Precision Psychiatry

EPV1200

Robotic Technology as a Tool for Precision Psychiatric Medicine: A Brief Review

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Introduction: Precision psychiatry look for tailoring mental health interventions according to individual biological and clinical characteristics. Robotic technology has emerged as a promising complement to improve the accuracy of diagnosis and personalized treatments delivery in this area.
Objectives: This mini-review aims to explore and synthesize the current advances in robotic technologies that support the development of precision psychiatry.
Methods: This review summarizes the recent developments in robotic applications relevant to precision psychiatry, with an emphasis on neuromodulation, therapeutic robotics and the integration of artificial intelligence for tailor-made psychiatric care. A literature review was conducted using peer-reviewed sources published over the past five years, focusing on translational research and clinical applicability.
Results: Our review demonstrated the powerful role of robotics, which represents a valuable catalyst in precision psychiatric medicine, facilitating adapted and effective mental health care through improved neuromodulation and therapeutic support. Robotic systems integrated into neuromodulation therapies, such as robot-assisted transcranial magnetic stimulation, improve targeting accuracy and treatment reproducibility by adjusting the positioning of the coil in real time according to neuroimaging and patient-specific movements. Social care robots offer supportive roles in therapy, providing engagement and behavioral intervention for disorders such as autism and dementia. In addition, integration with AI improves individualized data-driven treatment planning. While microscopic robotic devices for direct interventions on the brain remain experimental, current robotic technologies significantly advance the objectives of precision psychiatry.
Conclusions: Robotic tools contribute to the establishment of personalized psychiatric care by improving the specificity of the intervention, consistency and interaction with the patient. The challenges include technical complexity, accessibility and ethical considerations. Ongoing research aims to optimize robotic-human integration in order to maximize clinical benefits.

Disclosure of Interest: None Declared

EPV1202

Bridging Subjective and Biological Perspectives: Applying an AI-Driven EEG Index in Depression Care

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Introduction: Depression often remains underrecognized in Asian contexts due to stigma, limited illness insight, and reliance on self-reports. Objective neurophysiological tools can improve diagnostic clarity. The Stress Electroencephalography (EEG) Assessment (SEA) System™ is an AI-based, TFDA-approved device that analyzes 90 seconds of resting EEG to produce a SEA Index ranging from 1 to 10, where higher scores indicate greater likelihood of major depressive disorder (MDD); values ≥7 are considered positive for depression risk.
Objectives: This report illustrates how integrating the SEA System can strengthen diagnostic confidence, communication, and shared decision-making in MDD through three representative clinical cases.
Methods: Three patients with varied presentations underwent SEA assessment alongside psychiatric evaluation. Each case was analyzed for the SEA Index result and its influence on clinical management.
Results: In Case 1, a student's high SEA score (9, positive range) resolved parental disbelief and enabled early combined therapy. In Case 2, an academic skeptical of her diagnosis accepted treatment after her elevated score (8) validated MDD risk. In Case 3, a patient reporting remission showed persistent SEA elevation (9), revealing residual symptoms; after medication adjustment, his score dropped to 2 (negative range) with marked improvement. SEA scores thus provided quantifiable neurophysiological evidence supporting diagnostic and therapeutic decisions.
Conclusions: The SEA System offers a rapid, interpretable biomarker of depression severity that complements psychiatric evaluation, reframes depression as a measurable brain disorder, and promotes early detection, stigma reduction, and personalized care.

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EPV1203

Mapping Psychiatric Diagnoses in Free Text to ICD Codes Using Natural Language Processing (NLP) and Machine Learning

