinal cysts	EUS-FNA	Prevention of cyst infection	Suggested 44 BB
Pancreatic cysts	EUS-FNA	Prevention of cyst infection	Suggested 44 BB
All patients	Percutaneous endoscopic feeding tube placement	Prevention of peristomal infection	Recommended 444
Cirrhosis with acute GI bleeding	Required for all patients regardless of endoscopic procedures	Prevention of infectious adverse events and reduction of mortality	On admission 444
Synthetic vascular graft and other nonvalvular cardiovascular devices	Any endoscopic procedure	Prevention of graft and device infection	Not recommended 444
Prosthetic joints	Any endoscopic procedure	Prevention of septic arthritis	Not recommended 444 B
Peritoneal dialysis	Lower GI endoscopy	Prevention of peritonitis	Suggested 44 BB

EUS-FNA, EUS-guided FNA.

To briefly summarize these recommendations, patients undergoing endoscopic procedures do not require antibiotic prophylaxis, including patients with valvular heart disease or prosthetic joints. On the other hand, antibiotics are recommended for procedures associated with a significant risk of infection, or for patients with conditions that make them more susceptible to infection undergoing procedures associated with a high risk of bacteremia. These patients include: patients with significant neutropenia, cirrhotic patients with gastrointestinal bleeding and patients on peritoneal dialysis undergoing colonoscopy.

Colonoscopy preparation

Key to successful colonoscopy is adequate preparation. This is especially true for adenoma detection rate (ADR). The literature concerning colonoscopy preparation is very helpful in directing management

strategies(9–11)). Prior to instituting the standardized preparations listed in this manuscript there were at least 10 different preparations in use at the Carilion Clinic. This number has been reduced to 3 specific preparations with modifications based on the procedure time. In keeping with our established protocol (appendix 7), the patient must be NPO for 4 hours prior to the procedure but can have clear liquids prior to that time. The literature suggests that split dose preparations are more effective and better tolerated by patients in general(14,15). On the other hand patient compliance with a split dose prep can be an issue (16). Keeping these factors in mind and especially noting that many of our patients travel up to 3 hours for their procedures we chose to start split dose preparations for colonoscopies starting after noon (12 PM). The 12 PM time was chosen primarily to promote patient compliance.

It is clear from the literature that polyethylene glycol (Miralax) based preparations are better tolerated and equally effective compared to large volume preparations for average patients undergoing colonoscopy (8,9). Bisacodyl (Dulcolax) tablets were originally part of this preparation. Dulcolax does not seem to improve bowel preparation compared to Miralax alone but is associated with significantly more side effects compared to the Miralax alone (9,13). For this reason, Dulcolax is not used for our colonoscopy preparations. The Miralax preparation is our standard preparation with the 4-liter polyethylene glycol electrolyte preparations (Golytely, Trilyte) reserved for patients with significant constipation or for patients that previously failed the Miralax preparation.

For documentation purposes we are in the process of changing from the Aronchick bowel preparation scale(17) to the better validated Boston bowel preparation scale(18)but at the time of this publication this transition has not yet occurred system wide.

Colonoscopy preparation and patient instructions are presented as appendix 2 through 5. (For completeness, patient instructions for EGD are also listed as appendix 1)

Evaluation of Cardiopulmonary complication rates

To evaluate post procedural cardiopulmonary complications the EMR was queried for International Classification of Diseases (ICD) 9 codes applicable to post-procedural cardiopulmonary complications (table 3). When the ICD9 coding system changed to the ICD 10 system in the United States, these codes were mapped to the new coding system.

The rates of endoscopy related cardiopulmonary complications were compared for procedures performed between September 1, 2013 and August 31, 2014 (baseline annual data before the systematic management approach) and compared to endoscopies performed between September 1, 2015 and August 31, 2016 (annual data after the systematic management approach was in use).

Statistical analysis was performed using paired T test comparing aggregate cardiopulmonary complication rates for baseline data compared to the systematic management approach. A p value of greater than or equal to 0.05 was felt to show no significant difference between the two groups (non-inferiority).

