

Peer Review File

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Reviewer A:

Overall, this manuscript is well-written, thoughtful and relevant to the surgical community, touching on the key points of how social media and associated platforms may be used to help advance clinical and surgical collaboration throughout the globe, as well as noting potential pitfalls and trouble spots.

Reply:

Thank you.

I// Would spend 1-2 sentences addressing the pitfalls raised, e.g. should there be oversight or regulation of social media content by accredited surgical bodies (e.g. SAGES, ACS) or should there be "designated experts" such as academic and private staff? What can be used to overcome issues with echo chambers and link online communities in the social medial landscape - in particular address differences in communication and any barriers between patients, the general public, and the surgical community

Reply:

Thank you. We have adjusted the manuscript to include a statement about how oversight remains crucial in SM, particularly when it pertains to NNT dissemination. With respect to the problem of echo chambers, we have added a section which addresses potential means to combat that risk.

Changes in the text:

This effect may be counteracted by designating expert moderators for specific SM platforms who serve to examine and validate posts and videos prior to publication. For example, in the SAGES -sponsored “Colorectal Surgery Masters Program Collaboration” Facebook group, thirteen appointed administrators and moderators serve in that capacity and help moderate content.

While the formation of echo chambers may be inevitable due to the basic human tendency towards confirmation bias, means to encourage increased diversity of thought and ideas should be sought out. For example, SM algorithms may be optimized to facilitate exposure to a broader variety of viewpoints by allowing users manage the feed (e.g., Reddit) as opposed to platforms that do not provide such an option (e.g., Facebook or Twitter). (34) While data on specific differences among patient, general public and surgeon SM interact remains limited, a range of measurements have been proposed to help better understand them including assessing

real-time behavioral data and geographic market analyses.

2// This is a smaller aside but would expand in the future category by citing the specific liver cancer procedure performed by Dr. Ahmed at St Bart's, as also expand on the use of VR technologies as well as the possible role of both AR and VR technologies in the future for surgical education and training. Would also note the role of development of robotic surgery w/r/t DaVinci and other platforms as well, if possible, overlap with VR / AR technologies, and quickly address concerns in 1-2 sentences

Reply:

Thank you. Per the reviewer's suggestions, we have expanded on that topic in the manuscript.

Changes in the text:

Integrating AR hold potential to further enhance robotic assisted surgery as demonstrated in a study where fluorescent tissue labeling allowed surgeons to make for loss of tactile feedback and assess oncological adequacy of operations in real-time. (37) Studies have so far shown that both VR and AR are as effective compared to traditional methods in teaching anatomy (38) and suturing skills. (39) However, their use in patient care and the ethical implications have not been firmly established. Recently, the concept of a surgical metaverse where VR, AR, and other digital tools intersect online with SM to allow for virtual training and collaboration has gained attention.

3// Would define Multiverse for the non-educated audience and introduce its potential role for this audience.

Reply:

Thank you. We have now included a definition of metaverse. Respectfully, please note that the term multiverse does not appear in the manuscript.

Changes in the text:

In this context and generally, the term "metaverse" refers to a three dimensional, universal and interactive Internet-based space that is made possible by the use of VR headsets.

Reviewer B:

Thank you for submitting this interesting paper on "Dissemination of Laparoscopic and Robotic-Assisted Novel Surgical Technology Through Social Media". This is the subject

of the moment in terms of modernity, clearly related and anticipated by the confinement of COVID-19 pandemic.

When talking about SM, it is also essential to refer to Wikipedia, Second Life, Etc.

Reply:

Thank you. We have included Wikipedia and Second Life as important examples of SM platforms that help disseminate NNT's.

Changes in text:

Other notable SM platforms exist on an interactivity spectrum ranging from less-interactive encyclopedia-style site like Wikipedia to more immersive ones like Second Life where users can create Avatars and interact in a three-dimensional virtual world.

Another important remark is related to the use of SM by doctors: nearly 65% use SM for professional reasons and nearly 90% for personal activities, according to a research conducted in 2014 by SM site QuantiaMD. Certainly, these numbers should be different in 2022, and this research needs to be repeated.

Reply:

Thank you. We have now updated the text with updated details on patterns of SM use among surgeons.

Changes in text:

In a recent update on SM use among surgeons by Zerrweck et al., general and bariatric surgeons were surveyed. (1) In that study, 67.8% considered SM to be extremely useful in medicine whereas 7.8% felt that it may lead to dissemination of misinformation. Moreover, in that study, 43.5% of respondents noted they use SM daily multiple times and Twitter was the most commonly utilized platform.

You did not refer to the role of blogs in SM, which is quite important, as well as the Metaverse role in this interesting subject.

All the big companies (Facebook, Google, Microsoft, Apple, Etc.) are currently deeply involved in the development of Metaverse tools for all reasons, including medical and surgical purposes.

VR is a potent tool for training physicians in accidents and natural events, such as multiple road collisions, tsunamis, earthquakes, Etc. Wearing VR headsets, doctors can "see" the environment and the patients "inside" the area of the traumatic event, and even inside the patients, and learn how to do the best to conduct this situation. The same for bedside procedures and complex operations, mainly in the era of robotic surgery.

In my opinion, Medical Virtual Reality should be a discipline attached to the modern medical course curriculum.

Thank you. We have now discussed blogs as another important example of SM in the surgical space and expanded on the role of AR/VR.

Changes in text:

Blogs are another important form of SM used by surgeons to connect with patients and the public. (2) Akin to personal journals, posts are updated and maintained over time. In fact, several early surgical influencer popular today on popular SM platforms started as bloggers. Medical blogs are unique as they often include the personal perspective and narrative of the author, thereby allowing for an unfiltered and direct link to the reader.

Use of AR and VR has more recently been utilized to aid in operative planning and execution of complex liver surgery as demonstrated in in one study where a mixed reality head up display (Microsoft Hololens) was used to visualize a 3-dimensional (3D) hologram detailing liver anatomy. (3) Other iterations have incorporated robotic surgery and AR by displaying operative video feed on a virtual monitor also with a 3D head-up display to perform transanal total mesorectal excision.(4)

To finish, I would like to congratulate the authors on this fine study, and I am looking forward to hearing from you very soon.

Thank you.

1. Zerrweck C, Arana S, Calleja C, Rodriguez N, Moreno E, Pantoja JP, et al. Social media, advertising, and internet use among general and bariatric surgeons. *Surg Endosc.* 2020;34(4):1634-40.
2. Zhao JY, Romero Arenas MA. The surgical blog: An important supplement to traditional scientific literature. *Am J Surg.* 2019;218(4):792-7.
3. Lang H, Huber T. Virtual and Augmented Reality in Liver Surgery. *Ann Surg.* 2020;271(1):e8.
4. Huber T, Hadzijusufovic E, Hansen C, Paschold M, Lang H, Kneist W. Head-Mounted Mixed-Reality Technology During Robotic-Assisted Transanal Total Mesorectal Excision. *Dis Colon Rectum.* 2019;62(2):258-61.