

Report on a QI Project Eligible for Part IV MOC

Effect of Oral Simethicone with Split-dose Bowel Preparation on Endoscopic Visualization and Colonoscopy Quality Indicators during Routine Screening Colonoscopy

Instructions

Determine eligibility. Before starting to complete this report, go to the UMHS MOC website [ocpd.med.umich.edu], click on “Part IV Credit Designation,” and review sections 1 and 2. Complete and submit a “QI Project Preliminary Worksheet for Part IV Eligibility.” Staff from the UMHS Part IV MOC Program will review the worksheet with you to explain any adjustments needed to be eligible. (The approved Worksheet provides an outline to complete this report.)

Completing the report. The report documents completion of each phase of the QI project. Final confirmation of Part IV MOC for a project occurs when the full report is submitted and approved.

An option for preliminary review (recommended) is to complete a description of activities through the intervention phase and submit the partially completed report. (Complete at least items 1-16 and 27a-b.) Staff from the UMHS Part IV MOC Program will provide a preliminary review, checking that the information is sufficiently clear, but not overly detailed. This simplifies completion and review of descriptions of remaining activities.

Questions are in bold font and answers should be in regular font (generally immediately below the questions). To check boxes electronically, either put an “X” in front of a box or copy and paste “☑” over the blank box.

For further information and to submit completed applications, contact either:

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Report Outline

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J. Physician involvement	29-31. Physician’s role, requirements, reports, reflections, participation, number
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QI Project Report for Part IV MOC Eligibility

A. Introduction

1. **Date** (*this version of the-report*): September 24, 2015
2. **Title of QI project:** Effect of Oral Simethicone with Split-dose Bowel Preparation on Endoscopic Visualization and Colonoscopy Quality Indicators during Routine Screening Colonoscopy
3. **Time frame**
 - a. **Date physicians begin participating (may be in design phase):** September 22, 2014
 - b. **End date:** July 31, 2015

4. Key individuals

- a. **QI project leader** [*also responsible for attesting to the participation of physicians in the project*]
Name: Alison Freeman, MD, MPH
Title: Gastroenterology fellow
Organizational unit: Division of Gastroenterology
Phone number: 734-936-4785
Email address: alisonef@med.umich.edu
Mailing address: 3912 Taubman Center, 1500 E. Medical Center Dr. SPC 5362, Ann Arbor, MI 48109-5362

- a. **Clinical leader to whom the project leader reports regarding the project** [*responsible for overseeing/"sponsoring" the project within the specific clinical setting*]
Name: Stacy Menees, MD
Title: Assistant Professor
Organizational unit: Division of Gastroenterology
Phone number: 734-936-6400
Email address: sbartnik@med.umich.edu
Mailing address: 3912 Taubman Center, 1500 E. Medical Center Dr. SPC 5362, Ann Arbor, MI 48109-5362

5. **Approximately how many physicians were involved in this project categorized by specialty and/or subspecialty?** 16 physicians, all gastroenterologists at the Ann Arbor VAMC (AAVA)

6. Will the funding and resources for the project come only from internal UMHS sources?

- Yes, only internal UMHS sources
 No, funding and/or resources will come in part from sources outside UMHS,
which are: _____

The Multi-Specialty Part IV MOC Program requires that projects engage in change efforts over time, including at least three cycles of data collection with feedback to physicians and review of project results. Some projects may have only three cycles while others, particularly those involving rapid cycle improvement, may have several more cycles. The items below are intended to provide some flexibility in describing project methods. If the items do not allow you to reasonably describe the methods of your specific project, please contact the UMHS Part IV MOC Program office.

