Canadian Agency for Drugs and Technologies in Health

RAPID RESPONSE REPORT: REFERENCE LIST

TITLE: **SYMBIS for Neurosurgery and Spine Application: Clinical and Cost-Effectiveness**

DATE: 04 December 2014

RESEARCH QUESTIONS

1. What is the evidence for the clinical effectiveness of SYMBIS for spine application?
2. What is the evidence for the cost-effectiveness of SYMBIS for spine application?
3. What is the evidence for the clinical effectiveness of SYMBIS for neurosurgery?
4. What is the evidence for the cost-effectiveness of SYMBIS for neurosurgery?

KEY FINDINGS

One non-randomized study regarding the clinical effectiveness of SYMBIS for neurosurgery was identified.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2014, Issue 12), 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 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, 2009 and December 1 2014. 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	Q1,2: Adult patients requiring surgery for spine disease (e.g., degenerative disc diseases, spinal infections, spinal tumours, spinal trauma) that involves pedicle screw placement Q3,4: Adult patients with brain tumours, radiation necrosis, intractable epilepsy, brain vascular malformations, or spinal cord tumours
Intervention	Q1,2: Pedicle screw placement using SYMBIS (previously NeuroArm) (IMRIS Inc.) for spine application Q3,4: SYMBIS (IMRIS Inc.) for neurosurgery
Comparator	Q1,2: Freehand screw placement, minimally invasive surgery with percutaneous screw placement, fluoroscopy guided screw placement, or no comparator Q3,4: Microsurgery often with intra-operative MR imaging; or no comparator
Outcomes	Q1: Benefits (e.g. shorter operating times when coupled to other technologies such as laser ablation, decrease in revision surgery rates, decreased complications); Harms Q3: Benefits (e.g., improved safety due to precision and accuracy of the device, shorter operating times; Harms Q2,4: Cost effectiveness
Study Designs	Health technology assessment reports, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, 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.

One non-randomized study regarding the clinical effectiveness of SYMBIS for neurosurgery was identified. No relevant health technology assessment reports, systematic reviews, meta-analyses, randomized controlled trials or economic evaluations, and no evidence regarding the clinical effectiveness of SYMBIS for spine application or cost-effectiveness was identified.

Additional 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

1. Sutherland GR, Lama S, Gan LS, Wolfsberger S, Zareinia K. Merging machines with microsurgery: clinical experience with neuroarm. J Neurosurg. 2013 Mar;118(3):521-9. PubMed: PM23240694

Economic Evaluations
No literature identified.

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APPENDIX – FURTHER INFORMATION:

Systematic Reviews and Meta-analyses – Robotic Technology Unspecified

2. Marcus HJ, Cundy TP, Nandi D, Yang GZ, Darzi A. Robot-assisted and fluoroscopy-guided pedicle screw placement: a systematic review. Eur Spine J [Internet]. 2014 Feb [cited 2014 Dec 4];23(2):291-7. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3906467
PubMed: PM23801017

Non-Randomized Studies

Alternate Procedures

3. Motkoski JW, Yang FW, Lwu SH, Sutherland GR. Toward robot-assisted neurosurgical lasers. IEEE Trans Biomed Eng. 2013 Apr;60(4):892-8.
PubMed: PM23047855

Unclear Clinical Outcomes

4. Lang MJ, Greer AD, Sutherland GR. Intra-operative robotics: Neuroarm. Acta Neurochir Suppl. 2011;109:231-6.
PubMed: PM20960348

Case Studies

5. Pandya S, Motkoski JW, Serrano-Almeida C, Greer AD, Latour I, Sutherland GR. Advancing neurosurgery with image-guided robotics. J Neurosurg. 2009 Dec;111(6):1141-9.
PubMed: PM19374495

Review Articles

6. Sutherland GR, Wolfsberger S, Lama S, Zarei-nia K. The evolution of neuroarm. Neurosurgery. 2013 Jan;72 Suppl 1:27-32.
PubMed: PM23254809

7. Mattei TA, Rodriguez AH, Sambhara D, Mendel E. Current state-of-the-art and future perspectives of robotic technology in neurosurgery. Neurosurg Rev. 2014 Jul;37(3):357-66.
PubMed: PM24729137