Press release: *Neuroscience Applied*

Major Review Finds 34% Reduction in Suicide Risk Following Electroconvulsive Therapy in Patients with Severe Depression

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A newly published analysis reveals that individuals with severe depression who received electroconvulsive therapy (ECT) were 34% less likely to die by suicide compared to those treated with standard alternatives such as anti-depressant medication. This comprehensive meta-analysis (an analysis pooling and synthesizing previous studies), building on prior research and incorporating the most up-to-date evidence — is the first of its kind to demonstrate such a significant reduction in suicide risk linked to ECT. The findings also show that patients receiving ECT had 30% fewer deaths from any cause, suggesting broader health benefits beyond mental health.

Researchers from the University Psychiatric Clinics Basel in Switzerland reviewed high-quality studies on how various brain stimulation treatments affect suicidal thoughts and behaviours in people with depression. This meta-analysis is published in the peer-reviewed journal *Neuroscience Applied*.

Lead researcher Dr. Timur Liwinski explains:

“To our knowledge, this is the first meta-analysis to demonstrate a survival benefit of ECT for individuals with depression. Recent studies confirm that ECT remains the most effective treatment available for severe depression. Our work shows that suicide and all-cause mortality are also reduced.”

Depression and Suicide: A Global Health Crisis

Major Depressive Disorder (MDD) affects an estimated 300 million people worldwide, and the number continues to rise — increasing by approximately 20% between 2005 and 2015. The full impact of the COVID-19 pandemic on global mental health is still being assessed. Each year, nearly 700,000 people die by suicide, making it the fourth leading cause of death among 15- to 29-year-olds. Around half of all suicides are linked to depression or related mood disorders. Individuals with these conditions face a 20-fold higher risk of suicide compared to those without.

The Study

This new study brings together high-quality data from previous research on neurostimulation therapies for people with depression who do not respond to conventional treatments — such as selective serotonin reuptake inhibitors (SSRIs). Around one in three patients with major depression falls into this treatment-resistant category.
The research team examined how three neurostimulation techniques—Electroconvulsive

Therapy (ECT), repetitive Transcranial Magnetic Stimulation (rTMS), and Vagus Nerve Stimulation (VNS)—affect suicidal behaviour in individuals with depression. From an initial pool of 1,352 scientific studies, the team selected 26 studies that met strict quality and inclusion criteria. These studies all reported on treatment methods, suicide rates, suicidal thoughts, and overall mortality.

Results

Eleven of the studies focused specifically on ECT. A total of 17,890 individuals treated with ECT were compared to 25,367 individuals receiving standard care. There were 208 suicide deaths in the ECT group and 988 in the control group. Moreover, there were 511 deaths from all causes in the ECT group, compared to 1,325 in the control group. The study thus found that patients treated with ECT were 34% less likely to die by suicide and had a 30% lower risk of death from any cause compared to those receiving standard treatments. Additionally, individuals who received ECT showed a moderate reduction in suicidal thoughts.

For rTMS, the available data were too limited to draw firm conclusions. Small-scale studies did not show a significant effect on suicidal thoughts or suicide rates.

Patients treated with VNS appeared to experience a 60% reduction in all-cause mortality, but the small sample sizes limit the reliability of these findings. In contrast to ECT — which has been in clinical use since the 1930s — rTMS and VNS are relatively new treatments, and the evidence base is still developing. The researchers caution against overgeneralising from the current data.

Lead researcher Dr Timur Liwinski added:

“We observed that newer studies tended to report greater benefits from ECT than older ones. These more recent studies are often larger and methodologically stronger, reflecting how ECT treatment has evolved over time. In other words, modern ECT appears to be more effective than it was in the past. Since our analysis spans many decades, it’s likely that today's ECT offers even stronger protection against suicide than the 34% reduction we identified overall.”
He continued “Most of the studies included were observational, not experimental, which means the certainty of the evidence is limited. However, because people with severe depression and suicidal thoughts are such a vulnerable group, it is unlikely that long-term, high-quality experimental studies will be possible in the future”.

Commenting, Professor Martin Balslev Jørgensen (Professor of Psychiatry, Psychiatric Center Copenhagen and Institute of Clinical Medicine, University of Copenhagen), said:

“This valuable study is important because, although the effect of ECT on suicidality is well known among clinicians, it is helpful to have it so clearly documented. The observed effect on all-cause mortality, which is repeatedly found in studies, may lead to speculation about an unknown life-extending mechanism, but it is more likely due to patient selection”.

This is an independent comment, Professor Jørgensen was not involved in this work.

The authors note that there are limitations to this work as discussed in the published paper.

Published paper details: Electroconvulsive Therapy Reduces Suicidality and All-Cause Mortality in Refractory Depression: A Systematic Review and Meta-Analysis of Neurostimulation Studies

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More on the techniques

Electroconvulsive Therapy (ECT):
ECT is a well-established treatment for patients with depression who have not responded to other therapies. During the procedure, a small electrical current is applied to the brain, inducing controlled seizures. This process helps regulate the levels of neurotransmitters such as GABA, norepinephrine, serotonin, and dopamine. To ensure patient safety, ECT is administered under brief general anaesthesia, with a muscle relaxant used to prevent involuntary movements and injuries during the treatment.

Repetitive Transcranial Magnetic Stimulation (rTMS):
rTMS is a non-invasive procedure that uses magnetic pulses to stimulate the brain. These pulses induce electrical currents in the targeted areas of the brain, which in turn activates neurons and neuronal networks. This technique is aimed at improving brain function and is typically used when other treatments have not been effective.

Vagus Nerve Stimulation (VNS):
VNS involves implanting a small pulse generator under the patient's chest skin. Electrodes are then wrapped around the left vagus nerve in the neck, where they deliver electrical impulses to help regulate brain activity. This procedure is used primarily for patients who have not responded to traditional treatments.

ENDS

Notes for Editors

Advance embargoed copies of the paper are available from the press officer. Copies of the paper will also be available post embargo, see https://doi.org/10.1016/j.nsa.2025.105520: note that pre-embargo this link is not complete.

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Abstract

Depressive disorders are among the most common psychiatric disorders worldwide and associated with half of all suicides. There is robust evidence indicating that both electroconvulsive therapy (ECT) and repetitive transcranial magnetic stimulation (rTMS) effectively alleviate depressive symptoms in difficult-to-treat depression and enhance patient outcomes. However, there remains ongoing debate regarding their potential roles in preventing suicide and reducing all-cause mortality. Our study aims to investigate

the impact of various neurostimulation techniques, including ECT, rTMS, and vagus nerve stimulation (VNS), on reducing suicidality, including suicidal ideation and completed suicides, as well as on overall mortality among individuals diagnosed with depression. In this systematic review and meta-analysis, we searched on MEDLINE via PubMed until January 9, 2024 for randomised controlled trials and controlled observational studies that investigated suicide and all-cause mortality outcomes after neurostimulation treatment for depression. Of the 1351 screened records we identified 26 studies eligible for inclusion in our systematic review. We included 11 studies on ECT (involving 17'890 subjects treated with ECT and 25'367 controls receiving treatment as usual), 5 studies on rTMS and 3
studies on VNS in our meta-analysis. In the cumulative cohort, 208 suicide deaths (1.70%) were observed in the ECT group and 988 suicide deaths (5.02%) were registered in the control group. Moreover, there were 511 deaths from all causes

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