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CADTH RAPID RESPONSE REPORT: REFERENCE LIST

# Portable Stroke Diagnosis Devices for Adults with Stroke Symptoms: Diagnostic Accuracy and Cost-Effectiveness


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## Research Questions

1. What is the diagnostic accuracy of portable stroke diagnostic devices for adults with stroke symptoms?
2. What is the cost-effectiveness of portable stroke diagnostic devices for adults with stroke symptoms?

## Key Findings

One non-randomized study was identified regarding the diagnostic accuracy of portable stroke diagnostic devices for adults with stroke symptoms. No relevant economic evaluations were identified.

## Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE All (1946– ) via Ovid, Embase (1974– ) via Ovid, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were Cerebrotech, Lucid, Strokefinder, transcranial doppler ultrasonography, electric impedance, microwave tomography, portable devices, portable diagnosis, and stroke. 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 01, 2014 and June 12, 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

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|---|---|
| **Population** | Adults with stroke symptoms |
| **Intervention** | Portable diagnostic devices, i.e.:<br>1. Combination of transcranial Doppler ultrasound, robotic headset blood flow monitor, and machine learning<br>2. Bioimpedence spectroscopy visor; uses volumetric impedance phase-shift spectroscopy (VIPS)<br>3. Microwave tomography system |
| **Comparator** | Any comparator (e.g., Computed Tomography Angiography [CTA]; Las Angeles Motor Scale [LAMS]) |
| **Outcomes** | Q1: Diagnostic accuracy (e.g., specificity, sensitivity, area under the curve, positive or negative predictive values, accurate triage decision)<br>Q2: Cost-effectiveness |
| **Study Designs** | Health technology assessments, 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 was identified regarding the diagnostic accuracy of portable stroke diagnostic devices for adults with stroke symptoms. No relevant health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, or economic evaluations were 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. Kellner CP, Sauvageau E, Snyder KV, et al. The VITAL study and overall pooled analysis with the VIPS non-invasive stroke detection device. *J Neurointerv Surg*. 2018 Nov;10(11):1079-1084.
PubMed: PM29511114

### Economic Evaluations

No literature identified.

# Appendix — Further Information

## Previous CADTH Reports

2. Mobile stroke units for prehospital care of ischemic stroke. *(CADTH issues in emerging health technologies no. 154)*. Ottawa (ON): CADTH; 2017: https://www.cadth.ca/sites/default/files/pdf/eh0047_mobile_stroke_units_for_prehospital_care_of_ischemic_stroke.pdf. Accessed 2019 Jun 14.

3. Computed tomography angiography for diagnosis of stroke or transient ischemic attack: clinical effectiveness. *(CADTH rapid response report: summary with critical appraisal*. Ottawa (ON): CADTH; 2016: https://www.cadth.ca/computed-tomography-angiography-diagnosis-stroke-or-transient-ischemic-attack-clinical-1. Accessed 2019 Jun 14.

## Non-Randomized Studies

*Alternative Population – Patients with Traumatic Intracranial Hemorrhage*

4. Ljungqvist J, Candefjord S, Persson M, et al. Clinical evaluation of a microwave-based device for detection of traumatic intracranial hemorrhage. *J Neurotrauma*. 2017 Jul;34(13).

*Trial Protocols*

5. Kellner C, Sauvageau E, Snyder K, et al. Vital phase II: Volumetric impedance phase-shift spectroscopy for the noninvasive detection of hemispheric bioimpedance asymmetry in a cohort of patients presenting with acute ischemic stroke. *Eur Stroke J*. 2018 May;3(1 Suppl 1):250.

6. Granhed H. NCT02728908: Detecting traumatic intracranial hemorrhage with microwave technology. *ClinicalTrials.gov*. Bethesda (MD): U.S. National Library of Medicine; 2016: https://clinicaltrials.gov/ct2/show/NCT02728908. Accessed 2019 Jun 14.

## Review Articles

7. Montrief T, Alerhand S, Jewell C, Scott J. Incorporation of transcranial doppler into the ED for the neurocritical care patient. *Am J Emerg Med*. 2019 Jun;37(6):1144-1152. PubMed: PM30894296

8. Calderon VJ, Kasturiarachi BM, Lin E, Bansal V, Zaidat OO. Review of the mobile stroke unit experience worldwide. *Interv*. 2018 Oct;7(6):347-358. PubMed: PM30410512

9. Robba C, Cardim D, Sekhon M, Budohoski K, Czosnyka M. Transcranial doppler: a stethoscope for the brain-neurocritical care use. *J Neurosci Res*. 2018 April;96(4):720-730.

10. Blanco P, Blaivas M. Applications of transcranial color-coded sonography in the emergency department. *J Ultrasound Med*. 2017 Jun;36(6):1251-1266. PubMed: PM28240783

11. Liu Y, Hua Y, Feng W, Ovbiagele B. Multimodality ultrasound imaging in stroke: current concepts and future focus. *Expert Rev Cardiovasc Ther*. 2016 Dec;14(12):1325-1333. PubMed: PM27785921