

# OBSTETRICS & GYNECOLOGY



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- Comments from the reviewers and editors (email to author requesting revisions)
- Response from the author (cover letter submitted with revised manuscript)\*

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[obgyn@greenjournal.org](mailto:obgyn@greenjournal.org).

**Date:** May 28, 2021  
**To:** "Rashmi Rao" [REDACTED]  
**From:** "The Green Journal" em@greenjournal.org  
**Subject:** Your Submission ONG-21-985

RE: Manuscript Number ONG-21-985

Evaluation of Respiratory Emissions during Labor and Delivery: Implications for Transmission of COVID-19 during Vaginal Delivery

Dear Dr. Rao:

Your manuscript has been reviewed by the Editorial Board and by special expert referees. Although it is judged not acceptable for publication in Obstetrics & Gynecology in its present form, we would be willing to give further consideration to a revised version.

If you wish to consider revising your manuscript, you will first need to study carefully the enclosed reports submitted by the referees and editors. Each point raised requires a response, by either revising your manuscript or making a clear and convincing argument as to why no revision is needed. To facilitate our review, we prefer that the cover letter include the comments made by the reviewers and the editor followed by your response. The revised manuscript should indicate the position of all changes made. We suggest that you use the "track changes" feature in your word processing software to do so (rather than strikethrough or underline formatting).

Your paper will be maintained in active status for 21 days from the date of this letter. If we have not heard from you by Jun 18, 2021, we will assume you wish to withdraw the manuscript from further consideration.

#### REVIEWER COMMENTS:

Reviewer #1: The authors present an interesting analysis of the spread of Covid particles during the second stage of labor. This is an interesting and unique study that is important given the scope of the pandemic. Overall I found this to be a reasonably well done study albeit with some issues.

- 1) Line 80- Do the WHO recommendations include labor as part of these covid spreading procedures?
- 2) Line 91- What is the practicality of having women wear masks during labor? Is this really necessary if they test negative and since now nearly all patients admitted for labor are tested- is this germane?
- 3) Line 104-108- this is the most important part of your paper but is poorly described. I would include an appendix with a graph/picture of how you accomplished this
- 4) Line 132- there seems to be an emphasis on the "speed" of the breath. Is this really the most important measure? Is there a way to measure actual particle distance?
- 5) A suggestion- could you use pulmonary function testing equipment to measure some of these outcomes?
- 6) Line 177- I would tone down this section of your work. While this is important data- all of what you have presented is descriptive in nature.
- 7) It would be interesting if possible to correlate transmission with the data you have presented. Perhaps an analysis of the masks of the attendants in the room.

Reviewer #2: This is an interesting observational study of three patients negative for COVID in labor. Respiratory emissions were study using Schlieren imaging. Patient breath was shown to propagate progressively faster as the patient progressed from early labor, coughing during early labor, to Valsalva and forced expiration during the second stage of labor. Videos of the Schlieren imaging with the wave propagation of respiratory emissions were available for viewing. The authors conclude that these respiratory patterns during physiologic labor have implications for health care workers caring for COVID positive women in labor.

The study is limited by the small number of study subjects as well as lack of information on aerosol particle size.

The study is innovative and gives interesting information about respiratory emissions during labor with possible implications of respiratory infection risk to obstetrical health care workers.

In their discussion the authors should consider the commentary by Elizabeth A Morgan et al, "Why "good enough" is not good enough: scientific data, not supply chain deficiencies, should be driving Centers for Disease Control and Prevention Recommendations Am J Obstet Gynecol MFM. 2020 Aug;2(3):100165. doi: 10.1016/j.ajogmf.2020.100165. Epub 2020 Jun 25.

Reviewer #3: Thank you for allowing me the opportunity to review this interesting study. Authors' aim was to evaluate respiratory emissions during labor and delivery to help guide recommendations for type of personal protective equipment to be used by the obstetric provider team with the hypothesis that with Valsalva and pushing, respiratory particles would travel further and with greater speed remaining suspended in the air longer representing more of an aerosol-producing procedure.

1. Did all subjects receive regional anesthesia?
2. Did any of the study participants have a history respiratory disease/asthma?
3. Did any of the study participants develop SARS-CoV2 in the immediate postpartum period?
4. What were the patient's BMI?
5. It would be interesting to know patient's baseline respiratory function. Peak flow meter volumes as a baseline may help to estimate personal expiratory volumes and suggest those with increased risk of scatter during pushing.
6. Was the room temperature and room humidity recorded as a marker of gas particle travel based on ambient room temperature?