Table 3. ICD 9 codes used to identify cardiopulmonary complications

425.4:CARDIOMYOPATHY, PRIMARY NEC
425.8:CARDIOMYOPATHY IN DISEASES CE
427.0:TACHYCARDIA, PAROXYSMAL ATRIAL
427.1:TACHYCARDIA, PAROXYSMAL VENTRICULAR
427.5:ARREST, CARDIAC,
427.89:DYSRHYTHMIAS, CARDIAC NEC
429.3:CARDIOMEGALY
785.0:SYMPTOM, TACHYCARDIA NOS
785.9:SYMP INV CARDIOVASCULAR SYSTEM NEC
997.1:COMPLICATIONS, CARDIAC
415.0:COR PULMONALE, ACUTE
518.0:COLLAPSE, PULMONARY
518.82:INSUFFICIENCY, PULMONARY NEC
518.51:ACUTE RESP FAIL FOLLW TRUMA/SURGEY
518.81:FAILURE, ACUTE RESPIRATORY
518.84:RESPIRATORY FAILURE,ACUTE & CHRONIC
786.09:SYMP ABNORMALITY, RESPIRATORY NEC

Results:**Table 4. Cardiopulmonary complications before and after systematic approach to preprocedural management**

	Before systematic approach	After systematic
approach*		
Total cases	14,358	13,685
Cardiopulmonary complications	53	41

Percent total cases with

cardiopulmonary complications (%)

0.37

0.30

*p value = 0.1571

Table 5. Procedures associated with cardiopulmonary complications

Procedure	Before systematic approach	After systematic approach
Colonoscopy / flexible sigmoidoscopy	9	9
EGD	40	30
ERCP	4	2

Discussion

This article presents a systematic approach for preprocedural risk assessment and management of patients undergoing gastrointestinal endoscopy. The data is derived from patients undergoing gastrointestinal procedures at a large integrated health care system with a wide variety of physicians performing endoscopy at multiple sites. The endoscopists performing these procedures included gastroenterologists, surgeons and physician trainees under the supervision of staff physicians.

Our results confirm the hypothesis that a systematic approach to endoscopic preprocedural risk stratification and management did not increase postprocedural cardiopulmonary complications and in fact there was a trend toward improvement. We chose post-procedural cardiopulmonary complications as an objective marker for preprocedural preparedness.

The systematic approach presented in this article more appropriately utilized the CARES nursing staff by allowing ASA I and II patient to undergo telephone nursing visits rather than requiring a CARES office visit. This management change did not increase postprocedural cardiopulmonary complications but was more convenient for patients and improved patient satisfaction and compliance. While this probably reduced nursing costs, this may also have indirectly improved patient care by allowing CARES nursing staff more time to evaluate and manage sicker ASA III and IV patients with office visits. This is particularly germane for patients undergoing screening and surveillance colonoscopy.

Though not proven, we believe that unifying preprocedural management may have reduced additional adverse outcomes such as medication errors. Certainly, there was greater accessibility for patients undergoing CARES telephone nursing visits which may have improved patient compliance and reduced “no-show” rates. This is supported by a recent article demonstrating a 33% reduction in “no-show” rates with telephone reminder calls by a nurse one week prior to outpatient colonoscopy(19).

It was surprising to see that EGD was more often associated with cardiopulmonary complications when compared to colonoscopy. We don't have a clear explanation for this finding but wonder if airway irritation induced by EGD scope insertion could have resulted in laryngospasm. Another possible cause is pharyngeal irritation associated with scope insertion triggering vomiting with resultant aspiration. Finally, it is possible that patients presenting for EGD are more likely to have pulmonary complications from aspiration because of their underlying gastrointestinal problems (e.g. gastroesophageal reflux or a gastric emptying disorder).

It is also interesting to note the low rate of cardiopulmonary adverse events with ERCP, as ERCP cases tend to last longer and are typically performed on very ill patients. As previously noted all ERCP patients at our institution receive intubated general anesthesia for their procedures and we wonder if this level of airway management accounts for these excellent outcomes.

One area we believe could improve our systematic management model is the development of a more objective ASA classification tool. The ASA class serves as the cornerstone of our risk assessment protocol yet in many instances the ASA class seems somewhat arbitrary and subjective with significant interobserver variation even among anesthesia providers. Despite these shortcomings, the ASA classification system is widely accepted by anesthesiologists and appears to be the best validated risk assessment tool for endoscopy related cardiopulmonary complications. It is our opinion that a more objective ASA classification tool based on validated data inputs would be possible and helpful especially for care team members that are not anesthesia providers. Non-anesthesia staff members (CARES nurses) are often tasked with preprocedural risk assessment. We can envision a widely available validated phone or computer application for this purpose. This application could integrate with the EMR to bring in data that is already being entered as part of the preprocedural nursing visit.

