

Peer Review File

Article Information: <https://dx.doi.org/10.21037/jss-21-107>

Reviewer A

Comment:

Include in the abstract that these newer technologies require a learning-curve, in order for the surgeon and the OR staff to understand barriers and work flow of these new technologies in the OR. Surgeons need to be involved in the process of purchase decision and to be diligent on their research on technology.

Reply: Thank you for this suggestion.

Changes in Text: We have included the following addition to the abstract under the conclusion subheading: “These technologies require a learning-curve for the surgeon and the operating room staff to understand how to use them efficiently. Surgeons need to be involved in the process of purchase decisions.”

Comment:

Introduction:

Between first and second paragraph of the introduction, the authors can include a section regarding any disadvantages or any limitations regarding imaging/ software with computer assisted navigation. Which then can be followed by their last paragraph in the introduction.

Reply: Thank you for the suggestion.

Changes in the Text: We have added the following paragraph to the introduction: “There are limitations to computer assisted navigation. These systems make certain assumptions regarding the true position of patient anatomy relative to a patient anchored reference marker and an acquired image. In addition, these technologies project simulated images based on the perceived location of instruments in relation to the reference frame. Any failure of the surgeon or system to recognize an unintended change in these variables can result in inaccuracy. It is paramount that surgeons use visual anatomic landmarks, tactile feedback, and knowledge of the assumptions made by these technologies to identify and troubleshoot when found to be inaccurate.”

Comment:

Methods:

Line 56: change “means” to implies or “most likely means”

Reply: Thank you for the suggestion.

Changes in the Text: “means” was changed to “implies”. The sentence now reads: “The nature of peer review publications, which typically compare one or two systems

within the technology type, **implies** surgeons and hospital administrators do not have sufficient information to compare the increasingly large range of imaging, navigation, and robotics technologies when making purchasing decisions(19).”

Comment:

Discussion:

Line 78: Before FOV, include (field of view)

Reply: Thank you for the suggestion.

Changes in the Text: “field of view” was added before “FOV”

Comment:

Line 85: Remove “field of view “

Reply: Thank you for the suggestion.

Changes in the Text: “field of view” was removed.

Comment:

Line 94-95: Include the fact that, this is a limitation for this technology

Reply: Thank you for the suggestion.

Changes in the Text: This has been included in the paragraph.

Comment:

Line 116: Include any limitation for Ziehm RFD, if known

Reply: Thank you for the suggestion.

Changes in the Text: There are no limitations that the authors can identify specifically regarding Ziehm.

Comment:

Line 172- 173: Can mention is this a limitation for BodyTom

Reply: Thank you for the suggestion.

Changes in the Text: This has been included in the paragraph.

Comment:

Line 189-1191: “Intraoperatively it is 190 possible to use lower dose settings on 3D or CT scanners, but typically this is not used as 191 optimised image quality is preferred.” Later in section, can include more information or sources on why that is.

Any sources that can support this.

Reply: Thank you for the suggestion.

Changes in the Text: This was a statement made off of anecdotal evidence and therefore it has been removed.

Comment:

Line 260: Include any limitation for BrainLab, if known, in terms of accuracy or surgeon/OR barriers

Reply: Thank you for the suggestion.

Changes in the Text: This has been added to the BrainLab paragraph.

Comment:

Line 267: “The MazorX is table-mounted with the robotic arm..” any advantages/disadvantages when compared to other robotic systems, interms of accuracy when it comes to this feature.

Reply: Thank you for the suggestion.

Changes in the Text: There are no studied differences regarding accuracy of table mounted vs. floor mounted device.

Comment:

Line 305: This system is floor mounted, list or describe any advantages /disadvantages when compared to other robotic systems such as MazorX which is table-mounted interms of accuracy.

Reply: Thank you for the suggestion.

Changes in the Text: There are no studied differences regarding accuracy of table mounted vs. floor mounted device.

Comment:

Line 367- 368: “Surgeons’ preferences for implant systems will heavily impact the decision making around navigation and robotic platforms.” Include more information in why this is.

Reply: Thank you for the suggestion.

Changes in the Text: We have included the following sentence in the paragraph: “This is due to a more seamless integration of some implants with systems owned by the device companies.”

Reviewer B

Comment:

This manuscript is a narrative review which provides a comprehensive overview of technologies useful for spine surgeons. Authors discuss imaging, navigation, and robotics technologies currently available for spine surgery by exploring peer-reviewed data and provides recommendations regarding these new technologies. The manuscript is well-written with no major flaws in grammar or style. The usefulness of the manuscript to the spine surgery community might be average and not necessarily

innovative or novel, however, the fact that it encompasses such a broad spectrum of knowledge is nice as this paper can be a reference for readers to learn about new technologies. Recommend accept as-is. Nice figures.

Reply: Thank you for the kind review.

Changes in the Text: none

Reviewer C

Comment:

This is a solid review of current available intraoperative 3D imaging units, navigation platforms, and robotic guidance options including pros and cons with a unique inclusion of approximate dollar cost amount for each system. This allows a quick understanding of modern enabling technologies for spine instrumentation and capital acquisition costs.

Reply: Thank you for the kind review.

Changes in the Text: none