#### STATISTICAL EDITOR COMMENTS:

The Statistical Editor makes the following points that need to be addressed:

Reviewer #4: lines 56-60: There is no explanation as to how many measurements were obtained to arrive at the estimates for speed of breath and its SD. Were the measurements normally distributed, thus justifying summary as SD or more appropriately as median (range). Without knowing the sample sizes, there is no way the reader can judge how representative these estimates are. Also, the number of women is only  $n = 3$ , so hardly enough to make any but preliminary conclusions.

lines 105, 108: As the Authors know, measurement of speed requires accurate determination of both distance and time, yet the distances are repeated cited as "approximate". If so, then how can the speed be estimated to 0.01 m/sec accuracy?

lines 112-113: If the framing rates were 60 frames per second, then the time between frames was 0.017 seconds. Then how can the times in Fig 1 be formatted to the nearest 0.001 seconds? Seems like a violation of the Nyquist limit.

#### EDITOR COMMENTS:

1. Please note, our enthusiasm for your revised manuscript will be predicated in particular on how satisfactory your responses are to the comments of the statistical reviewer.
2. The Editors of Obstetrics & Gynecology are seeking to increase transparency around its peer-review process, in line with efforts to do so in international biomedical peer review publishing. If your article is accepted, we will be posting this revision letter as supplemental digital content to the published article online. Additionally, unless you choose to opt out, we will also be including your point-by-point response to the revision letter. If you opt out of including your response, only the revision letter will be posted. Please reply to this letter with one of two responses:
  - A. OPT-IN: Yes, please publish my point-by-point response letter.
  - B. OPT-OUT: No, please do not publish my point-by-point response letter.
3. Responsible reporting of research studies, which includes a complete, transparent, accurate and timely account of what was done and what was found during a research study, is an integral part of good research and publication practice and not an optional extra. Obstetrics & Gynecology supports initiatives aimed at improving the reporting of health research, and we ask authors to follow specific guidelines for reporting randomized controlled trials (ie, CONSORT), observational studies (ie, STROBE), observational studies using ICD-10 data (ie, RECORD), meta-analyses and systematic reviews of randomized controlled trials (ie, PRISMA), harms in systematic reviews (ie, PRISMA for harms), studies of diagnostic accuracy (ie, STARD), meta-analyses and systematic reviews of observational studies (ie, MOOSE), economic evaluations of health interventions (ie, CHEERS), quality improvement in health care studies (ie, SQUIRE 2.0), and studies reporting results of Internet e-surveys (CHERRIES). Include the appropriate checklist for your manuscript type upon submission. Please write or insert the page numbers where each item appears in the margin of the checklist. Further information and links to the checklists are available at <http://ong.editorialmanager.com>. In your cover letter, be sure to indicate that you have followed the CONSORT, MOOSE, PRISMA, PRISMA for harms, STARD, STROBE, RECORD, CHEERS, SQUIRE 2.0, or CHERRIES guidelines, as appropriate.
4. Standard obstetric and gynecology data definitions have been developed through the reVITALize initiative, which was convened by the American College of Obstetricians and Gynecologists and the members of the Women's Health Registry Alliance. Obstetrics & Gynecology has adopted the use of the reVITALize definitions. Please access the obstetric data definitions at <https://www.acog.org/practice-management/health-it-and-clinical-informatics/revitalize-obstetrics-data-definitions> and the gynecology data definitions at <https://www.acog.org/practice-management/health-it-and-clinical-informatics/revitalize-gynecology-data-definitions>.

informatics/revitalize-gynecology-data-definitions. If use of the reVITALize definitions is problematic, please discuss this in your point-by-point response to this letter.

5. Because of space limitations, it is important that your revised manuscript adhere to the following length restrictions by manuscript type: Original Research reports should not exceed 5,500 words. Stated word limits include the title page, précis, abstract, text, tables, boxes, and figure legends, but exclude references.