Risk stratification is much better characterized for surgery patients as compared to endoscopy patients. Surgical risk stratification tools include surgical risk calculators but it is unclear if these risk calculators can be applied to endoscopy patients that have a much lower risk of cardiopulmonary complications (20,21).

The management strategies presented in this paper were the work product of a multidisciplinary team. The management recommendations incorporated available literature, expert opinion and input from clinical team members. We believe that institutions will find our methods helpful and we hope they will further refine and expand on our recommendations.

Finally, it is important to note that successful implementation of a systemic management approach requires "buy in" from a wide variety of clinical staff members in several clinical departments. We recommend a standardized educational format delivered to the entire clinical team to facilitate this process. In our case, we used a standardized power point lecture delivered by the director of ambulatory endoscopy in partnership with an anesthesiologist. We found this lecture format with a long question and answer period worked well and encouraged clinical team members to contribute useful ideas that were subsequently incorporated into our final management algorithms.

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Appendix 1

EGD Instructions

DO NOT eat anything solid after midnight.

You may have clear liquids (see below list).

You may have clear liquids up to 6 hours before the time to arrive for your procedure.

MEDICATIONS:

- If you take any “blood thinners” to prevent blood clotting for any kind of heart, lung, or blood vessel condition you must have specific instructions from your physician about the use of these medications before you have your procedure.
- You may continue to take aspirin up to the day of your procedure
- If you take iron supplements, do NOT take 3 days prior to your procedure.
- If you take INSULIN, take only ½ your usual dose both the evening before and the morning of your procedure.
- Take ½ doses of hypoglycemic agents the day before and hold the day of procedure.
- Unless otherwise instructed, take All your other medications both the day before and the day of your procedure.

CLEAR LIQUID DIET LIST:

Beverages: Soft drinks (orange, ginger ale, cola, Sprite, 7 UP, Coke, Pepsi, etc.), Gatorade (NO red, blue or purple), Crystal Light, Kool-Aid, strained fruit juices without pulp (apple, white grape, orange, lemonade, etc.), water, tea or coffee without milk or non-dairy creamers.

Soup: Fat-free, low sodium chicken or beef bouillons or broth

Desserts: Hard candies, Jell-O (NO red, blue or purple) (Lemon, Lime or Orange with no fruit or toppings), Popsicles, Italian Ice (NO red, blue or purple, no sherbets or fruit bars)

Appendix 2

Miralax (polyethylene glycol) Bowel Prep for patients scheduled before 12 pm

Before beginning your prep, you will need to purchase the following items:

- 238-gram bottle of Miralax (generic/store brand is okay)
- 64-oz bottle of Gatorade (NO RED, BLUE OR PURPLE)

DO NOT drink anything colored red, blue or purple. Milk & dairy products are NOT allowed. Drink plenty of clear liquids throughout day. DO NOT eat anything solid.

THE DAY BEFORE THE PROCEDURE

In the morning, empty the entire 238-gram bottle of Miralax and the 64-oz. bottle of Gatorade into a separate container shake well and refrigerate. Have a clear liquid (see list below) breakfast. DRINK PLENTY THROUGHOUT THE DAY TO KEEP WELL HYDRATED.

Have a clear liquid lunch. Continue drinking plenty of clear liquids.

At approximately 6:00 pm, begin drinking your Gatorade/Miralax preparation.

Drink 8 oz. every 10-15 minutes until the bottle is empty and rectal effluent is clear. Drink plenty of clear liquids.

You may use a straw to help get more liquid down easier and quicker

You will experience diarrhea, which may persist during the night.

Have a clear liquid dinner and continue drinking clear liquids until bedtime.

MEDICATIONS:

If you take any “blood thinners” to prevent blood clotting for any kind of heart, lung, or blood vessel condition you must have specific instructions from your physician about the use of these medications before you have your procedure.

You may continue to take aspirin up to the day of your procedure

If you take iron supplements, do NOT take 3 days prior to your procedure.

