Transcranial Magnetic Stimulation for Neuropsychiatric Disorders: Clinical Effectiveness and Guidelines

Context
Post-traumatic stress disorder (PTSD) affects 12% of Canadians, generalized anxiety disorder (GAD) affects 2.6%, and depression affects 8%. These conditions can be treated with medications or counselling, but patients may still experience symptoms that interfere with daily life; up to two-thirds of patients with depression do not respond to conventional treatment. Brain stimulation techniques are one potential alternative.

Technology
Transcranial magnetic stimulation (TMS) is a non-invasive procedure that uses a magnetic field to stimulate nerve cells in the brain. To create the magnetic field, a large electromagnetic coil is placed on the scalp and a strong electric current is passed through it. The magnetic field passes through the scalp and bone, electrically stimulating the cortex. In repetitive TMS (rTMS), the treatment is repeated over a number of days, weeks, or months.

Issue
How TMS might work to treat PTSD, GAD, or depression isn’t fully understood. Some studies have shown that TMS can improve the symptoms of depression, but evidence continues to emerge, and the overall benefits remain unclear. A review of the clinical effectiveness and current guidelines will help to inform clinical decisions on the use of TMS in patients with PTSD, GAD, or depression.

Methods
A limited literature search of key resources was conducted, 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
- For PTSD, there is early evidence that TMS may improve clinical outcomes.
- For GAD, no evidence was found.
- For depression, some studies may show a benefit, but four health technology assessments have been unable to make conclusions. Evidence is generally inconsistent and of low quality.
- Evidence-based guidelines for PTSD and depression are mixed, with some listing TMS as a potential first-line option, some giving criteria for second-line use, and some stating TMS should be used for research purposes only. No evidence-based guidelines were found for the use of TMS in GAD.

Results
The literature search produced 465 citations of which 116 were deemed potentially relevant. Five additional articles were identified from the grey literature. Of these 121 reports, 29 met the criteria for inclusion in this review — 4 health technology assessments, 14 systematic reviews, 6 randomized controlled trials, and 5 evidence-based guidelines.

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