

October 14th 2015

Re: Manuscript ID# 21040

Dear Dr. Herrerias and Dr. Imagawa,

We would like to thank the reviewers and editors of the World Journal of Gastrointestinal Endoscopy for taking the time to review our manuscript entitled *“Use of Automated Irrigation Pumps Improves Quality of Bowel Preparation for Colonoscopy”* and provide us with feedback and constructive comments.

We have revised our manuscript and incorporated the changes suggested by the editors and reviewers. Here is a list of these comments with detailed answers:

Editor's Comments:

- *“Please provide institutions of all authors according to the order of authors. Author names should be given first, then the complete name of institution, city, province and postcode. Once the author has two or more institutions, please list them one by one. When two or more authors are in one institution, list them together. Thank you.”*

Author's institutions have been revised as requested, including grouping authors by institution.

- *“Please put the reference numbers in square brackets in superscript at the end of citation content or after the cited author's name.”*

Square brackets in superscript were added to each reference number throughout the manuscript.

- *“Please add PubMed citation numbers and DOI citation to the reference list and list all authors.”*

The references were updated to include all authors (rather than 3 authors et al). We also include PMID, PMCID and/or DOI when available.

- Other requested minor corrections include:

- “vs.” changed to italics
- “p” value changed to italic “*P*” throughout the paper and the tables
- Space was added after “*P*”
- Space was removed from “95%CI” throughout the paper and the tables
- A list of abbreviations was added at the end of table 1

Reviewers' Comments:

- *"How was the withdrawal time in both manual and AIP group? Poor bowel prep. usually disturbs the procedure and requires more time. This also can affect the detection rate of polyps and adenomas".*

We agree that this is a very pertinent question. Unfortunately, withdrawal time was not systematically recorded in our endoscopy unit at the time of the study. We would expect the automated irrigation pump to save time in cases with good bowel prep by allowing for quick flushes as needed, while its effect on patients with more sub-optimal prep is not clear, as endoscopists would attempt to clean rather than reschedule the patients and this can indeed lead to longer procedures. We have added a sentence to the limitations paragraph stating that this information is missing.

- *"Do you have any data on repeated colonoscopy in patients with poor bowel prep.? If you do have, how was the detection rate of polyps and adenomas?"*

We do not have data on the subsequent exams for patients who had a repeat colonoscopy for poor bowel prep. Given the known miss rate for polyps and adenomas in tandem colonoscopy studies (up to 28% for adenomas), we would expect a significant number of polyps to be found if colonoscopy is repeated for poor prep or any other reason and so did not feel that collecting this data for one sub-group without a control group would be very helpful.

- *"This is an important paper assessing the use of a device during colonoscopic procedures. The conclusion in the abstract is different from the conclusion in the text. In fact, this investigation shows the improvement of bowel preparation with no benefit in the quality of the exam (incidence of polyps were the same). But really, the authors concluded that AIPs improve the endoscopist assessment of the quality of the bowel preparation and reduces the number of repeat procedures due to sub-optimal preparation. In this way, the authors should correct the paper using this last one conclusion".*

We completely agree with the reviewer's point that we only showed an improvement in the quality of the bowel preparation without affecting other quality measures of colonoscopy (i.e. polyp and adenoma detection rates). We have changed the title of the manuscript from "improve quality of colonoscopy" to "improve quality of bowel preparation for colonoscopy" (running title, citation and introduction of abstract have been modified as well). The discussion and conclusion paragraphs also reflect this.

- *“As a retrospective observation study, how could the authors confirm their review of the film of colonoscopy without bias?”*

The procedures are not routinely videotaped in the US. Data was extracted from the endoscopy pathology reports in regards to factors related to colonoscopy, including quality of the bowel preparation. We agree that this methodology has limitations, mainly related to relying on each endoscopist assessment of the quality of the bowel prep, and these are listed in the discussion section of the paper.

- *“ the author(s) may prove the fact that water amount is important factor for the quality of colonoscopy than AIPs. vs manual irrigation.”*

We agree with the reviewer that it is possibly that the total volume of the water used is more important than the technique (manual or automated). We are unable to determine that precisely, as the volume used was not recorded. However we suspect that the AIPs group might have received a larger volume, as it is a lot more efficient at delivering flushes than the manual technique and this is one the ways that AIPs help during colonoscopy. We have added a sentence to the limitations paragraph acknowledging the unavailable data.

- *“Title: I don’t think you have the ability to say that the use of AIP improved the QUALITY of the colonoscopy. Major quality metrics include (cecal intubation rate, ADR, perforation rate, withdrawal time, procedure completion rate) were either not evaluated or were unchanged. I think at best you can say that the AIP upgrades the prep quality and reduces short interval repeat endoscopy.”*

We completely agree with the reviewer and have changed the title of the manuscript accordingly.

- *“Intro: can you provide a citation that the AIP is ‘more efficient’ than manual irrigation. No doubt they are more convenient.”*

We are unable to find any paper that has looked into this. All endoscopists would agree that asking the assistant for one manual flush after another is not efficient, however this has never been published. We would be happy to add a reference if such a reference existed.

- *"Intro: note that your aims in the intro vs in the methods are written in slightly different verbiage. The Intro suggests that ADR was the main aim while the methods suggest that the primary aim was the prep quality."*

We agree with the reviewer and have modified the sentence in the introduction to make it clear that quality of bowel prep is the main outcome.