If you take INSULIN, take only ½ your usual dose both the evening before and the morning of your procedure.

Take ½ doses of hypoglycemic agents the day before and hold the day of procedure.

Unless otherwise instructed, take all your other medications both the day before and the day of your procedure.

CLEAR LIQUID DIET LIST:

Beverages: Soft drinks (orange, ginger ale, cola, Sprite, 7 UP, Coke, Pepsi, etc.), Gatorade (NO red, blue or purple), Crystal Light, Kool-Aid, strained fruit juices without pulp (apple, white grape, orange, lemonade, etc.), water, tea or coffee without milk or non-dairy creamers.

Soup: Fat-free, low sodium chicken or beef bouillons or broth

Desserts: Hard candies, Jell-O (NO red, blue or purple) (Lemon, Lime or Orange with no fruit or toppings), Popsicles, Italian Ice (NO red, blue or purple, no sherbets or fruit bars)

You may have clear liquids up to 6 hours before the time to arrive for your procedure.

If you have any questions about these instructions you may call: XXX-XXX-XXXX

On the day of the procedure at the time of check-in

Please notify the nursing staff if you had any difficulty completing your colon preparation.

Appendix 3

Miralax (polyethylene glycol) Bowel Prep for patients scheduled after 12 pm

Before beginning your prep, you will need to purchase the following items:

- 238-gram bottle of Miralax (generic/store brand is okay)
- 64-oz bottle of Gatorade (NO RED, BLUE OR PURPLE)

DO NOT drink anything colored red, blue or purple. Milk & dairy products are NOT allowed. Drink plenty of clear liquids throughout day. DO NOT eat anything solid.

THE DAY BEFORE THE PROCEDURE

In the morning, empty the entire 238-gram bottle of Miralax and the 64-oz. bottle of Gatorade into a separate container shake well and refrigerate. Have a clear liquid (see list below) breakfast. DRINK PLENTY THROUGHOUT THE DAY TO KEEP WELL HYDRATED.

- At approximately 4:00 pm, begin drinking your Gatorade/Miralax preparation. Have a clear liquid dinner. Continue drinking plenty of clear liquids.
- Drink 8 oz. every 10-15 minutes until ½ the bottle is empty and rectal effluent is clear. Drink plenty of clear liquids.
- You may use a straw to help get more liquid down easier and quicker
- You will experience diarrhea, which may persist during the night.

THE MORNING OF THE PROCEDURE:

- 5 hours prior to your procedure, drink the remaining ½ of your Gatorade/Miralax preparation.

- Drink 8 oz. every 10-15 minutes until the bottle is empty and rectal effluent is clear. Drink plenty of clear liquids.
- Do not have anything else by mouth after you are done drinking this.

MEDICATIONS:

If you take any “blood thinners” to prevent blood clotting for any kind of heart, lung, or blood vessel condition you must have specific instructions from your physician about the use of these medications before you have your procedure.

You may continue to take aspirin up to the day of your procedure

If you take iron supplements, do NOT take 3 days prior to your procedure.

If you take INSULIN, take only ½ your usual dose both the evening before and the morning of your procedure.

Take ½ doses of hypoglycemic agents the day before and hold the day of procedure.

Unless otherwise instructed, take all your other medications both the day before and the day of your procedure.

CLEAR LIQUID DIET LIST:

Beverages: Soft drinks (orange, ginger ale, cola, Sprite, 7 UP, Coke, Pepsi, etc.), Gatorade (NO red, blue or purple), Crystal Light, Kool-Aid, strained fruit juices without pulp (apple, white grape, orange, lemonade, etc.), water, tea or coffee without milk or non-dairy creamers.

Soup: Fat-free, low sodium chicken or beef bouillons or broth

Desserts: Hard candies, Jell-O (NO red, blue or purple) (Lemon, Lime or Orange with no fruit or toppings), Popsicles, Italian Ice (NO red, blue or purple, no sherbets or fruit bars)

You may have clear liquids up to 6 hours before the time to arrive for your procedure.

If you have any questions about these instructions you may call: XXX-XXX-XXXX

On the day of the procedure at the time of check-in:

Please notify the nursing staff if you had any difficulty completing your colon preparation.