6. Specific rules govern the use of acknowledgments in the journal. Please note the following guidelines:

- \* All financial support of the study must be acknowledged.
- \* Any and all manuscript preparation assistance, including but not limited to topic development, data collection, analysis, writing, or editorial assistance, must be disclosed in the acknowledgments. Such acknowledgments must identify the entities that provided and paid for this assistance, whether directly or indirectly.
- \* All persons who contributed to the work reported in the manuscript, but not sufficiently to be authors, must be acknowledged. Written permission must be obtained from all individuals named in the acknowledgments, as readers may infer their endorsement of the data and conclusions. Please note that your response in the journal's electronic author form verifies that permission has been obtained from all named persons.
- \* If all or part of the paper was presented at the Annual Clinical and Scientific Meeting of the American College of Obstetricians and Gynecologists or at any other organizational meeting, that presentation should be noted (include the exact dates and location of the meeting).
- \* If your manuscript was uploaded to a preprint server prior to submitting your manuscript to Obstetrics & Gynecology, add the following statement to your title page: "Before submission to Obstetrics & Gynecology, this article was posted to a preprint server at: [URL]."

7. The most common deficiency in revised manuscripts involves the abstract. Be sure there are no inconsistencies between the Abstract and the manuscript, and that the Abstract has a clear conclusion statement based on the results found in the paper. Make sure that the abstract does not contain information that does not appear in the body text. If you submit a revision, please check the abstract carefully.

In addition, the abstract length should follow journal guidelines. The word limit for Original Research articles is 300 words. Please provide a word count.

8. In your Abstract, manuscript Results sections, and tables, the preferred citation should be in terms of an effect size, such as odds ratio or relative risk or the mean difference of a variable between two groups, expressed with appropriate confidence intervals. When such syntax is used, the P value has only secondary importance and often can be omitted or noted as footnotes in a Table format. Putting the results in the form of an effect size makes the result of the statistical test more clinically relevant and gives better context than citing P values alone.

If appropriate, please include number needed to treat for benefits (NNTb) or harm (NNTh). When comparing two procedures, please express the outcome of the comparison in U.S. dollar amounts.

Please standardize the presentation of your data throughout the manuscript submission. For P values, do not exceed three decimal places (for example, "P = .001"). For percentages, do not exceed one decimal place (for example, 11.1%).

9. Please review examples of our current reference style at <http://ong.editorialmanager.com> (click on the Home button in the Menu bar and then "Reference Formatting Instructions" document under "Files and Resources"). Include the digital object identifier (DOI) with any journal article references and an accessed date with website references. Unpublished data, in-press items, personal communications, letters to the editor, theses, package inserts, submissions, meeting presentations, and abstracts may be included in the text but not in the reference list.

In addition, the American College of Obstetricians and Gynecologists' (ACOG) documents are frequently updated. These documents may be withdrawn and replaced with newer, revised versions. If you cite ACOG documents in your manuscript, be sure the reference you are citing is still current and available. If the reference you are citing has been updated (ie, replaced by a newer version), please ensure that the new version supports whatever statement you are making in your manuscript and then update your reference list accordingly (exceptions could include manuscripts that address items of historical interest). If the reference you are citing has been withdrawn with no clear replacement, please contact the editorial office for assistance ([obgyn@greenjournal.org](mailto:obgyn@greenjournal.org)). In most cases, if an ACOG document has been withdrawn, it should not be referenced in your manuscript (exceptions could include manuscripts that address items of historical interest). All ACOG documents (eg, Committee Opinions and Practice Bulletins) may be found at the Clinical Guidance page at <https://www.acog.org/clinical> (click on "Clinical Guidance" at the top).

10. When you submit your revision, art saved in a digital format should accompany it. If your figure was created in Microsoft Word, Microsoft Excel, or Microsoft PowerPoint formats, please submit your original source file. Image files should not be copied and pasted into Microsoft Word or Microsoft PowerPoint.

Figure 1: Please upload as a figure file on Editorial Manager.

11. Authors whose manuscripts have been accepted for publication have the option to pay an article processing charge and

publish open access. With this choice, articles are made freely available online immediately upon publication. An information sheet is available at <http://links.lww.com/LWW-ES/A48>. The cost for publishing an article as open access can be found at <https://wkauthorservices.editage.com/open-access/hybrid.html>.

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You will be receiving an Open Access Publication Charge letter from the Journal's Publisher, Wolters Kluwer, and instructions on how to submit any open access charges. The email will be from [publicationservices@copyright.com](mailto:publicationservices@copyright.com) with the subject line 'Please Submit Your Open Access Article Publication Charge(s)'. Please complete payment of the Open Access charges within 48 hours of receipt.