B. Plan

7. General goal

a. Problem/need. What is the “gap” in quality that resulted in the development of this project? Why is this project being undertaken? A substantial percentage of patients undergoing routine screening colonoscopy at the AAVA develop formation of bubbles in all or part of their colon following standard split-dose bowel preparation with MoviPrep that obscures all or part of their mucosa, sometimes preventing adequate visualization for colon cancer screening. Oral simethicone has been shown to reduce the formation of bubbles in the colon and is part of routine bowel preparation at some institutions.

b. Physician’s role. What is the physician’s role related to this problem? As physicians, we decide the bowel preparation that the patient takes for the colonoscopy procedure. At all times, we want to optimize this for our patients. As a poorly prepped colonoscopy incurs costs to the health system and to the patient themselves (time off work, need for repeat procedure)

c. Project goal. What general outcome regarding the problem should result from this project? (*Specific aims/targets are addressed in #12b.*) This project will improve the quality of screening colonoscopy by initiating the addition of oral simethicone with split-dose bowel regimen and assess its impact on endoscopic visualization as well as other secondary colonoscopy quality indicators, including bowel preparation quality, polyp / adenoma detection rate (ADR), and endoscopist follow-up recommendations for screening and surveillance.

8. Patient population. What patient population does this project address. All Ann Arbor VAMC patients scheduled to undergo outpatient colonoscopy

9. Which Institute of Medicine Quality Dimensions are addressed? *[Check all that apply.]*

- | | | |
|---|---|--|
| <input checked="" type="checkbox"/> Effectiveness | <input type="checkbox"/> Equity | <input type="checkbox"/> Safety |
| <input checked="" type="checkbox"/> Efficiency | <input type="checkbox"/> Patient-Centeredness | <input checked="" type="checkbox"/> Timeliness |

10. What is the experimental design for the project?

- Pre-post comparisons (baseline period plus two or more follow-up measurement periods)
 Pre-post comparisons with control group
 Other: _____

11. Baseline measures of performance:

a. What measures of quality are used? If rate or %, what are the denominator and numerator?

Primary outcome: Intraluminal gas bubbles. Intraluminal gas bubbles were assessed in 3 regions of colon (right, transverse, and left colon) and graded as follows: 0 = bubbles filling the entire lumen; 1 = bubbles covering the circumference of the lumen; 2 = bubbles covering at least half the luminal circumference; 3 = no or minimal bubbles.

We used the separate ratings in three regions to create two summary scores:

- Total score for bubbles/visualization – The ratings (possible range = 0 to 3) for each region were totaled for each patient (possible range = 0 to 9). (Increasing scores represent improvement.)
- Clinically significant bubbles – “Yes” for the patient if any segment of the three segments of the colon had a bubble score of 0 or 1, indicating visualization may have been obscured enough to impact endoscopic visualization. “No” for the patient if no segment had a bubble score of 0 or 1. (Decreasing scores represent improvement.)

These two important variables, total bubble score and any segment 0 or 1 (clinically significant), are highlighted in the attached data results.

Secondary outcome: Overall quality of bowel preparation. Overall quality of bowel preparation was assessed in 3 regions of the colon (right, transverse, and left colon) using a validated scale (Boston Bowel Preparation Scale (BBPS)): 0 = unprepared colon, residual stool cannot be cleared; 1 = portion of mucosa cannot be seen due to residual stool; 2 = minor residual stool remaining; 3 = entire mucosa seen after cleaning). We used the separate ratings in three regions to create a summary score:

- Total score for bowel prep – The ratings (possible range = 0 to 3) for each region were totaled for each patient (possible range = 0 to 9). (Increasing scores represent improvement.)

Endoscopists describe the bowel preparation as excellent, good, fair, poor, or inadequate. These ratings were categorized into a measure of whether preparation was less than desirable:

- Endoscopists description of bowel prep – Whether the endoscopist rated the preparation as desirable (0 = excellent, good, or adequate) or less than desirable (1 = fair, poor, or inadequate).

Other outcomes measured and reported at the end of the project. During the project, data were collected for additional outcomes that could be affected by the administration of simethicone and improved visualization. These measures included:

- Patient's tolerance of bowel preparation (patient questionnaire)
- Polyps detected (both in aggregate and also by colon region),
- Adenomas detected (measured in aggregate by colon region and by size)
- Procedure completed.
- Need for early repeat colonoscopy due to poor prep or intraluminal bubbles.