Appendix 4

Golytely/Trilyte 4-liter Bowel Prep

Before beginning your prep, you will need to purchase the following items:

- Pick up your prescription at your pharmacy
- o You may use flavor packets if it is given to you with your prescription.

DO NOT drink anything colored red, blue or purple. Milk & dairy products are NOT allowed. Drink plenty of clear liquids throughout day. DO NOT eat anything solid.

THE DAY BEFORE THE PROCEDURE

- In the morning prepare your prescription according to the instructions on the package and refrigerate. Have a clear liquid (see list below) breakfast. DRINK PLENTY THROUGHOUT THE DAY TO KEEP HYDRATED.
- At 4:00 pm, begin drinking your prescription.
 - o Drink 8 oz. every 10-15 minutes until the bottle is empty and rectal effluent is clear. Drink plenty of clear liquids.
 - o You may use a straw to help get more liquid down easier and quicker
- Have a clear liquid dinner and continue drinking clear liquids until bedtime.

MEDICATIONS:

- If you take any “blood thinners” to prevent blood clotting for any kind of heart, lung, or blood vessel condition you must have specific instructions from your physician about the use of these medications before you have your procedure.
- You may continue to take aspirin up to the day of your procedure
- If you take iron supplements, do NOT take 3 days prior to your procedure.
- If you take INSULIN, take only ½ your usual dose both the evening before and the morning of your procedure.
- Take ½ dose of hypoglycemic agents the day before and hold the day of procedure.
- Unless otherwise instructed, take ALL your other medications both the day before and the day of your procedure.

CLEAR LIQUID DIET LIST:

Beverages: Soft drinks (orange, ginger ale, cola, Sprite, 7 UP, Coke, Pepsi, etc.), Gatorade (NO red, blue or purple), Crystal Light, Kool-Aid, strained fruit juices without pulp (apple, white grape, orange, lemonade, etc.), water, tea or coffee without milk or non-dairy creamers.

Soup: Fat-free, low sodium chicken or beef bouillons or broth

Desserts: Hard candies, Jell-O (NO red, blue or purple) (Lemon, Lime or Orange with no fruit or toppings), Popsicles, Italian Ice (NO red, blue or purple, no sherbets or fruit bars)

You may have clear liquids up to 6 hours before the time to arrive for your procedure.

If you have any questions about these instructions you may call: XXX-XXX-XXXX

On the day of the procedure at the time of check-in:

Please notify the nursing staff if you had any difficulty completing your colon preparation.

Appendix 5

Two Day Miralax (polyethylene glycol) Bowel Prep with Magnesium Citrate

Before beginning your prep, you will need to purchase the following items:

- 238-gram bottle of Miralax (generic/store brand is okay)
- 64-oz bottle of Gatorade (any color except RED)
- 8 OZ. bottle of magnesium citrate

DO NOT drink anything colored red, blue or purple. Milk & dairy products are NOT allowed. Drink plenty of clear liquids throughout day. DO NOT eat anything solid.

TWO DAYS PRIOR TO YOUR PROCEDURE:

- Clear liquids whole day (see list below)
- At 6:00 pm, take whole bottle of magnesium citrate.

THE DAY BEFORE THE PROCEDURE

- In the morning, empty the entire 238-gram bottle of Miralax and the 64-oz. bottle of Gatorade into a separate container shake well and refrigerate. Have a clear liquid (see list below) breakfast. DRINK PLENTY THROUGHOUT THE DAY TO KEEP WELL HYDRATED.

- Have a clear liquid lunch. Continue drinking plenty of clear liquids.
- At approximately 6:00 pm, begin drinking your Gatorade/Miralax preparation.
- o Drink 8 oz. every 10-15 minutes until the bottle is empty and rectal effluent is clear. Drink plenty of clear liquids.
- o You may use a straw to help get more liquid down easier and quicker
- o You will experience diarrhea, which may persist during the night.
- Have a clear liquid dinner and continue drinking clear liquids until bedtime.

MEDICATIONS:

- If you take any “blood thinners” to prevent blood clotting for any kind of heart, lung, or blood vessel condition you must have specific instructions from your physician about the use of these medications before you have your procedure.
-
- You may continue to take aspirin up to the day of your procedure
- If you take iron supplements, do NOT take 3 days prior to your procedure.
- If you take INSULIN, take only ½ your usual dose both the evening before and the morning of your procedure.
- Take ½ doses of hypoglycemic agents the day before and hold the day of procedure.
- Unless otherwise instructed, take all your other medications both the day before and the day of your procedure.

