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CADTH RAPID RESPONSE REPORT: REFERENCE LIST

Optical Topographical Imaging System: Clinical Effectiveness, Cost-Effectiveness, and Safety

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Research Questions

1. What is the clinical effectiveness of optical topographical imaging surgical systems?
2. What is the cost-effectiveness of optical topographical imaging surgical systems?
3. What is the clinical evidence regarding the safety optical topographical surgical systems?

Key Findings

No relevant literature was identified regarding the use, effectiveness, or safety of optical topographical imaging surgical systems for spinal and neurosurgery.

Methods

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No methodological filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2014 and January 24, 2019. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Patients undergoing neurosurgery and/or in combination with ENT surgery (e.g. cranial neurosurgery, posterior spinal procedure)
Intervention	Optical topographical imaging (OTI) or machine vision image guided surgery (MvIGS) (e.g. manufacturer 7D surgical systems)
Comparators	Q1-2: O-arm (intraoperative CT acquisition)/Stealth Station (computer software system); ArcadisC (3D fluoroscopy acquisition) /Stryker Spine Map (computer software system); No comparator Any other types of surgical systems Q3: No comparator
Outcomes	Q1: Clinical effectiveness (revision rate for screw placement) Q2: Cost-effectiveness (e.g. QALYs) Q3: Safety
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, and economic evaluations.

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and economic evaluations.

No relevant health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, or economic evaluations were identified regarding the use of optical topographical imaging systems for neurosurgery and spinal surgery.

References of potential interest are provided in the appendix.

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

No literature identified.

Economic Evaluations

No literature identified.

Appendix — Further Information

Randomized Controlled Trials – Ongoing Trials Not Yet Completed

1. Guha D, Jakubovic R, Gupta S. Intraoperative error propagation in 3-dimensional spinal navigation from nonsegmental registration: a prospective cadaveric and clinical study. *Global Spine J*. 2018 Oct.
   https://journals.sagepub.com/doi/full/10.1177/2192568218804556 Accessed 2019 Jan 30.

2. Sunnybrook Health Sciences Centre. NCT03391089: Non-contact intraoperative optical imaging during spinal procedures. *ClinicalTrials.gov*. Bethesda (MD): U.S. National Library of Medicine; 2018: https://clinicaltrials.gov/ct2/show/NCT03391089 . Accessed 2019 Jan 30

Non-Randomized Studies - Optical Topographical Imaging Not Specified

3. Chang CM, Jaw FS, Lo WC, Fang KM, Cheng PW. Three-dimensional analysis of the accuracy of optic and electromagnetic navigation systems using surface registration in live endoscopic sinus surgery. *Rhinology*. 2016 Mar;54(1):88-94.
   PubMed: PM26747431

Review Articles

4. Guha D, Yang VXD. Perspective review on applications of optics in spinal surgery. *J Biomed Opt*. 2018 Jun;23(6):1-8.
   PubMed: PM29893070

5. Harmsen S, Teraphongphom N, Tweedle MF, Basilion JP, Rosenthal EL. Optical surgical navigation for precision in tumor resections. *Mol Imaging Biol*. 2017 06;19(3):357-362.
   PubMed: PM28271367

6. Overley SC, Cho SK, Mehta AI, Arnold PM. Navigation and robotics in spinal surgery: where are we now? *Neurosurg*. 2017 Feb;80(S3):S86-S99..
   https://academic.oup.com/neurosurgery/article/80/3S/S86/3044990 Accessed 2019 Jan 30.

Mixed Intervention

7. Jakubovic R, Ramjist J, Gupta S, et al. High-frequency micro-ultrasound imaging and optical topographic imaging for spinal surgery: initial experiences. *Ultrasound Med Biol*. 2018 Nov;44(11):2379-2387.
   PubMed: PM30006213

Additional References - Non-Patient Related Health Outcomes

8. Jakubovic R, Guha D, Gupta S, et al. High speed, high density intraoperative 3D optical topographical imaging with efficient registration to MRI and CT for craniospinal surgical navigation. *Sci Rep*. 2018 Oct 5;8(1):14894.
   PubMed: PM30291261

9. Mahboob SO, Eljamel M. Intraoperative image-guided surgery in neuro-oncology with specific focus on high-grade gliomas. *Fut Oncol*. 2017 Nov;13(26):2349-2361. PubMed: PM29121778

10. ReMAP Network. O7 optically guided laser ablation with integrated surgical navigation system. 2015; https://remapnetwork.org/project-themes/opticsphotonics/o7-optically-guided-laser-ablation-with-integrated-surgical-navigation-system-2/ Accessed 2019 Jan 30.