Many factors other than intraluminal gas bubbles affect these outcomes. The project did not have sufficient sample size (power) reliably to detect changes in these outcomes. In case this information is of interest, the data are in Tables 4, 5, and 6 in the Appendix. Data for these outcomes were not available for participants to review until the end of the project. Only scores on intraluminal gas bubbles and on quality of bowel preparation guided planning through the project's QI cycles.

b. Are the measures nationally endorsed? If not, why were they chosen? The bubble scoring system is not nationally endorsed, but is based on prior published studies on this topic. The quality of the bowel preparation was determined based on a validated ordinal scale called Boston Bowel Preparation Scale (BBPS). The polyp detection rates and adenoma detection rates are based on national quality standards for colonoscopy.

c. What is the source of data for the measure (e.g., medical records, billings, patient surveys)?

Intraluminal bubble score and BBPS were determined at the time of endoscopy by the performing physician and recorded for each patient onto individual records. Self-completed patient questionnaires were used to evaluate tolerance of bowel preparation. The remainder of the information was obtained by review of medical records, including information from their endoscopy and pathology reports.

d. What methods were used to collect the data (e.g., abstraction, data analyst)? Each participating physician, performed routine screening colonoscopy as per usual routine and calculated both bubble and bowel prep scores at the time of the procedure. Bubble scores and BBPS scores were tallied daily. Patient self-reported symptoms / tolerance of bowel prep was recorded on a self-completed questionnaire at the time of check-in for the colonoscopy. Additionally, each participating physician reviewed a minimum of 25 medical records to determine procedure completion rates, polyp detection, and adenoma detection rates (both in aggregate and also by colon region), which was then entered into data spreadsheet.

e. For what time period was the sample collected for baseline data? Historical data regarding the utility of oral simethicone on luminal bubbles was initially obtained by review of published data, which were presented at faculty meeting in September 2014. To determine local occurrence of intraluminal gas bubbles and quality of bowel preparation baseline scores were collected from patients undergoing outpatient colonoscopy at the AAVA between December 1, 2014 and January 31, 2015.

12. Specific performance objectives

- a. What was the overall performance level(s) at baseline?** (E.g., for each measure: number of observations or denominator, numerator, percent. Can display in a data table, bar graph, run chart, or other method. Can show here or refer to attachment with data.)

Measures	Baseline 12/1/14–1/31/15 n = 348
Intraluminal gas bubbles	
Total score for bubbles (range: 0–9)	8.18
Any segment 0 or 1	11.2%
Bowel preparation	
Total score for bowel prep (range: 0–9)	7.80
Endoscopist description as only fair, poor, or inadequate	13.5%

Note: See the Appendix for detailed data on patient demographics, intraluminal gas bubbles, bowel preparation, and other measures.

b. Specific aim: What was the target for performance on the measure(s) and the timeframe for achieving the target?

No nationally recognized standards for bubble scores exist. The study team determined that an overall 30% improvement in bubble scores would be ideal.

- Total score for bubbles. An improvement of $\geq 30\%$ between the baseline of 8.18 and the ideal score of 9 would be an increase to ≥ 8.43 .
- “Any segment 0 or 1” – clinically significant. A reduction of $\geq 30\%$ in the 11.2% baseline of “any segment 0 or 1” would be a reduction to $\leq 7.8\%$.

We expect to achieve these improvements by the end of the second cycle, 6/30/15.

No specific targets were set for performance for secondary and other outcomes, including bowel preparation, patient tolerance, polyp / ADR detection rates, colonoscopy completion rates, and need for early repeat colonoscopy due to prep issues.

c. How were the performance targets determined, e.g., regional or national benchmarks?

National benchmarks for bowel preparation adequacy were not published until January 2015. However, we felt that an overall 30% improvement in clinically significant bubble scores (ie, reduction in any colon segment with a bubble score of 0 or 1) would be ideal and that greater than 90% of colonoscopies should have adequate bowel preparation and bubble scores.