CLEAR LIQUID DIET LIST:

Beverages: Soft drinks (orange, ginger ale, cola, Sprite, 7 UP, Coke, Pepsi, etc.), Gatorade (NO red, blue or purple), Crystal Light, Kool-Aid, strained fruit juices without pulp (apple, white grape, orange, lemonade, etc.), water, tea or coffee without milk or non-dairy creamers.

Soup: Fat-free, low sodium chicken or beef bouillons or broth

Desserts: Hard candies, Jell-O (NO red, blue or purple) (Lemon, Lime or Orange with no fruit or toppings), Popsicles, Italian Ice (NO red, blue or purple, no sherbets or fruit bars)

You may have clear liquids up to 6 hours before the time to arrive for your procedure.

If you have any questions about these instructions you may call: XXX-XXX-XXXX

On the day of the procedure at the time of check-in:

Please notify the nursing staff if you had any difficulty completing your colon preparation.

Appendix 6

CARES evaluation taken from the EMR (screenshots)

Hyperspace - Carilion Clinic - PRE SURG TESTING CST - Training Sandbox - SAMMY CALABRIA

North Carolina, Melinda

Female, 43 y.o., 12/14/1973

Unit: PSTI

MRN: 651
CSN: 38035
EMPI: None

Allergies: No Known A...
Last Height: 1.727 m (...
Wt: FILE NEW WEIGHT
Last BMI and %ile: 22...

Attending: None
Pref Lang: English [22]
No POA

Code

Infection: None
Isolation: None
FYI: None

MyChart: None
Diff Air: None
Adv Dir Filed?...

Admit Date: 05/17/2017
LOS: 0 Minutes
New Res/Order?...

Registries: None

Enhanced Recovery: No
DRG EDD Date Only: None
DRG LOS: None

Summary

Chart Review

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MAR

Flowsheets

Intake/Output

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Immunizations

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PST Navigator

History

Admission

Device/Implants/Tx

Symptoms ROS

Arrival

LMP

Potential Risks

Pre-hab Checklist

Patient Code

Adlt Risk Assess(AI)

Rapid Respon...

Adlt Risk Assess(...

Flu Assessment

Pneumo Assessment

CARE MGMT PRESCREEN

Care Mgmt Prescr...

B PASS/CAREPLAN/EDU

Boarding Pass

Care Plan

Patient Education

Progress Notes

OTHER

Sedation Assess...

Critical Results

Customize

More

Anesthesia Complications - OR ANESTHESIA COMPLICATIONS

Time taken: 0914 5/17/2017

Show: Row Info Last Filed Details All Choices

Values By Create Note

ANESTHESIA COMPLICATIONS

Have you had any problems with anesthesia? Yes No

Explain

Has anyone in family had problems with anesthesia? Yes No

Explain

Restore Close F9 Cancel

Previous F7 Next F8

History

Last Update: History

Name Margaret A. Montane Date and Time Sat Jun 14, 2014 12:34 PM

Social History

Category Smoking Status History Never Assessed

Smokeless Tobacco Status Unknown

Alcohol Use Not Asked

Drug Use Not Asked

Socioeconomic History

Mental Status Spouse Name # of Children Years Education

Single

Preferred Language Ethnicity Race

English Non-Hispanic White or Caucasian

Birth History

Obstetric History as of 5/17/2017

None

None

Device/Implants/Tx

New Reading

No data found.

Symptoms ROS

New Reading

No data found.

