



Response to “*Primum non nocere*: robots and spinal surgery”

Alexander M. Lieber, Gregory J. Kirchner, Yehuda E. Kerbel, Amrit S. Khalsa

Department of Orthopedic Surgery, Drexel University College of Medicine, Philadelphia, PA, USA

Correspondence to: Amrit S. Khalsa, MD. Department of Orthopedic Surgery, Drexel University College of Medicine, 245 N. 15th Street, MS 420, Philadelphia, PA 19102, USA. Email: akhalsa1@gmail.com.

Provenance: This is an invited article commissioned by the Section Editor Guoxin Fan, MD (Department of Orthopedic Surgery, Shanghai Tenth People's Hospital, Tongji University School of Medicine, Shanghai, China).

Response to: Zygorakis CC, Theodore N. *Primum non nocere*: robots and spinal surgery. *J Spine Surg* 2018;4:810-1.

Submitted Dec 13, 2018. Accepted for publication Dec 14, 2018.

doi: 10.21037/jss.2018.12.12

View this article at: <http://dx.doi.org/10.21037/jss.2018.12.12>

With great interest, we read the response to our article, “Robotic-assisted pedicle screw placement fails to reduce overall postoperative complications in fusion surgery”. We would like to thank the authors for their time and attention to our work. We would also like to thank Dr. Theodore for his innovative contributions to the field of robotic-assisted spinal surgery. It is our opinion that the response underscores the significance of our study while correctly characterizing its limitations.

Indeed, our study was unable to assess long-term complications or functional outcomes. Nevertheless, we were able to provide strong evidence that robotic-assisted pedicle screw placement is non-inferior to the conventional technique regarding short-term complications. This is an important finding considering concern regarding the learning curve associated with adopting new technologies. We agree that our conclusion regarding patient safety is a seminal step for additional research and continued adoption of robotic-assisted spinal surgery.

As the authors stated, one of the ethical tenets of medicine is *Primum non nocere*—first, do no harm. In contemporary times, however, the definition of this principle has grown beyond physical or mental harm to encompass the physician responsibility to practice effective and efficient health care (1). By focusing on the limitations of our measurement of perioperative complications, we believe the authors deemphasized our conclusion that robot assistance is associated with significantly higher hospital charges and longer length of stay compared to

the conventional technique. In particular, we found that use of robotic assistance increased hospital charges by an average of 40 percent. To our knowledge, this is the first quantitative comparison of costs between robotic-assisted and conventional spinal surgery.

We believe that this finding is equally deserving of further investigation as our conclusions regarding patient outcomes. Additional research is needed to weigh the benefit of robotic spine surgery with the added cost. This is especially relevant as the demand for spinal surgery continues to increase and policymakers explore alternative payment models to control health care spending (2). Like our colleagues who have demonstrated increased precision albeit limited clinical benefits and increased costs in robotic-assisted total knee arthroplasty (3), the debate over how to reconcile the growing role of robotics in spinal surgery with growing costs is likely to emerge. Therefore, as we look forward to future investigations in the field of robotic-assisted surgery, we also encourage spine surgeons and researchers to espouse principles of resource stewardship.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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Cite this article as: Lieber AM, Kirchner GJ, Kerbel YE, Khalsa AS. Response to “*Primum non nocere*: robots and spinal surgery”. *J Spine Surg* 2019;5(1):178-179. doi: 10.21037/jss.2018.12.12