13. Data review and identifying underlying (root) causes.

a. Who was involved in reviewing the baseline data, identifying underlying (root) causes of the problem(s), and considering possible interventions (“countermeasures”) to address the causes? Briefly describe:

- **Who was involved?** All 16 AAVA gastroenterologists
- **How?** (e.g., in a meeting of clinic staff) We discussed results at monthly clinical staff meetings. We also had on-going informal discussions on a rolling basis (by conference call, email, or in person) with nurses and physicians to discuss cost containment options / decisions.
- **When?** September 22, 2014 faculty meeting to discuss the project and possible addition of simethicone as a feasible intervention strategy. We had on-going discussions in person and by email with physicians and nursing staff regarding cost containment strategies for the veterans

(see 14 below). Baseline bubble scores (through Jan. 26, 2015) were reviewed at faculty meeting on January 28, 2015. We had previously planned to implement simethicone into the bowel preps based on historical published data, and this plan was reconfirmed after review of our baseline bubble scores.

- b. What were the primary underlying/root causes for the problem(s) that the project can address?** (*Causes may be aspects of people, processes, information infrastructure, equipment, environment, etc. List each primary cause separately.*) Intraluminal gas bubble formation is common and has potential to obscure polyps or lead to need for early repeat colonoscopy due to poor prep. The main categories of causes were:

People: gastroenterologists had different views of the extent to which intraluminal gas bubbles were a problem and of the value of adding simethicone.

Cost-containment: uncertainty regarding whether cost of adding simethicone would be worth the increased effectiveness in visualization. Adding oral simethicone to the VA bowel prep could increase costs to the veterans, especially those veterans with low service connectedness that must pay a co-pay for each medication prescribed regardless of pill quantity.

Operational: no protocol for adding simethicone was in place.

C. Do

14. Intervention(s). Describe the interventions implemented as part of the project.

Education and feedback:

The meeting on Sep. 22, 2014, provided a shared understanding of the extent to which intraluminal gas bubbles were a problem and of the potential value of adding simethicone. The meeting on Jan. 28, 2015, confirmed the extent of the problem locally and agreement to implement simethicone into bowel preps when likely to be cost effective.

Cost containment:

After reviewing costs and likely effectiveness, the gastroenterologists agreed to include simethicone in the bowel prep only for patients without a co-payment for their bowel prep, so that we did not introduce any additional costs to the veterans. This decision was reached after considering the clinical value of adding simethicone and the following options: 1) mailing out industry-donated supply of simethicone to the veterans, 2) discussing with pharmacy ways to “bundle” the bowel prep medications so that the veterans are charged a single co-payment for a “bowel prep package” rather than individual co-payments for each medication, 3) adding simethicone to all veterans scheduled for colonoscopy regardless of co-payment status (which is based on the service connectedness to the VA), and lastly, 4) limiting the addition of simethicone to only veterans who do not have a co-payment based on high level of service connectedness.

Changing the bowel prep protocol:

The standard MoviPrep involves a split preparation with one half of prep administered the night prior to procedure, and second half administered the morning of procedure. We added simethicone 160mg PO immediately after each half of bowel prep is completed (for a total of 320mg simethicone). The standard bowel prep instructions are reviewed by a nurse with each veteran by phone, and then written instructions are mailed out to the patient. Changing the bowel prep protocol involved retraining the nurses and other administrative staff regarding changes to the bowel prep protocol so that they could educate the patients. We provided retraining verbally and also developed a new phone script describing the changes in the prep. We also revised the written patient instructions.

15. Who was involved in carrying out the intervention(s) and what were their roles?

The AAVA gastroenterologists decided to add in simethicone to a subset of veterans (see 14 above), performed routine endoscopy to determine bubble and BBPS scores, and then helped with data extraction from a review of medical records to evaluate our secondary outcomes.

The AAVA GI nurses provided input into cost containment options and were responsible for reviewing the bowel prep instructions with the patients by phone prior to their procedures.

Stacy Menees signed pharmacy orders for the simethicone.

Patients were responsible for completing the bowel prep as instructed.

16. When was the intervention initiated? (For multiple interventions, initiation date for each.)
 Intervention 1: February 1, 2015

D. Check

17. Post-intervention performance measurement. Did this data collection follow the same procedures as the initial collection of data described in #11: population, measure(s), and data source(s)?

Yes No – If no, describe how this data collection

Note: Although the data collection followed the same procedures, the number of patients undergoing colonoscopy was decreased. During the baseline period and at the start of the intervention period a higher number of colonoscopies were scheduled to address a back-log of patients needing screening colonoscopies. By February 2015 the back-log had been eliminated and the daily colonoscopy volume decreased.