LMP-DO NOT ENTER LMP DATE if pt Currently Pregnant or OB(4)

SAMMY CALABRIA

Start

Internet Explorer

Google Chrome

Microsoft Word

Microsoft Excel

Microsoft PowerPoint

Microsoft Access

Microsoft Outlook

Microsoft OneNote

Microsoft Publisher

Microsoft Word 2010

Microsoft Excel 2010

Microsoft PowerPoint 2010

Microsoft Access 2010

Microsoft Outlook 2010

Microsoft OneNote 2010

Microsoft Publisher 2010

Microsoft Word 2013

Microsoft Excel 2013

Microsoft PowerPoint 2013

Microsoft Access 2013

Microsoft Outlook 2013

Microsoft OneNote 2013

Microsoft Publisher 2013

Microsoft Word 2016

Microsoft Excel 2016

Microsoft PowerPoint 2016

Microsoft Access 2016

Microsoft Outlook 2016

Microsoft OneNote 2016

Microsoft Publisher 2016

North Carolina, Melinda

Female, 43 y.o., 12/14/1973

Unit: PSTI

MRN: 651

CSN: 38035

EMPI: None

Allergies: No Known A...

Last Height: 1.727 m (...)

WT: FILE NEW WEIGHT

Last BMI and %ile: 22...

Attending: None

Pref Lang: English [22]

No POA

Code

Infection: None

Isolation: None

FYI: None

MyChart: None

Diff Air: None

Adv Dir Filed?...

Private?:

Admit Date: 05/17/2017

LOS: 0 Minutes

New Rslt/Order?...

Registries: None

Enhanced Recovery: No

DRG EDD Date Only: None

DRG LOS: None

PST Navigator

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Discharge

History

Patient Code

Rapid Respon...

Charge Naviga...

Care Mgmt Prescr...

Boarding Pass

Care Plan

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Progress Notes

Sedation Assess...

Critical Results

Customize

More

OR PST Potential Risks

TIME/CASE INFO

Time Capture

Procedure

ORDERS

Sign/Held Orders

Manage Orders

Release Held Ord...

ALLERGIES/MEDS

Allergies

Home Meds

VITALS/OB/ASSESS1

Adult Vitals

Adult DB Gen Info

Anesthesia Compl...

HISTORY

Device/Implants/Tx

Symptoms ROS

LMP

Potential Risks

Pre-hab Checklist

Adt Rsk Assess(All)

Adt Rsk Assess(...)

Flu Assessment

Pneumo Assessment

CARE MGMT PRESCREEN

Care Mgmt Prescr...

B PASS/CAREPLAN/EDU

Boarding Pass

Care Plan

Patient Education

Progress Notes

OTHER

Sedation Assess...

Critical Results

History

Surgical History

Medical History

Adenoidectomy

Yes

No

Dissectomy - Cervical

Yes

No

Hysterectomy

Yes

No

Appendectomy

Yes

No

Dissectomy - Lumbar

Yes

No

Kidney Transplant

Yes

No

CABG

Yes

No

Dissectomy - Thoracic

Yes

No

Knee Arthroscopy

Yes

No

Cardiac Catheterization

Yes

No

Ear Tubes

Yes

No

Knee Replacement

Yes

No

Carotid Endarterectomy

Yes

No

EGD

Yes

No

Lung Transplant

Yes

No

Cataract removal/IOL implant

Yes

No

Gastric Bypass

Yes

No

Mastectomy

Yes

No

Cholecystectomy

Yes

No

Gastric Surg Lap Band

Yes

No

Rotator Cuff Repair

Yes

No

Colon Resection

Yes

No

Heart Transplant

Yes

No

Shoulder Arthroscopy

Yes

No

Colonoscopy

Yes

No

Hernia Repair

Yes

No

Tonsillectomy

Yes

No

C-Section

Yes

No

Hip Replacement

Yes

No

Tubal Ligation

Yes

No

Anesthesia Complications

Delayed Emergence

Postop Nausea and Vomiting

Atypical Pseudocholinesterase

Malignant Hyperthermia

Postoperative Confusion

Awareness under Anesthesia

Neurological

Head Injury

Parkinson's

Alzheimer's

Headaches

Seizures

Autism

Memory Loss

Spina Bifida

Carpal Tunnel

Migraines

Stroke

Cerebral Aneurysm

Multiple Sclerosis

Syncope

Cerebral palsy

Myasthenia Gravis

TIA

Confusion

Neuroleptic Malignant Syndrome

Traumatic Brain Injury

Dizziness

Guillain Barre

HEENT

Difficulty Swallowing

Oral Infection

Blind

SAMMY CALABRIA

Start

Internet Explorer

Google Chrome

Microsoft Edge

Firefox

Opera

VLC

Spotify

Adobe Reader

Word

Carilion Clinic ENDOSCOPY Protocol

Hyperspace - Carilion Clinic - PRE SURG TESTING CST - Training Sandbox - SAMMY CALABRIA

North Carolina, Melinda X

North Carolina, Melinda...
Female, 43 y.o., 12/14/1973
Unit: PSTI

MRN: 651
CSN: 38035
EMPI: None

Allergies: No Known A...
Last Height: 1.727 m (...
Wt: FILE NEW WEIGHT
Last BMI and %ile: 22....