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If you choose to revise your manuscript, please submit your revision through Editorial Manager at <http://ong.editorialmanager.com>. Your manuscript should be uploaded in a word processing format such as Microsoft Word. Your revision's cover letter should include the following:

- \* A confirmation that you have read the Instructions for Authors (<http://edmgr.ovid.com/ong/accounts/authors.pdf>), and
- \* A point-by-point response to each of the received comments in this letter. Do not omit your responses to the Editorial Office or Editors' comments.

If you submit a revision, we will assume that it has been developed in consultation with your co-authors and that each author has given approval to the final form of the revision.

Again, your paper will be maintained in active status for 21 days from the date of this letter. If we have not heard from you by Jun 18, 2021, we will assume you wish to withdraw the manuscript from further consideration.

Sincerely,

The Editors of Obstetrics & Gynecology

2019 IMPACT FACTOR: 5.524

2019 IMPACT FACTOR RANKING: 6th out of 82 ob/gyn journals

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June 18, 2021

Dear Dr. Rouse and the *Obstetrics & Gynecology*'s Editorial team,

Please find enclosed our manuscript entitled *Evaluation of Respiratory Emissions During Labor and Delivery: Implications for Transmission of SARS-CoV-2 During Vaginal Delivery*. We thank you for the initial review and feel that our revisions have addressed the reviewers' and editor's comments and suggestions. Our point by point responses are attached to this cover letter.

The act of labor and vaginal delivery involves physiologic activities, including heavy breathing and repeated Valsalva maneuvers, that alter the gas cloud momentum and increase the risk of respiratory disease transmission. However there has been no study to date investigating respiratory emissions during labor and delivery. Therefore, current recommendations for PPE use are based on limited or extrapolated data at best. We have partnered with our engineering colleagues at UCLA and present here a characterization of respiratory emissions produced during labor and vaginal delivery using Background-Oriented Schlieren imaging.

Our findings demonstrate that the physiologic activities during different stages of labor and vaginal delivery produce respiratory emissions that travel significantly faster and further than that of normal breathing. We believe this has significant implications for transmission of SARS-CoV-2 on labor and delivery, where providers are in close contact with the patient for prolonged periods of time. Our data suggests that labor and delivery should be considered a high-risk procedure, and obstetric providers caring for suspected or confirmed COVID-19 patients should be equipped with full personal protective equipment, including N95 masks.

The data contained in this manuscript has not been previously published and is not under editorial consideration in any other journal. The authors are submitting solely to *Obstetrics & Gynecology* and will not submit the manuscript elsewhere unless a final negative decision is made by the editors. The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Approval from the University of California, Los Angeles institutional review board (UCLA IRB#20-000931) was obtained for this study, and written consent for publication was provided by the patients. The authors have no conflicts of interest to disclose. All co-authors have read and approved the manuscript and permission has been obtained from all persons named in the acknowledgments.

Thank you in advance for your additional review of our work. We look forward to your comments.

Sincerely,

A handwritten signature in black ink, appearing to be "Rashmi Rao".

Rashmi Rao, MD  
Assistant Clinical Professor  
Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology  
University of California, Los Angeles

Dear Dr. Rouse and the *Obstetrics & Gynecology's* Editorial team,

Thank you for providing us the opportunity to revise our manuscript and address the reviewers' comments. Below is a detailed point by point response to each comment with our responses bolded. In addition, the manuscript is edited with the "track changes" function.

#### REVIEWER COMMENTS:

Reviewer #1: The authors present an interesting analysis of the spread of Covid particles during the second stage of labor. This is an interesting and unique study that is important given the scope of the pandemic. Overall I found this to be a reasonably well done study albeit with some issues.

1) Line 80- Do the WHO recommendations include labor as part of these covid spreading procedures?

**Thank you for this clarifying question. Currently the WHO does not list labor or vaginal delivery as an aerosol-generating procedure. The WHO list of aerosol-generating procedures includes tracheal intubation, noninvasive ventilation (e.g. BiPAP, CPAP), tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, sputum induction induced by using nebulized hypertonic saline, and autopsy procedures. Labor and vaginal delivery have not been evaluated and therefore conclusions regarding whether this represents an aerosol-generating procedure cannot be made. However, clarifying that the WHO does not list labor and vaginal delivery is an excellent point and we have added this list of procedures and highlighted the lack of consideration for labor and vaginal delivery to the introduction (lines 103-107).**

2) Line 91- What is the practicality of having women wear masks during labor? Is this really necessary if they test negative and since now nearly all patients admitted for labor are tested- is this germane?

