Peer Review File

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Reviewer Comments:

Overall, this paper is not so much a review as a collection of opinions by the authors followed by a discussion of their program' s outreach to the underdeveloped world. This is interesting in itself but certainly has no role as part of a review of IONM. It also is not real science but an interesting and an inspiring story. The authors should make sure the IONM article is rather state of the art, but opinion driven.

Reply: Thank you for taking the time to provide critique and feedback. As described in the Background of the Abstract and the Introduction, the extent of the scientific review of IONM is limited to its application in various surgery types. This provides the foundation to understand the remainder of the paper. The dearth of data and literature for IONM in resource-limited settings prevents a true scientific review from being completed. Our aim is to bring attention to the problem and begin contributing to the expansion of IONM as well as to the literature base.

Changes in the text: See below

Comment 1: On page 2 lines 49 — a dermatomal change in sensation is not benign! I would just say that a number complications from quadriparesis and hemiparesis to sensory loss, cranial nerve injury and ataxia may be seen after surgery.

Reply 1: It is agreed that the word choice is poor. The text was changed.

Changes in the text: Lines 48 and 49

Comment 2: Page 3—do the authors have any support for the statement on line 63 that it is technician shortage rather than billing and or efficacy issues that prevent further use of IONM? In line 63 it says that the strongest evidence for the value of IONM is in spine surgery but the data here is quite limited and contradictory. I think the strongest data may be for acoustic neuroma surgery. The authors need to be careful in making statements off hand. This entire section should be re-written to avoid conclusions that are not supported by data.

Reply 2: While billing and efficacy certainly are important to consider, cost is far and away the biggest barrier to expansion, both in high income countries and resource-limited countries. To simplify our message, we revised the sentence. Instead, we focused on stating that IONM utilization is increasing in high-income countries.

In response to the second part of the comment, about evidence for the value of IONM, we changed our wording in the section to be less likely to be construed as opinion.

Changes in the text: Lines 63; 65

Comment 3: The authors do not tell us how they selected papers for review. When I used the search

term “intra-operative neurophysiologic monitoring or intraoperative monitoring or (evoked potentials and surgery)” and chose the last 10 years and human studies only in pubmed I got 12,000 articles. With this massive number how did the authors select papers to review?

Reply 3: We agree that the overall literature in the field is quite expansive. As outlined in our Methods section, combinations of keywords allowed for significant narrowing of the available literature to review. Also, in instances where the literature is light, such as the use of IONM in resource-limited countries, secondary searching of the existing paper reference lists provided further papers to review. This process is also included in our Methods section.

Changes in the text: None

Comment 4: Page 8 line 198—electrocorticography involves recording and is separate from electrical stimulation using cortical electrodes. The authors should note the difference in seizure frequency using the penfield and multipulse stimulation paradigms.

Reply 4: We agree that electrocortography and electrical stimulation are separate. The wording in the sentence was revised to reflect this. Given that the section is intended to give a brief overview of IONM in intracranial surgery, we chose not to elaborate on the various stimulation methods and their impact on seizure activity.

Changes in the text: Line 198

Comment 5: Page 10- line 251— the authors should always try to use data rather than inserting their opinion into the paper.

Reply 5: It is our view that the reviewer misinterpreted the sentence in question. Our intent was to include what the authors of the just cited paper (#64) stated in said paper. Nonetheless, the sentence was reworded to avoid confusion to other readers.

Changes in the text: Lines 250, 251

Comment 6: Line 260: Since ABRET is an AMERICAN society, it is not surprising that there are few CNIM techs in other countries. This is not the same as saying that there are not qualified technologists in those other countries.

Reply 6: It is agreed that ABRET is an American accreditation entity. However, the organization is internationally recognized and it has the only available database to query the presence of technologists world-wide. Our intent in the paper is simply to shine light on the vast differences in technologist numbers. Revision of the sentence illustrates that difference more explicitly. Moreover, there is new text to address that qualified technologists may exist and are not counted in the ABRET database.

Changes in the text: Lines 263, 265

Comment 7: Line 308 and following: If training that is done in the authors facility is so intensive,

are any of the anesthesiologists D.ABNM certified or are any certified by ACNS? Can the authors say what the training is?

Reply 7: Members of our group do not have additional certification mentioned by the reviewer. To avoid confusion, the first sentence in the section is reworded and the second sentence is removed.

Changes in the text: Lines 310-12

Comment 8: Line 321—It is NOT the traditional IONM model to have a technologist and a remote neurologist. The traditional model is to have a trained doctoral level specialist in the room with the patient with our without a technologist. The model that the authors discuss has been adapted by larger companies to be cost effective but is not necessarily the best model.

Reply 8: The reviewer rightfully points out the specific connotation that the word "traditionally" means. We replaced the word and added that the interpreter can be on-site or remote.

Changes in the text: Lines 321, 322

Comment 9: Line 322—why is the authors team so unique? There are many large academic centers that have neurologists, neurophysiologists, anesthesiologists—why is the author' s team that has mainly anesthesiologists better or in a better position to provide education?

Reply 9: It is true that many types of physicians are in a position to be involved in IONM and patient care. Anesthesiologists are uniquely suited for both because of our relationship with surgeons as well as our knowledge of the interplay of IONM and anesthetic pharmacology and physiology. However, to avoid opinion, wording was changed to minimize the implication that our team is in a "better position to provide education".

Changes in the text: Line 323