Author's response to reviews

Title: Utilization of Base Deficit and Reliability of Base Deficit as a Surrogate for Serum Lactate in the Peri-Operative Setting

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Author's response to reviews: see over
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Sabina Alam, PhD
Senior Scientific Editor
BMC series journals

Dear Dr. Alam,

Thank you very much for your consideration of our manuscript entitled: “Utilization of Base Deficit and Reliability of Base Deficit as a Surrogate for Serum Lactate in the Peri-Operative Setting”. We appreciate the suggestions and critiques of the reviewers. We have incorporated the suggested changes into the manuscript and we are pleased that with assistance of the reviewers and the editorial staff we have produced a much-enhanced manuscript. We hope the present version of the manuscript is suitable for publication. In the following pages, we detail the changes and adjustments made to the original submission.

Best Regards,

Lakhmir S. Chawla, MD
Assistant Professor of Medicine
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Reviewer #1

1. The authors state several times the possibility that saline loading is the factor that confounds the BD and LAC correlation in surgical patients. There are multiple factors that can affect the base deficit in these patients, which should be mentioned in the Intro and Conclusions. One of these is renal function.

Response: We agree with the reviewer, and we have added language to reflect these comments.

2. Do the authors have data on the renal function of these patients? How many had some degree of renal insufficiency, which would result in false elevations of the base deficit?

Response: Unfortunately, we do not have baseline renal function available for the patients in this cohort.

3. The method used to measure lactate should be described in the methods section. Was a point of care device used?

Response: We thank the reviewer for this point, and we have specified the technique in the Methods section. Blood was immediately placed on ice and evaluated for pH, partial pressure or carbon dioxide/oxygen, oxygen saturation and lactate levels using standard blood gas analysis (ABL 700; Radiometer Americ Inc; Westlake, OH).

4. ASA class is a categorical variable, not a continuous scale or measurement. It should not be presented as a mean +/- standard deviation. This should be changed in the manuscript and Table 2, perhaps reporting the percent in each ASA category, or the percent with ASA >= 3.

Response: We thank the reviewer for this point, and we corrected this.

5. Figure 2 is redundant - the exact same data is presented in Table 1 - and should be deleted.

Response: We thank the reviewer for this point, and we have removed Figure 2.
6. There appears to be no reference to Figures 3 or 4 in the manuscript, and no mention of the data from these figures.

Response: We thank the reviewer for this pointing out this omission, and we have corrected this error.

7. This is a small series, and I imagine that the number of patients who had elevated lactates was very small. There is no mention of the size of the group that had HL - how many patients (or lab values) had lactate > 2. What was the p-value for the ROC curve? This should be mentioned also as a limitation in the discussion, as this study is very under-powered with the current numbers.

Response: 14/35 (40%) patients had a lactate above 2.0 mmol/L. Of all the samples assessed (n=88), 28.4% had hyperlactatemia. We have added these data to Table 1.

Minor Essential Revisions
1. Table 2 has several abbreviations (CABG, ASA) that should be described in a footer below the table.

Response: We thank the reviewer for this comment, and we have added a Legend to Table 1
Reviewer #2

To the authors,
This is a combination report of survey and prospective observational study. In their survey, they found anesthesiologists frequently used base deficit as an endpoint of resuscitation, and threshold of abnormal base deficit was almost 6 mEq/L. Serum lactate was also frequently used as an endpoint, and its threshold was almost 4 mmol/L. They also conducted a prospective observational study and found that base deficit was not good surrogate of hyperlactatemia. They concluded that the use of base deficit as a surrogate for serum lactate was not warranted and it should be measured directly in the operating room.

Major Compulsory Revisions
1. Most important drawback of this study is that almost all of the blood gas machine can measure serum lactate directly in this 21st century. In your surveyed hospital, how many machines can measure arterial lactate? Can you provide this information from your survey?

Response: We agree with the reviewer that the newer machines have this capacity, but unfortunately many institutions have not upgraded their systems. We conducted a survey of institutions in the Washington DC area and we found that very few were automatically providing lactate values as part of their ABGs. (Chawla et al, BMC Emerg Med. 2008 Dec 16;8:18.) In our institution, the ABG provides a serum lactate, but in the operating room, most of our anesthesiologists use point of care blood gas analysis, which does not provide serum lactate.

2. The results were completely predictable. You have to show us why this study is important and what can we learn from this study.

Response: We agree with the reviewer that this was predictable, but this fact has not translated into a change in clinical practice as evidenced by our survey. Our hope is that other investigators will validate our findings in large diversified cohort and push to change practice.
3. Why you choose the cutoff value of hyperlactatemia was 2 mmol/L? As your survey suggested, higher cutoff value will be appropriate, such as >4 mmol/L. Furthermore, please provide how many patients (samples) have been classified to hyperlactatemia.

Response: We chose the cut-off of 2.0 mmol/L because the previous literature in the study of hyperlactatemia has used this demarcation point. A cut-off of 4.0 mmol/L is equivalent to shock in some clinical trials (Rivers et al, NEJM) and our hope would be that our diagnostic tests identify hyperlactatemia prior to the development of shock. 14/35 (40%) patients had a lactate above 2.0 mmol/L. Of all the samples assessed (n=88), 28.4% had hyperlactatemia. We have added these data to Table 1.

4. The results will be incomplete. No explanation for Figure 4. Please correct.

Response: We thank the reviewer for pointing out this omission and we had made the suggested changes.

5. Your hypothesis was not clearly stated. Please clarify your hypothesis clearly in Introduction.

Response: We thank the reviewer for this suggestion and we had made the suggested changes.

6. Please provide how to measure lactate.

Response: We thank the reviewer for this point, and we have specified the technique in the Methods section. Blood was immediately placed on ice and evaluated for pH, partial pressure or carbon dioxide/oxygen, oxygen saturation and lactate levels using standard blood gas analysis (ABL 700; Radiometer Americ Inc; Westlake, OH).

Minor Essential Revisions

1. Page 5, Methods section: What was HIPAA?

Response: Health Insurance Portability and Accountability Act

2. Page 6, last line: all means are reported as +/- SD???
Response: These are the percent of the total

3. Page 12, Table of Question 2 and 4: Difficult to understand Q1, Q2,… Please clarify what Q1, Q2… mean.
Response: The Q refers to quartile. We have added a Legend to clarify this point.

4. Page 13, Table 2: The percentage numbers of operation categories would be mistake. Please correct.
Response: We thank the reviewer for this suggestion and we had made the suggested changes.

5. Page 16, Figure 2: Color should not be used.
Response: We have removed Figure 2