



## Topic Exploration Report

Topic explorations are designed to provide a high-level briefing on new topics submitted for consideration by Health Technology Wales. The main objectives of this report are to:

1. Inform discussions on new topics received by HTW.
2. Determine the quantity and type of evidence available on a topic.
3. Assess the topic against HTW selection criteria.

Topic:	Robot-assisted thoracic surgery
Topic exploration report number:	TER042
Referrer:	Tom Combella and Malgorzata Kornaszewska, Cardiothoracic Surgery, Cardiff and Vale UHB
Topic exploration undertaken by:	Health Technology Wales

### Aim of Search

Health Technology Wales researchers searched for evidence on the clinical and cost effectiveness of robotic surgery for lobectomy or anterior mediastinal mass excision.

### Summary of Findings

#### *Technology assessments*

Searches did not identify any existing or ongoing technology assessments of robot-assisted thoracic surgery.

#### *Systematic reviews*

Several systematic reviews were identified studying robot-assisted thoracic surgery; three of which were published in the last two years and include quantitative pooled analysis comparing thoracic surgery to other surgical techniques. The existing reviews based their conclusions on evidence from cohort/observational studies and did not identify any evidence from randomised trials.

Although further investigation of their exact scope is needed, these reviews appear relevant to a potential appraisal of robot-assisted thoracic surgery, and suggest that robotic surgery may be more beneficial than alternative types of surgery for some outcomes. A further two ongoing systematic reviews were also identified.

#### *Economic evaluations*

We did not identify any relevant economic evaluations of robot-assisted thoracic surgery.

### *Guidelines/policies*

NHS England published a Clinical Commissioning Policy on robotic assisted lung resection in July 2016. This states that robotic assisted lung resection for primary lung cancer should not be routinely commissioned. Conclusions of the policy are based on two meta-analyses conducted in 2015, on the basis of which it was concluded that there was insufficient evidence to recommend robot-assisted surgery over the alternatives.

### *Ongoing trials*

Four ongoing randomised trials comparing robotic thoracic surgery to standard surgical techniques were identified. Two of these trials have passed their reported primary completion date; HTW contacted the study investigators to enquire about availability of results. We have received some preliminary data for one of the trials; no response was received from the authors of the second trial. The timescale for availability of full results from these trials is therefore not known.

## Conclusions

Several systematic reviews are available that summarise the clinical effectiveness of robot-assisted thoracic surgery. These only include evidence from non-randomised trials, but randomised trials comparing robotic thoracic surgery to standard surgical techniques are underway. It is unclear at this stage whether any relevant evidence is available with which to assess the cost effectiveness of robot-assisted thoracic surgery.

## Areas of Uncertainty

The majority of the evidence found uses the Da Vinci robotic surgery system (Intuitive Surgical). Other robotic systems are available or in development. Further appraisal would involve establishing what other robotic surgery systems could be available in NHS Wales, and what evidence exists to support their use.

Current standard of care for people having lobectomy or mediastinal mass excision is either open surgery or video-assisted thoracic surgery. The proportion of people who have each type of surgery, and how this varies according to indication, disease stage, and other factors, requires further research.

## Feasibility of Technology Assessment

Sufficient evidence exists on robot-assisted thoracic surgery to inform a technology assessment by HTW. The clinical effectiveness of this intervention is unclear and clear guidance on this would help to inform NHS Wales. Several studies were identified that measured costs of the procedure but we did not identify any existing economic evaluations.

HTW's Assessment Group concluded to progress this topic to Evidence Appraisal. This will be published as EAR011.

## Brief literature search results

Resource	Results
HTA organisations	
<a href="#">Healthcare Improvement Scotland:</a>	No results relevant to thoracic surgery.  Advice is available on the use of DaVinci robot surgical devices in some other types of surgery/sites of surgery (Rectal cancer, <a href="#">Advice Statement 013-18</a> ; laparoscopic partial nephrectomy, <a href="#">Advice Statement 003/18</a> ; oropharyngeal and supraglottic laryngeal cancer, <a href="#">Advice Statement 002/18</a> ; head and neck cancer of unknown primary, <a href="#">Advice Statement 001/18</a> )
<a href="#">Health Technology Assessment Group</a>	No results.
<a href="#">Health Information and Quality Authority</a>	In 2011, HIQA published a health technology assessment of robot-assisted surgery in selected surgical procedures, but this did not include thoracic surgery.
UK guidelines and guidance	
<a href="#">SIGN</a>	No results relevant to thoracic surgery.
<a href="#">NICE</a>	No results relevant to thoracic surgery.  NICE guideline CG121 (Lung Cancer: diagnosis and management) does not make any recommendations about different types of surgery (i.e. robotic surgery compared to other options).
Secondary literature and economic evaluations	
<a href="#">EUnetHTA</a>	OTCA14 “Robotic surgery in thoracic and visceral indications”. Rapid evidence assessment. Published May 2019. <a href="https://www.eunetha.eu/otca14-robot-assisted-surgery-for-thoracic-and-visceral-surgery-final-assessment-now-available/">https://www.eunetha.eu/otca14-robot-assisted-surgery-for-thoracic-and-visceral-surgery-final-assessment-now-available/</a>
<a href="#">ECRI</a>	No results relevant to thoracic surgery.
<a href="#">Cochrane library</a>	No results relevant to thoracic surgery.
Medline	<ul style="list-style-type: none"> <li>• Emmert, A., Straube, C., Buentzel, J., &amp; Roever, C. (2017). Robotic versus thoracoscopic lung resection: A systematic review and meta-analysis. <i>Medicine (Baltimore)</i>, 96(35), e7633. doi:10.1097/md.0000000000007633</li> <li>• Nakamura, H. (2014). Systematic review of published studies on safety and efficacy of thoracoscopic and robot-assisted lobectomy for lung cancer. <i>Ann Thorac Cardiovasc Surg</i>, 20(2), 93-98.</li> <li>• Nasir, B. S., Bryant, A. S., Minnich, D. J., Wei, B., &amp; Cerfolio, R. J. (2014). Performing robotic lobectomy and segmentectomy: cost, profitability, and outcomes. <i>Ann Thorac Surg</i>, 98(1), 203-208; discussion 208-209. doi:10.1016/j.athoracsur.2014.02.051</li> <li>• Wei, S., Chen, M., Chen, N., &amp; Liu, L. (2017). Feasibility and safety of robot-assisted thoracic surgery for lung lobectomy in patients with non-small cell lung cancer: a systematic review and meta-analysis. <i>World J Surg Oncol</i>, 15(1), 98. doi:10.1186/s12957-017-1168-6</li> <li>• Yamashita, S., Yoshida, Y., &amp; Iwasaki, A. (2016). Robotic Surgery for Thoracic Disease. <i>Ann Thorac Cardiovasc Surg</i>, 22(1), 1-5. doi:10.5761/atcs.ra.15-00344</li> <li>• Ye, X., Xie, L., Chen, G., Tang, J. M., &amp; Ben, X. S. (2015). Robotic thoracic surgery versus video-assisted thoracic surgery for lung cancer: a meta-analysis. <i>Interact Cardiovasc Thorac Surg</i>, 21(4), 409-414. doi:10.1093/icvts/ivv155</li> </ul>