18. Performance following the intervention.

a. The collection of the sample of performance data following the intervention occurred for the time period: February 1 – April 30, 2015

b. What was post-intervention performance level? (E.g., for each measure: number of observations or denominator, numerator, percent. Can display in a data table, bar graph, run chart, or other method. Can show here or refer to attachment with data.)

Measures	Baseline 12/1/14–1/31/15 n = 348	Post-Intervention 1 2/1–4/30/15 n = 204
<u>Intraluminal gas bubbles</u>		
Total score for bubbles (range: 0–9)	8.18	8.71
Any segment 0 or 1	11.2%	2.9%
<u>Bowel preparation</u>		
Total score for bowel prep (range: 0–9)	7.80	7.78
Endoscopist description as only fair, poor, or inadequate	13.5%	10.0%

Note: See the Appendix for detailed data on patient demographics, intraluminal gas bubbles, bowel preparation, and other measures.

- c. Did the intervention produce the expected improvement toward meeting the project’s specific aim (item 12.b)?

Intraluminal gas bubbles

- Mean total bubble score increased from 8.18 to 8.71, surpassing our goal of 8.43 and closing 65% of the gap between 8.18 and 9.
- “Any segment 0 or 1” was reduced from 11.2% to 2.9%, surpassing our goal of 7.8% and closing 74% of the gap between 11.2% and 0%.

Bowel preparation (not directly targeted)

- Total mean bowel prep score remained essentially unchanged (7.80 and 7.78).
- Endoscopists grading the bowel prep as only fair, poor, or inadequate decreased from 13.5% to 10.0%, closing 26% of the gap from 13.5% to 0%.

E. Adjust – Replan**19. Review of post-intervention data and identifying continuing/new underlying causes.****a. Who was involved in reviewing the post-intervention data, identifying underlying (root) causes of the continuing/new problem(s), and considering possible adjustments to interventions (“countermeasures”) to address the causes? Briefly describe:**

- **Who was involved?** All 16 AAVA gastroenterologists primarily. The AAVA GI nurses were also asked for input regarding any logistical problems.
- **How?** (*e.g., in a meeting of clinic staff*) We discussed project issues at clinical staff meetings and subsequent email discussions with physicians, nurses, and administrative staff.
- **When?** Bubble scores were tallied regularly and mean total scores were reported and discussed at monthly clinical staff meetings on February 23, 2015, March 12, 2015, and April 29, 2015 (when data through April 27 were reviewed).

b. What were the primary underlying/root causes for the continuing/new problem(s) that the project can address? (*Causes may be aspects of people, processes, information infrastructure, equipment, environment, etc. List each primary cause separately.*)

The underlying problems were primarily operational:

- Took some time for the RNs to become familiar with new bowel prep regimen and verbally educate veterans appropriately
- Some of the veterans may not have received proper written instructions in the mail
- Some of the veterans that were supposed to receive simethicone may not have received it in the mail in time for their procedure.

F. Redo**20. Second intervention. What additional interventions/changes were implemented?**

Intervention 2 did not involve substantive changes in the intended interventions, but assessed performance after the transition to the new protocol was fully implemented, reducing operational problems. It also assessed whether the initial intervention was sustained.

21. The second intervention was initiated when? (For multiple interventions, initiation date for each.)

May 1, 2015

G. Recheck

22. Post-second intervention performance measurement. Did this data collection follow the same procedures as the initial collection of data described in #11: population, measure(s), and data source(s)?

Yes No – If no, describe how this data collection

Note: The measurement process remained the same. However, the daily screening colonoscopy volume decreased to a new stable rate because the back-log of screening colonoscopies had been eliminated in February 2015.

23. Performance following the second intervention.

a. The collection of the sample of performance data following the intervention(s) occurred for the time period: May 1 – June 30, 2015

b. What was the performance level? (E.g., for each measure: number of observations or denominator, numerator, percent. Can display in a data table, bar graph, run chart, or other method. Can show here or refer to attachment with data.)