**We agree that it is difficult and impractical for women to wear masks during labor especially during the second stage when repeated Valsalva is required. It is correct that most institutions test patients routinely now and do not necessarily require a mask if they test negative; however, most institutions, such as ours, require a mask for patients who are COVID positive or pending a COVID test result (i.e., presents in active labor without a COVID test within 72 hours). In general, however, we agree that it is very difficult to wear a mask in labor. Our study aims to characterize the extent of respiratory emissions when women do not wear masks.**

3) Line 104-108- this is the most important part of your paper but is poorly described. I would include an appendix with a graph/picture of how you accomplished this

**Thank you for this suggestion. We have added Figure 1 (a diagram and photo) to clarify the optical setup for Background-Oriented Schlieren imaging in the labor and delivery room. The additional figure details the location of the patient bed, lights, camera, and background along with important distances.**

4) Line 132- there seems to be an emphasis on the "speed" of the breath. Is this really the most important measure? Is there a way to measure actual particle distance?

**Thank you for this question. The speed of the breath's front is a readily measured parameter through Background-Oriented Schlieren imaging and is directly related to the distance traveled by the breath front in a given instant of time. Because the extent of the field of view in these experiments is only 1.2 m from the patient's mouth, the actual distance of propagation (reached by virtually all breathing modalities), is not as useful as the distance per time or speed at which the warm breath travels across the field of view. Note that others have documented that droplets and aerosols remain suspended in higher speed turbulent clouds, such as those produced by coughs, for a greater distance than in lower speed breath clouds (e.g., Bourouiba et al), as also observed in our studies.**

5) A suggestion- could you use pulmonary function testing equipment to measure some of these outcomes?

**Thank you for this excellent suggestion. We agree that indices from pulmonary function testing equipment may have provided additional information regarding velocity/speed of breath. However, administration of pulmonary function tests during labor and delivery is likely to be more intrusive and uncomfortable for patients compared to Background-Oriented Schlieren imaging of the breath. In addition, this was not included in our initial protocol approved by the IRB and the patients reported in this study are no longer pregnant and unable to undergo this additional testing.**

6) Line 177- I would tone down this section of your work. While this is important data- all of what you have presented is descriptive in nature.

**Thank you for this comment. We have changed the wording of this section and added a statement that this study is primarily descriptive in nature (lines 217-220)**

7) It would be interesting if possible to correlate transmission with the data you have presented. Perhaps an analysis of the masks of the attendants in the room.

**Thank you for this interesting suggestion. The patients included within this study were confirmed COVID negative in order to not increase the risk of exposure to the additional personnel in the room required for obtaining imaging. As a result, we are unable to assess whether or not viral particles were present on the masks of the attendants in the room to correlate risk of transmission. We recognize that a limitation of this study is that it does not definitively quantify transmission risk, but the risk of transmission can be extrapolated from characteristics of the gas cloud produced from respiratory emissions, severity of disease, and duration of exposure. We have clarified this limitation in our discussion (lines 224-232).**

Reviewer #2: This is an interesting observational study of three patients negative for COVID in labor. Respiratory emissions were study using Schlieren imaging. Patient breath was shown to propagate progressively faster as the patient progressed from early labor, coughing during early labor, to Valsalva and forced expiration during the second stage of labor. Videos of the Schlieren imaging with the wave propagation of respiratory emissions were available for viewing. The authors conclude that these respiratory patterns during physiologic labor have implications for health care workers caring for COVID positive women in labor. The study is limited by the small number or study subjects as well as lack of information on aerosol particle size.



The study is innovative and gives interesting information about respiratory emissions during labor with possible implications of respiratory infection risk to obstetrical health care workers.

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**Thank you for this excellent suggestion. We have added the commentary to our discussion and references (lines 245-253).**

Reviewer #3: Thank you for allowing me the opportunity to review this interesting study. Authors' aim was to evaluate respiratory emissions during labor and delivery to help guide recommendations for type of personal protective equipment to be used by the obstetric provider team with the hypothesis that with Valsalva and pushing, respiratory particles would travel further and with greater speed remaining suspended in the air longer representing more of an aerosol-producing procedure.