Attending: None
Pref Lang: English [22]
No POA

Code

Infection: None
Isolation: None
FYI: None

MyChart: None
Diff Air: None
Adv Dir Filed?...
Private?:

Admit Date: 05/17/2017
LOS: 0 Minutes
New Rslt/Order?...
Registries: None

Enhanced Recovery: No
DRG EDD Date Only: None
DRG LOS: None

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Obstructive Sleep Apnea Screening Tool

Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?

1=Yes 0=No

Do you often feel tired, fatigued, or sleepy during daytime?

1=Yes 0=No

Has anyone observed you stop breathing during your sleep?

1=Yes 0=No

Do you have or are you being treated for high blood pressure?

1=Yes 0=No

BMI (Calculated)

BMI more than 35?

1=Yes 0=No

Age over 50 years old?

1=Yes 0=No

Neck circumference > 15.75 inches (men's shirt size large or women's top size XL or >)?

1=Yes 0=No

Male gender?

1=Yes 0=No

Obstructive Sleep Apnea Screening Tool

Scoring- Total of all "yes" answers

Restore Close F9 Cancel

Previous F7 Next F8

Adlt Rsk Assess (SDA)

New Reading

No data found.

Flu Risk Assessment

New Reading

No data found.

Pneumo Risk Assessment

New Reading

No data found.

Appendix 7

Carilion Clinic CARES endoscopy protocol

Last Reviewed: August 2016 Final

	HOLD/STOP	GO
DIET	Colonoscopy-no solids day prior to procedure.	Meds with sip of water as instructed
		Clear liquids as instructed by endo provider up to 4 hrs. prior to sched
	Oral hypoglycemic medications- HOLD on morning of procedure	Antihypertensive meds (HOLD Ace inhibitors, Angiotensin Receptor Inhibitors the day prior to the procedure)

MEDICATIONS	Glucophage - <i>HOLD</i> the night before and morning of procedure	Cardiac Meds & Beta Blockers
	Ace inhibitors, Angiotensin Receptor Inhibitors, & Renin Inhibitors day of the procedure	GERD Meds
	Methotrexate day before & day of procedure	Usual dose of long acting insulin (Lantus & Levemir)
	5 Days: Herbals NSAIDS except for aspirin	Insulin pump at basal rate on the day of procedure
	14 Days: Phentermine	Aspirin unless greater than 650 mg daily

LABS	ASA 1 & 2	ASA 3 & 4
	No EKG for <u>EGD or Colonoscopy</u> UNLESS patient is having cardiac symptoms or has had change in cardiac status in last	
	No diagnostic testing for ASA 1 or 2 EXCEPT in the following circumstances: BMP for DM, diuretics, & long term steroid use.	EGD & Colonoscopy
		BMP for DM, diuretics, & long-term steroids
		BMP day of procedure for dialysis patients
		CBC with Diff for recent GI bleed or cirrhosis
		PT/INR for:
		1. Cirrhosis
		2. Esophageal varices
		3. If anticoagulants have been discontinued 72 hours or more
		4. If still on anticoagulants and will be discontinued prior to procedure the day of the procedure
		ERCP
		BMP for DM, diuretics, & long-term steroids
		CBC with Diff for recent GI bleed and cirrhosis
		PT/INR for:
		1. Cirrhosis
		2. Esophageal varices
		3. If anticoagulants have been discontinued 72 hours or more
		4. If still on anticoagulants and will be discontinued prior to procedure the day of the procedure

EKGs		ERCP
		EKG: 60 yrs. or greater & no previous EKG in past 6 months 1. History hypertension 2. Heart disease 3. Arrhythmias 4. Chronic obstructive pulmonary disease 5. Diabetes 6. Dialysis patient 7. Severe vascular disease
		A copy of EKG done within 6 months with no recent change in symptoms