Measures	Baseline 12/1/14–1/31/15 n = 348	Post-Intervention 1 2/1–4/30/15 n = 204	Post-Intervention 2 5/1–6/30/15 n = 150
Intraluminal gas bubbles			
Total score for bubbles (range: 0–9)	8.18	8.71	8.86
Any segment 0 or 1	11.2%	2.9%	2.0%
Bowel preparation			
Total score for bowel prep (range: 0–9)	7.80	7.78	8.52
Endoscopist description as only fair, poor, or inadequate	13.5%	10.0%	2.7%

Note: See the Appendix for detailed data on patient demographics, intraluminal gas bubbles, bowel preparation, and other measures.

c. Did the second intervention produce the expected improvement toward meeting the project’s specific aim (item 12.b)?

Intraluminal gas bubbles

- Mean total bubble score further increased from 8.71 to 8.86, further exceeding our target of ≥ 8.43 and closing 83% of the gap between 8.18 and 9.
- “Any segment 0 or 1” was further reduced from 2.9% to 2.0%, further reduction below our target of ≤ 7.8% and closing 85% of the gap between 11.2% and 0%.

Bowel preparation (not directly targeted)

- Total mean bowel prep score increased from 7.78 to 8.52, closing 60% of the gap between 7.80 and 9.
- Endoscopists grading the bowel prep as only fair, poor, or inadequate decreased from 10.0% to 2.7%, closing 80% of the gap from 13.5% to 0%.

H. Readjust

24. Review of post-second intervention data and identifying continuing/new underlying causes.**a. Who was involved in reviewing the data, identifying underlying (root) causes of the continuing/new problem(s), and considering additional possible adjustments to interventions (“countermeasures”) to address the causes? Briefly describe:**

- **Who was involved?** Only the 16 AAVA gastroenterologists
- **How?** (e.g., in a meeting of clinic staff) We discussed project results at a faculty meeting.
- **When?** July 20, 2015

b. What were the primary underlying/root causes for the continuing/new problem(s) that the project can address? (Causes may be aspects of people, processes, information infrastructure, equipment, environment, etc. List each primary cause separately.)

The continued improvement over the second cycle is likely due veterans receiving simethicone with bowel prep as planned, whereas some in Intervention 1 that were supposed to receive simethicone may not actually have received it and/or not received instructions on how to take it.

The remaining problem with intraluminal bubbles in patients prescribed simethicone is extremely small. The most likely causes are rare instances where patients have not received it or do not follow instructions to take it and how to take it.

If no additional cycles of adjustment are to be documented for the project for Part IV credit, go to item #25.

If a few additional cycles of adjustments, data collection, and review are to be documented as part of the project to be documented, document items #20 – #24 for each subsequent cycle. Copy the set of items #20 – #24 and paste them following the last item #24 and provide the information. When the project to be documented for Part IV credit has no additional adjustment cycles, go to item #25.

If several more cycles are included in the project for Part IV credit, contact the UM Part IV MOC Program to determine how the project can be documented most practically.

I. Future Plans**25. How many subsequent PDCA cycles are to occur, but will not be documented as part of the “project” for which Part IV credit is designated?**

We were able to show sustainable improvements in bowel prep with the addition of simethicone to the standard colonoscopy prep. For this project, no further problems or interventions are planned. However, a possible future QI project could potentially address the issue of patient compliance.

26. How will the project sustain processes to maintain improvements?

The added prescription of simethicone and related instructions has been incorporated into our standard procedures for bowel prep for colonoscopy. New personnel are trained on these procedures.

27. Do other parts of the organization(s) face a similar problem? If so, how will the project be conducted so that improvement processes can be communicated to others for “spread” across applicable areas?

Within the Ann Arbor VA: Based on this QI project we decided to add simethicone as a permanent component of the standard colonoscopy prep procedures to all veterans, regardless of co-payment status. We are currently discussions with the VA ways to reduce costs to all of our veterans for the medications in the colonoscopy bowel prep.

Beyond the Ann Arbor VA: We plan to publish our results to share the information with gastroenterologists, particularly those at other VA centers, to encourage them to incorporate simethicone into bowel prep protocols.

28. What lessons (positive or negative) were learned through the improvement effort that can be used to prevent future failures and mishaps or reinforce a positive result?