1. Did all subjects receive regional anesthesia?

**All subjects received regional anesthesia. Thank you for your clarifying questions. We have added a brief summary of the subjects along with a table with study participant characteristics to our results (line 163-164, Table 1)**

2. Did any of the study participants have a history respiratory disease/asthma?

**None of the study participants had a history of respiratory disease or asthma (line 164-165, Table 1).**

3. Did any of the study participants develop SARS-CoV2 in the immediate postpartum period?

**None of the study participants developed SARS-CoV2 in the immediate postpartum period (line 166-167)**

4. What were the patient's BMI?

**The patient's BMIs were the following: patient 1 – 27.51 (kg/m<sup>2</sup>), patient 2 – 24.59 (kg/m<sup>2</sup>), patient 3 – 41.71(kg/m<sup>2</sup>). We have added the BMIs in the patient characteristics table (Table 1).**

5. It would be interesting to know patient's baseline respiratory function. Peak flow meter volumes as a baseline may help to estimate personal expiratory volumes and suggest those with increased risk of scatter during pushing.

**Thank you for this interesting suggestion. We agree that baseline respiratory function through pulmonary function tests or peak flow meter assessments may have provided additional information regarding velocity/speed of breath. However, this was not included**

**in our initial protocol approved by the IRB and the patients reported in this study are no longer pregnant and unable to undergo this additional testing.**

6. Was the room temperature and room humidity recorded as a marker of gas particle travel based on ambient room temperature?

**The room temperature and humidity were not specifically recorded for each subject, but there was not significant variance between subjects and recordings. For all 3 patients, the thermostat for the labor and delivery room was set to a standard temperature and humidity condition that was considered comfortable for each patient. Care was also taken to ensure the room was maintained at a cooler temperature (approximately 70 degrees Fahrenheit) to enable Background Oriented Schlieren imaging to visualize the difference in the woman's warm breath relative to the surroundings. We have added this description to the methods section (lines 141-145)**

#### STATISTICAL EDITOR COMMENTS:

The Statistical Editor makes the following points that need to be addressed:

Reviewer #4: lines 56-60: There is no explanation as to how many measurements were obtained to arrive at the estimates for speed of breath and its SD. Were the measurements normally distributed, thus justifying summary as SD or more appropriately as median (range). Without knowing the sample sizes, there is no way the reader can judge how representative these estimates are. Also, the number of women is only  $n = 3$ , so hardly enough to make any but preliminary conclusions.

**Thank you for this observation. We have clarified that the estimated speed of breath presented in the results is an average of multiple recordings taken at the different stages of labor for three subjects (line 158-160). In addition, the speed of the breath front or breath cloud decays over time, and this variation is the source of averaging and standard deviation for the first 20 frames (i.e., first 0.33 seconds) of imaging. With regard to presenting the data as a median with range versus our stated mean and standard deviation, either could be determined from our results. However, the latter is how speed of emissions are most commonly reported. We recognize that the limitation of the study is its low number of participants and agree that the conclusions are preliminary. We have reviewed this limitation in the discussion (line 220-224).**

lines 105, 108: As the Authors know, measurement of speed requires accurate determination of both distance and time, yet the distances are repeatedly cited as "approximate". If so, then how can the speed be estimated to 0.01 m/sec accuracy?

**Thank you for this clarification. The "approximate" distances were indicating the placement of equipment. The speed estimate is based on the calibration (meters per pixels), which was very accurately determined during image processing. We have removed the term "approximately" when reporting the speed in the results (line 176).**

lines 112-113: If the framing rates were 60 frames per second, then the time between frames was 0.017 seconds. Then how can the times in Fig 1 be formatted to the nearest 0.001 seconds? Seems like a violation of the Nyquist limit.

The stated framing rate of 60 frames per second is more precisely stated in the manufacturer's manual as 59.94 FPS. Hence, we calculate the time between "shots" precisely as  $1/59.94 = 0.0167$  seconds (line 143-144). As a result, the number of significant digits is appropriate. The time  $t=0$  sec occurs when the breath is first observed to emanate from the mouth. For Figure 1 (now Figure 2), the still shots are at the 6<sup>th</sup> ( $t=0.100$  sec) and 20<sup>th</sup> ( $t=0.333$  sec) shots. The Nyquist limit pertains more appropriately to resolution of periodic processes, which is not the situation for breathing images, but even here, the videos show reasonably well resolved, non-jittery propagation of the breath front.

