Transthoracic Echocardiography in Adult Patients With Ischemic Stroke: A Review

Context
Ischemic stroke, an interruption of blood flow to the brain, is responsible for significant mortality and disability, particularly among older adults. Of the 40,000 to 50,000 strokes that occur in Canada each year, about 80% are ischemic. An investigation into the possible cause of the blockage, or embolus, is commonly undertaken to look for factors that can be modified to reduce the risk of subsequent stroke.

Technology
Echocardiography is used to determine if a stroke was caused by a heart abnormality, such as a thrombus in the heart itself or an abnormal right-to-left shunt within the heart allowing an embolus from elsewhere in the body to be passed through the heart to the brain. There are two main types of echocardiography. Transthoracic echocardiography (TTE) involves ultrasound visualization of the heart through the chest wall and is available in two modes — the older fundamental harmonic TTE and the more recently developed second harmonic TTE. Transesophageal echocardiography (TOE) involves inserting a probe into the esophagus, which provides better images of the heart than TTE but is more invasive, less well-tolerated, more time-consuming, costly, and potentially less readily available.

Issue
A review of the clinical and cost-effectiveness of using TTE to identify cardiac sources of emboli in adult patients with ischemic stroke, alone and compared with TOE, will help inform decisions regarding which diagnostic technology to use in these patients.

Methods
A limited literature search was conducted of key resources, and titles and abstracts of the retrieved publications were reviewed. Full-text publications were evaluated for final article selection according to predetermined selection criteria (population, intervention, comparator, outcomes, and study designs).

Key Messages
- TTE can be useful for identifying cardiac sources of emboli, particularly blood clots in the left atrium or left ventricle, and some right-to-left shunts.
- TTE is less invasive, quicker to perform, and requires fewer staff than TOE.
- TTE is generally less sensitive and somewhat less specific than TOE for identifying cardiac sources of emboli.
- Second harmonic TTE may be more accurate than fundamental harmonic TTE (based on limited evidence).
- TTE results will change the stroke management plan of only a small proportion of patients.
- No information was found on the effect of TTE on long-term outcomes of TTE in patients with ischemic stroke.
- A UK health technology assessment found second harmonic TTE cost-effective in detecting a single abnormality, left atrial thrombus.

Results
The literature search identified 357 citations, with 6 additional articles identified from other sources. After screening the abstracts, 48 were deemed potentially relevant, and 12 met the criteria for inclusion in this review.