From the initiation of the QI project our gastroenterologists supported it to improve the quality of our bowel preparations. The quality of our colonoscopies and patient satisfaction was vitally important to all of our participating physicians. We quickly realized that we also needed to involve the nurses and administrators early in the planning process in order to get their buy in and to obtain their input regarding possible roadblocks or issues that will need to be addressed.

J. Physician Involvement

Note: To receive Part IV MOC a physician must both:

- a. *Be actively involved in the QI effort, including at a minimum:*
 - *Work with care team members to plan and implement interventions*
 - *Interpret performance data to assess the impact of the interventions*
 - *Make appropriate course corrections in the improvement project*
- b. *Be active in the project for the minimum duration required by the project*

29. Physician's role. What were the minimum requirements for physicians to be actively involved in this QI effort? *(What were physicians to do to meet each of the basic requirements listed below? If this project had additional requirements for participation, also list those requirements and what physicians had to do to meet them.)*

- a. *Interpreting baseline data, considering underlying causes, and planning intervention. (As appropriate, use or modify the following response.)*
Physicians had to participate as described in item #13a.
- b. *Implementing intervention. (As appropriate, use or modify the following response.)*
Physicians had to participate as described in items #14, #15, and #16.
- c. *Interpreting post-intervention data, considering underlying causes, and planning changes. (As appropriate, use or modify the following response.)*
Physicians had to participate as described in item #24a.
- d. *Implementing further intervention/adjustments. (As appropriate, use or modify the following response.)*
Physicians had to participate as described in items #20 and #21.
- e. *Interpreting post-adjustment data, considering underlying causes, and planning changes. (As appropriate, use or modify the following response.)*
Physicians had to participate as described in item #24a.

30. How were reflections of individual physicians about the project utilized to improve the overall project?

During clinical staff meetings, processes to obtain and include ways to include simethicone into the colonoscopy bowel prep regimen were discussed and our physicians provided their ideas and opinions regarding the need for this new medication vs the cost of the additional co-pay required of some of our veterans. We ultimately decided as a group that the improvements in bowel prep quality outweighed the additional cost of this medication. We will now work with the VA to find ways to make this addition cost-effective to the VA and our veterans.

31. How did the project ensure meaningful participation by physicians who subsequently request credit for Part IV MOC participation? Not applicable – all participating physicians were involved in participation for MOC credit prior to collection of any baseline data.

K. Sharing Results

32. Are you planning to present this QI project and its results in a:

- Yes No Formal report to clinical leaders?
 Yes No Presentation (verbal or poster) at a regional or national meeting?
 Yes No Manuscript for publication?

L. Project Organizational Role and Structure

33. UMHS QI/Part IV MOC oversight – this project occurs within:

- University of Michigan Health System

• Overseen by what UMHS Unit/Group?

• Is the activity part of a larger UMHS institutional or departmental initiative?

- No Yes – the initiative is:

- Veterans Administration Ann Arbor Healthcare System

• Overseen by what AAVA Unit/Group? Gastroenterology

• Is the activity part of a larger AAVA institutional or departmental initiative?

- No Yes – the initiative is:

- An organization affiliated with UMHS to improve clinical care

• The organization is:

• The type of affiliation with UMHS is:

- Accountable Care Organization type (*specify which*):

- BCBSM funded, UMHS lead state-wide Collaborative Quality Initiative (*specify which*):

- Other (*specify*):

Appendix
Detailed Data On Patient Demographics,
Intraluminal Gas Bubbles, Bowel Preparation, and Other Measures

Table 1. Demographics

Variable	Baseline 12/1/14 – 1/31/15 (n = 348)	Post-Intervention 1 2/1 – 4/30/15 (n = 204)	Post-Intervention 2 5/1-6/30/15 (n = 150)	Difference
Age (mean, yrs)	61.5	61.6	62.7	NS
BMI	29.8	29.9	30.9	NS
Sex (% male)	94.0%	94.6%	91.3%	NS
Race (% White)	79.8%	73.0%	77.3%	NS
Precall (% yes)	94.9%	93.6%	90.0%	NS
Speak to pt (% yes)	78.7%	79.9%	70.7%	NS
Completed procedure (% yes)	98.9%	97.1%	99.3%	NS
Diabetes	23.5%	24.0%	27.3%	NS
Chronic Narcotics	15.6%	13.7%	21.3%	NS
Mobility Issues	5.9%	4.9%	9.3%	NS