- *"How did you determine that you needed 8 months of AIP vs 4 months of foot pumps...was a power analysis conducted?"*

As explained in the paper, the use of AIPs was suspended for 4 months in our unit and the cases conducted during that time became the manual flushes group. We chose 2 separate 4 months group to compare and found that the results of the combined 8 months or either of the 4 months separately were the same.

- *"Can you clarify how you picked the months of the study...I get that you are trying to correct for the level of training of the fellows involved, but from my perspective this is completely irrelevant. If you have a staff member present at every scope, the presence of the fellow (or their skill level, or the month of training) is not relevant. Your ADR, completion rate, etc should be the same because there is staff presence....they would not let you miss a polyp or permit an incomplete scope because the fellow was struggling."*

Our results do indeed confirm the reviewer's comments. The presence or absence of a fellow and their level of training did not make any difference in this study. This was a suggestion from our own institution's research meeting, to compare identical periods of time, in case there was a relationship between level of training and yield of colonoscopy, however it turned out not to be the case.

- *"Can you clarify how patients were identified for the study (what database was searched), and how you guaranteed that patients did/did not have an AIP used. Was AIP use documented in the chart?"*

Patient selection started from the daily schedule of the endoscopy unit, using weekly print-outs from the software used to create endoscopy reports (Endo-Works). Each case was then reviewed using our electronic medical records to determine inclusion/exclusion criteria, before chart abstraction. In regards to the second question, we agree that this is a very important point. The AIPs were not available during the timeframe when the control group was scoped. However for the AIPs group, the devices were routinely connected to the endoscope by the technician for every

single case. Individual endoscopists could use it or not and that information does not get recorded anywhere. Our suspicion is that there are cases at both extremes of prep quality during which the AIPs are not used, while the use of AIPs for the other cases varies from endoscopist to endoscopist. We have added a sentence to the limitations section explaining that the use of irrigation by either technique could not be determined for every case in either group.

- *"I think you have to acknowledge that you don't have any way to note if the AIP or manual irrigation were/were not actually used during any of the cases, or if there was any difference in the volume of irrigation used between the two methods. I don't think it makes a difference, but it bears noting that there is data missing. This issue is danced around a bit...you say the AIP "was routinely connected to the endoscope" but not that it was used 100% of the time."*

The reviewer is correct that irrigation by either method and volume of water used could not be determined. As explained above, these 2 points were added as limitations.

- *"Why did you exclude non-gastroenterologist performed colonoscopies? Were they not subject to the same issues of no API?"*

There were some surgeons who performed a few colonoscopy during the study period, however these were excluded as their number was very small (a dozen cases) and some information (such as quality of the bowel prep) was not routinely documented. We decided to restrict the study to a more homogenous group of board-certified gastroenterologists.

- *"Were there any differences between the groups in terms of the use of the q 160 or q180 scopes....obviously one of the reported advantages in the scopes is that an improved HD image permits higher ADR."*

Both model of endoscopes were used throughout all the time periods included in the study.

- *"please state how the prep quality was determined. Who decided the grade; the fellow, the staff member? You bring up in the discussion that there is a potential for bias here, but its unclear to me how much bias might exist here."*

The prep quality is usually determined by the attending physician. The bias that we talk about has to do with the scale used (Aronchik), which is more subjective and has more intra-observer variability than other prep scales (such as BBPS). We have added a sentence to the methods section

to state that the attending physician was responsible for determining the quality of the bowel prep for each case.

- *“Were there any differences in the withdrawal time, cecal intubation rate or total procedure time between the groups?”*

Unfortunately, withdrawal time was not systematically recorded in our endoscopy unit at the time of the study. We would expect the automated irrigation pump to save time in cases with good bowel prep by allowing for quick flushes as needed, while its effect on patients with more sub-optimal prep is not clear, as endoscopists would possibly attempt to clean rather than reschedule the patients and this can indeed lead to longer procedures. We have added a sentence to the limitations paragraph stating that this information is missing.

- *“How does your recommendation for early scope in these groups compare to national averages or literature reported numbers for poor prep using non-split dosing? 21% seems very high to me for the non-AIP group.”*

We completely agree that 21% is a very high number. In the study by Menees et al. (AJG 2014), which looked at screening colonoscopies with normal exams, the recommendation for repeat colonoscopy were deemed “inappropriate” (sooner than 10 years) in 24% of cases, and fair bowel prep was the most important factor leading to such a recommendation. Our study is different in many aspects, including that a large proportion of our cases had adenomas, which might decrease the endoscopist’s tolerance of long interval for sub-optimal bowel prep.

- *“ I think your methods have to at least acknowledge the potential for Bias in the study due to the methods used. Your endoscopists had a tool (the AIP) that they clearly liked due to its convenience and efficacy that was taken away from them for administrative reasons and they were forced to manually irrigate. I’m sure nobody was happy about that process, and I’m sure the willingness to manually irrigate was not that high. I’m not implying that anything is wrong with this, but there is clear potential for bias here. I don t think this bias would exist if you were looking at your first experience with..”*

We completely agree with the reviewer. We have already stated that in the paragraph about ADRs in the discussion, and have added it again as an additional limitation to the study.

We hope that these revisions and modifications to our manuscript have satisfactorily addressed all concerns expressed by the editors and reviewers of the World Journal of Gastrointestinal Endoscopy, and hope that our paper is now acceptable for publication.

Sincerely,

Fadi Antaki, MD