Ongoing secondary research	
<a href="#">PROSPERO database</a>	<p>We identified protocols for two ongoing systematic reviews:</p> <ul style="list-style-type: none"> <li>• Kai Qian, Bo Deng, Qun-You Tan, Qi-Di Sun. Perioperative outcomes of robotic video-assisted thoracoscopic surgery (R-VATS) for thymectomy compared to the video-assisted thoracoscopic surgery (VATS) technique. PROSPERO 2018 CRD42018098836 Available from: <a href="http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42018098836">http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42018098836</a></li> <li>• Tianci Chai, Jiangbo Lin, Yuhan Lin, Zhenyang Zhang, Wenwei Lin, Junjie Hong, Yunyang Zhuang, Chuangcai Yang, Shuai Peng, Linwei Zhuang, Zhangwei Tong, Sui Chen, Zhimin Shen, Mingqiang Kang. Comparison between video-assisted thoracoscopic lung cancer resection and robot-assisted lung cancer resection. PROSPERO 2018 CRD42018111864 Available from: <a href="http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42018111864">http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42018111864</a></li> </ul>
Ongoing trials	
<a href="#">Clinicaltrials.gov</a>	<ul style="list-style-type: none"> <li>• Videothoracoscopic (VATS) vs. Robotic Approach for Lobectomy or Anatomical Segmentectomy (ROMAN). Prospective, randomised, multicentre study. Recruitment Status : Recruiting. Estimated Primary Completion Date :March 2022. ClinicalTrials.gov Identifier: NCT02804893</li> <li>• Robotic Lobectomy vs. Thoracoscopic Lobectomy for Early Stage Lung Cancer. Prospective randomized study. Recruitment Status : Recruiting. Estimated Study Completion Date : March 2018. ClinicalTrials.gov Identifier: NCT02617186. The trial description states that a prospective cost utility analysis will also be undertaken. HTW have contacted the study authors to enquire about the availability of study results but as of January 2018 we have received no response.</li> <li>• Comparison of Robot Assisted Thoracic Surgery With Video Assisted Thoracic Surgery in Case of Lung Cancer. Randomised trial. Recruitment Status: Recruiting. Estimated Study Completion Date : July 2018. ClinicalTrials.gov Identifier: NCT03152071. HTW have contacted the study authors and obtained some preliminary results from this study.</li> <li>• The Study of Robot-assisted Thoracoscopic Surgery Versus Video-assisted Thoracoscopic Surgery Lobectomy for Non-small Cell Lung Cancer on Short-term and Long-term Outcomes. Randomised controlled trial. Recruitment Status : Recruiting. Estimated Study Completion Date : January 2020. ClinicalTrials.gov Identifier: NCT03134534</li> </ul>
Other	
Evidence provided by the topic proposer	<ul style="list-style-type: none"> <li>• A systematic review and meta-analysis of robotic versus open and video-assisted thoracoscopic surgery approaches for lobectomy. O'Sullivan KE, Kreaden US, Hebert AE, Eaton D, Redmond KC. Interact Cardiovasc Thorac Surg. 2018 Nov 27. doi: 10.1093/icvts/ivy315. [Epub ahead of print] PMID: 30496420</li> <li>• Video-Assisted Thoracoscopic Versus Robotic-Assisted Thoracoscopic Thymectomy: Systematic Review and Meta-analysis. Fok M, Bashir M, Harky A, Sladden D, DiMartino M, Elsyed H, Howard C, Knipe M, Shackcloth MJ. Innovations (Phila). 2017 Jul/Aug;12(4):259-264. doi:10.1097/IMI.0000000000000382. PMID: 28759542</li> </ul>

Evidence provided by other stakeholders	NHS England. Clinical commissioning policy: robotic assisted lung resection for primary lung cancer. July 2016. <a href="https://www.england.nhs.uk/wp-content/uploads/2018/07/Robotic-assisted-lung-resection-for-primary-lung-cancer.pdf">https://www.england.nhs.uk/wp-content/uploads/2018/07/Robotic-assisted-lung-resection-for-primary-lung-cancer.pdf</a>
Date of search:	December 2019, updated May 2019
Concepts used:	robotic surgery; da Vinci; lung diseases; thoracic surgery