NS = Not statistically significant

Table 2. Bubble Scores

	Baseline Group (n = 348)	Intervention 1 (n = 204)	Intervention 2 (n = 150)	Difference
Right colon , mean score (0-3)	2.62	2.90	2.92	p<0.001
Transverse colon , mean score (0-3)	2.73	2.94	2.97	p<0.001
Left colon , mean score (0-3)	2.83	2.97	2.97	p<0.001
Total score , mean (0-9)	8.18	8.71	8.86	p<0.001
Right colon , 0 or 1	34 (10.4%)	6 (2.9%)	3 (2.0%)	p<0.001
Transv colon , 0 or 1	22 (6.7%)	2 (1.0%)	0	p<0.001
Left colon , 0 or 1	10 (3.1%)	5 (2.4%)	0	p=0.005
Any segment 0 or 1	39 (11.2%)	6 (2.9%)	3 (2.0%)	p<0.001
Total score ≤6	55 (16.8%)	10 (4.9%)	6 (4.0%)	p=0.01

Table 3. Boston Bowel Prep Scores (BBPS)

	Baseline Group (n = 348)	Intervention 1 (n = 204)	Intervention 2 (n = 150)	Difference
Right colon , mean score (0-3)	2.53	2.63	2.77	p=0.0013
Transverse colon, mean score (0-3)	2.65	2.63	2.86	NS (p=0.059)
Left colon , mean score (0-3)	2.64	2.64	2.87	p=0.011
Total score , mean (0-9)	7.80	7.78	8.52	p=0.018
Right colon, 0 or 1	19 (5.5%)	8 (3.9%)	3 (2.0%)	NS
Transv colon , 0 or 1	15 (4.3%)	6 (2.9%)	0	p=0.03
Left colon , 0 or 1	15 (4.3%)	6 (2.9%)	0	p=0.03
Total score ≤6	86 (24.8%)	60 (29.4%)	17 (11.3%)	
Endoscopist Description (fair/poor/inadequate)	47 (13.5%)	20 (10.0%)	4 (2.7%)	p=0.03

Table 4. Polyp / ADR Differences

	Baseline Group (n = 348)	Intervention 1 (n = 204)	Intervention 2 (n = 150)	Difference
Any polyps detected?	256 (73.6%)	153 (75.0%)	113 (75.3%)	NS
Number of polyps (mean)	3.21	3.32	3.07	NS
Any adenomas detected?	196 (56.3%)	121 (59.3%)	89 (59.3)	NS**
Any adenomas less than 1cm?	188 (54.2%)	112 (54.9%)	83 (55.3%)	NS
Any adenomas ≥ 1cm?	49 (14.2%)	32 (15.7%)	27 (18.0%)	NS
CRC identified?	5 (1.4%)	1 (0.5%)	1 (0.67%)	NS

** No statistical difference when evaluated by colon segment

Table 5. Other Secondary Variables

Variable	Baseline Group (n = 348)	Intervention 1 (n = 204)	Intervention 2 (n = 150)	Difference
Repeat early due to poor prep	20 (5.8%)	10 (4.9%)	3 (2.0%)	p=0.003
Repeat early due to bubbles	7 (2.0%)	1 (0.5%)	1 (0.7%)	NS

**Table 6. Patient Satisfaction:
Percent Self-Reporting Moderate or Severe Symptoms on a 4-Point scale**

Symptom	Baseline Group (n = 348)	Intervention 1 (n = 204)	Intervention 2 (n = 150)	Difference
Nausea	28 (8.1%)	23 (11.8%)	11(7.8%)	NS
Abdominal Pain	31 (8.9%)	11 (5.7%)	7 (5%)	NS
Boating	44 (12.6%)	29 (15%)	15 (10.7%)	NS
Generalized malaise	40 (12.1%)	23 (11.9%)	13 (9.3)	NS