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Introduction: Mental health is a major public health concern. Over one in three people reported mental problems in 2023, and suicide is the second leading external cause of death. Manual coding of psychiatric diagnoses from free text into ICD-10 slows clinical workflows, introduces errors, and hinders research. Automating this process with natural language processing (NLP) and machine learning (ML) can improve consistency, reduce administrative burden, and assist clinicians in improving diagnostic accuracy and treatment planning.
Objectives: 1) to clean and normalize an anonymous corpus of 79,048 Spanish psychiatric notes; 2) to evaluate semantic representations and identify the most suitable Spanish biomedical embeddings; 3) to develop and compare multilabel classification models, including XGBoost, random forests, neural networks, hierarchical models, and large language models (LLMs) fine-tuned with QLoRA; 4) to measure performance and computational cost.
Methods: The dataset from a Spanish hospital was used for model training. It contained more than 150,000 diagnostic labels referring to 83 ICD-10 codes and was preprocessed to correct errors, normalize codes, and replace abbreviations. Several embedding models were tested, with multilingual e5-large selected as the most effective. This representation was used as input to classical classifiers, neural networks, hierarchical models grouped by diagnostic families, and LLMs. Training and evaluation followed a stratified split, using F1, precision, and recall as metrics. All experiments were executed on a single NVIDIA RTX 4090 GPU.
Results: The best balance between accuracy and cost was achieved with multilingual e5-large embeddings and multilabel XGBoost, reaching F1 = 0.72 with four minutes of training (Figure 1). A neural network on top of the encoder increased F1 to 0.76, at 37× higher cost. The hierarchical family-based approach lowered combined performance to F1 = 0.667 due to error propagation, with overall results ranging from 0.37 (Disorders of adult personality and behaviour) to 0.78 (Mood disorder) across models. Llama-3 LLMs fine-tuned with QLoRA improved from near-zero performance to F1 = 0.62, showing potential but still underperforming compared to embedding-based models. All approaches were computationally feasible within limited resources.

Image 1:

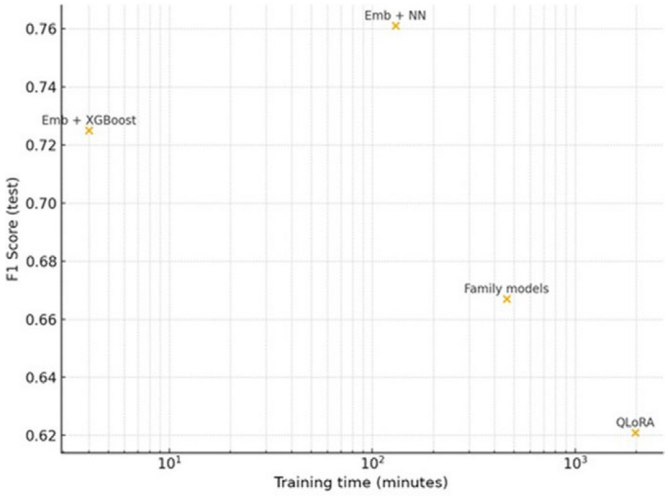


Figure 1 - Comparison between F1-score and training time for the different lines of work.

Conclusions: Automatic mapping of psychiatric notes to ICD-10 codes is feasible and clinically valuable. The embedding + XGBoost pipeline offers the most practical trade-off for immediate deployment, while fine-tuned encoders provide higher accuracy when computational budgets allow. Fine-tuned LLMs represent a promising medium-term option if larger corpora and hardware are available. Limitations include short note length, class imbalance, and labelling variability. Future work will explore active learning with experts, synthetic data generation, and adaptation to ICD-11.

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EPV1204

Phenotype-Based Stratification of Olanzapine Response in Young Patients with Schizophrenia: Clinical, Neurochemical and Pharmacokinetic Insights

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Introduction: Schizophrenia is a chronic psychiatric disorder involving dysregulation in dopamine, glutamate, and serotonin systems. Olanzapine is widely used in treatment, yet patient response varies significantly. Understanding how olanzapine and its metabolites relate to clinical symptoms and neurochemical markers may enable more personalized and effective therapeutic strategies.
Objectives: To evaluate the clinical, neurochemical, and immunological impact of olanzapine and its metabolites in young schizophrenia patients, identify treatment response subgroups, and explore associations between neurotransmitter levels and symptom severity.
Methods: Fifty-one patients (mean age: 27.7 years) diagnosed with schizophrenia and treated with olanzapine were included. Symptom severity was assessed using PANSS, CDSS, and BDI-II. Neurochemical and immunological parameters were evaluated.
Plasma concentrations of olanzapine and its metabolites were measured using a validated HPLC-MS/MS method (MassTox® TDM kit). The assay showed high linearity (1.034–145 µg/L, R^2 = 0.9998), precision (CV = 12.4%), and accuracy (bias: –2.7% to 4.2%). Statistical analysis included partial correlation (adjusting for age, sex, treatment duration) and Hierarchical Clustering on Principal Components (HCPC). Clusters were compared using v-tests ($p < 0.05$).
Results: Three phenotypic clusters were identified:

- **Cluster 1 (21.6%):** Patients responded well at low olanzapine levels (<4.35 µg/L), with significantly lower negative symptoms (PANSS: 11.91 vs. 21.22, $p < 0.001$) and depression scores (CDSS: 3.55 vs. 8.54, $p = 0.001$; BDI-II: 10.09 vs. 18.74, $p = 0.008$).