#### EDITOR COMMENTS:

1. Please note, our enthusiasm for your revised manuscript will be predicated in particular on how satisfactory your responses are to the comments of the statistical reviewer.

**We appreciate the comments of the statistical reviewer and believe we have addressed the comments and suggestions.**

2. The Editors of Obstetrics & Gynecology are seeking to increase transparency around its peer-review process, in line with efforts to do so in international biomedical peer review publishing. If your article is accepted, we will be posting this revision letter as supplemental digital content to the published article online. Additionally, unless you choose to opt out, we will also be including your point-by-point response to the revision letter. If you opt out of including your response, only the revision letter will be posted. Please reply to this letter with one of two responses:

A. OPT-IN: Yes, please publish my point-by-point response letter.

B. OPT-OUT: No, please do not publish my point-by-point response letter.

**Yes, please publish my point-by-point response letter.**

3. Responsible reporting of research studies, which includes a complete, transparent, accurate and timely account of what was done and what was found during a research study, is an integral part of good research and publication practice and not an optional extra. Obstetrics & Gynecology supports initiatives aimed at improving the reporting of health research, and we ask authors to follow specific guidelines for reporting randomized controlled trials (ie, CONSORT), observational studies (ie, STROBE), observational studies using ICD-10 data (ie, RECORD), meta-analyses and systematic reviews of randomized controlled trials (ie, PRISMA), harms in systematic reviews (ie, PRISMA for harms), studies of diagnostic accuracy (ie, STARD), meta-analyses and systematic reviews of observational studies (ie, MOOSE), economic evaluations of health interventions (ie, CHEERS), quality improvement in health care studies (ie, SQUIRE 2.0), and studies reporting results of Internet e-surveys (CHERRIES). Include the appropriate checklist for your manuscript type upon submission. Please write or insert the page numbers where each item appears in the margin of the checklist. Further information and links to the checklists are available at <http://ong.editorialmanager.com>. In your cover letter, be sure to indicate that you have followed the CONSORT, MOOSE, PRISMA, PRISMA for harms, STARD, STROBE, RECORD, CHEERS, SQUIRE 2.0, or CHERRIES guidelines, as appropriate.

**We have followed the STROBE guidelines as appropriate. We have now included the STROBE checklist with our revised manuscript.**

4. Standard obstetric and gynecology data definitions have been developed through the reVITALize initiative, which was convened by the American College of Obstetricians and Gynecologists and the members of the Women's Health Registry Alliance. Obstetrics & Gynecology has adopted the use of the reVITALize definitions. Please access the obstetric data definitions at <https://www.acog.org/practice-management/health-it-and-clinical-informatics/revitalize-obstetrics-data-definitions> and the gynecology data definitions at <https://www.acog.org/practice-management/health-it-and-clinical-informatics/revitalize-gynecology-data-definitions>. If use of the reVITALize definitions is problematic, please discuss this in your point-by-point response to this letter.  
**We have abided by the reVITALize definitions throughout this manuscript.**

5. Because of space limitations, it is important that your revised manuscript adhere to the following length restrictions by manuscript type: Original Research reports should not exceed 5,500 words. Stated word limits include the title page, précis, abstract, text, tables, boxes, and figure legends, but exclude references.  
**Our revised manuscript meets the length restrictions of Original Research reports with a total word count of 2,842.**

6. Specific rules govern the use of acknowledgments in the journal. Please note the following guidelines:

- \* All financial support of the study must be acknowledged.
- \* Any and all manuscript preparation assistance, including but not limited to topic development, data collection, analysis, writing, or editorial assistance, must be disclosed in the acknowledgments. Such acknowledgments must identify the entities that provided and paid for this assistance, whether directly or indirectly.
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**Our acknowledgements meet the above listed guidelines.**

7. The most common deficiency in revised manuscripts involves the abstract. Be sure there are no inconsistencies between the Abstract and the manuscript, and that the

Abstract has a clear conclusion statement based on the results found in the paper. Make sure that the abstract does not contain information that does not appear in the body text. If you submit a revision, please check the abstract carefully.

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**The primary results of our study are the speeds of the respiratory emissions produced at different stages of labor, which is most commonly presented as a mean with a standard deviation. We have ensured that the presentation of data remains standardized and consistent throughout the manuscript.**

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