GP fact sheet

Transcranial magnetic stimulation (TMS) and robotic TMS in treatment-resistant depression (TRD)

Aim

To equip general practitioners (GPs) with the knowledge to understand TMS and robotic TMS, their role in managing treatment-resistant depression (TRD), and how to guide patients toward appropriate referral pathways.

Learning objectives

1. Understand the mechanism and benefits of TMS and robotic TMS
2. Recognise the differences between traditional and robotic TMS delivery
3. Identify when patients with TRD may benefit from referral for TMS

Introduction

TMS is a non-invasive, evidence-based neuromodulation therapy for a treatment-resistant major depressive episode. A treatment resistant major depressive episode is defined as having not responded to at least two adequate trials of antidepressant medication (i.e., adequate dose and duration), ideally from different classes of antidepressant (e.g., SSRI vs SNRI). TMS uses magnetic pulses to stimulate the dorsolateral prefrontal cortex (DLPFC), a region involved in mood regulation.

Robotic TMS advances this treatment by incorporating robotic guidance and neuronavigation. This increases accuracy, precision and consistency of coil placement.

For patients with TRD, often presenting after years of unsuccessful treatments, TMS offers a safe, well-tolerated, and non-systemic alternative.

How does TMS work?

- TMS delivers short bursts of magnetic pulses through a coil placed on the scalp
- These pulses induce small electrical currents in specific brain regions (most commonly the left dorsolateral prefrontal cortex), which are underactive in depression
- Repeated stimulation over multiple sessions helps normalise brain activity in mood-regulating networks
- Patients are awake and seated; no anesthetic is required
- Sessions last 20–40 minutes, typically 5 days per week for 4–6 weeks

How TMS can benefit a patient

Benefit	Description	Key statistics
Effective for TRD	Provides an option when multiple antidepressants have failed	Response rates: 30-50%
Non-drug treatment	Avoids systemic side effects of medications	Side effects are mild and transient
Lifestyle	Patients can drive, and attend work or university during treatment	TMS is safe and does not interfere with daily functioning
Durability	Benefits last months; maintenance available	~60% maintain response at 12 months
Well tolerated	Awake, no anaesthetic required	Dropout rates <5%
Alternative to ECT	Neuromodulation without memory/cognitive side effects	Often chosen over ECT for safety and tolerability

Traditional vs robotic TMS

Feature	Traditional TMS	Robotic TMS
Coil placement	Manual placement by clinician, or use of a fixed-arm	Robotic arm with neuronavigation
Target accuracy and precision	Dependent on operator skill and is variable between sessions.	Sub-millimetre accuracy; consistent and repeatable targeting between sessions.

Assessment and diagnosis

Red flags for TRD in GP consultation

- Failed at least two antidepressants at adequate dose/duration
- Persistent moderate–severe depression despite adjunctive therapies, including psychological intervention
- Ongoing functional impairment

Screening tools

- PHQ-9 for depression severity
- GAD-7 for anxiety comorbidity
- Review of medication history and tolerability

Management strategies

TMS

- Outpatient treatment, no anaesthetic
- 20–30 sessions over 4–6 weeks
- Minimal side effects (scalp discomfort, mild headache)
- Can be combined with medication and psychotherapy

When to refer
Outpatient or inpatient admission

Referral pathway	Appropriate when
Outpatient TMS	Patient can be treated in community safely and prefers minimal interruption to lifestyle
Inpatient TMS	Patient has more complex treatment needs (e.g., medication review) and risks (e.g., suicidality)

How Avive's programs help

Avive Health provides access to both traditional and robotic TMS within a comprehensive TRD pathway:

- Rapid access to psychiatrists for TRD assessment
- Evidence-based TMS and robotic TMS delivered in safe outpatient settings
- Integration with psychological therapies and relapse prevention
- Flexible scheduling to support work and family commitments
- Ongoing monitoring to track PHQ-9 scores and functional recovery

Content created by consultant psychiatrist Dr Bjorn Burgher. v1.0 – Updated September 2025.