

AI-supported diagnosis and therapy in psychiatry

How AI can be integrated to improve mental health care

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Challenges in mental health care

Challenges

- Critical shortage of professionals
- Growing patient demand
- Long waiting time
- High cost
- Stigma

Solution

Need for innovative solutions

Areas of using AI in mental health care

- Improving clinical care: improving diagnostic accuracy, early detection, personalized treatment
- Reduction of employees' burden: Automate labour-intensive tasks (data preparation, integration)
 - Example: MedCat (King's college's ongoing project)
- Operational efficiency: clinical data can inform administrative decisions (optimise bed utilization, optimize care pathways)

Significance of human behavior as phenotype

- Human behavior is the best indicator of a person's health. From an evolutionary perspective, changes in behavior can either increase or decrease survival chances. (Whether we smoke or eat fast food, these behaviors shape our health.)
- It is difficult to objectively describe and quantify human behavior
- We can not rule out the possibility of subjective bias during diagnosis
- Also, there might be behavioral markers that we may overlook with current examination methods

Areas of using AI in mental health care: Improving diagnostic accuracy

Prediction	n	Data type	AUC	Reference
Dementia	76,367	Population based surveys	0.91	Cleret de Langavant et al. 2018
Alzheimer's disease	273	Amyloid PET scan	0.91	Mathotaarachchi et al. 2017
Suicide	5,543	EHR	0.84	Walsh et al. 2017
Delirium	18,223	HER without known cognitive impairment	0.68	Wong et al. 2018
Depression	1039	fMRI	0.83	Gallo et al 2023
Depression	319	Smartphone dat	0.76	Liu et al. 2022

Areas of using AI in mental health care: personalized treatment

- **Predictive analytics** in optimizing therapy
 - can help determine the most effective medication or therapy based on the patient's profile, reducing the trial-and-error process. (unbiased treatment recommendations. Potential to reduce the impact of subjective judgements.
 - AI can recommend adjustments to treatment plans based on real-time monitoring of symptoms and progress.
- **Virtual Therapists and Chatbots:** AI-powered virtual therapists, such as chatbots, can provide accessible, on-demand mental health support. These tools can:
 - Offer **cognitive-behavioral therapy (CBT)** techniques and psychoeducation.
 - Engage patients in conversation to assess their mental state and offer therapeutic interventions when needed.
 - Provide continuous support between traditional therapy sessions, improving engagement and adherence to treatment.

Not all tools are equal

Woebot

- Text based
- Designed for depressive disorders
- Designed by clinicians
- Trained on large amount of data
- Uses rules-based AI
- Available 24/7



Tessa

- Text based
- Designed for eating disorders
- Designed by clinicians
- Trained on large amount of data
- Used rules-based AI, later integrated generative AI-features
- Patients reported aversive effects



Expectations of AI in psychiatry

- Helps in diagnostics
- Helps to find personalized treatment options
- Early detection, relapse prevention
- Possible treatment tools (AI therapist)

Diagnostics in psychiatry

- DSM-5, ICD-11
- Psychotic disorders
 - Schizophrenia
 - Bipolar disorder
 - Schizoaffective disorder
- No valid biomarkers
- Heterogenic diagnostic groups
- The diagnostic criteria are artificial, do not always represent biology

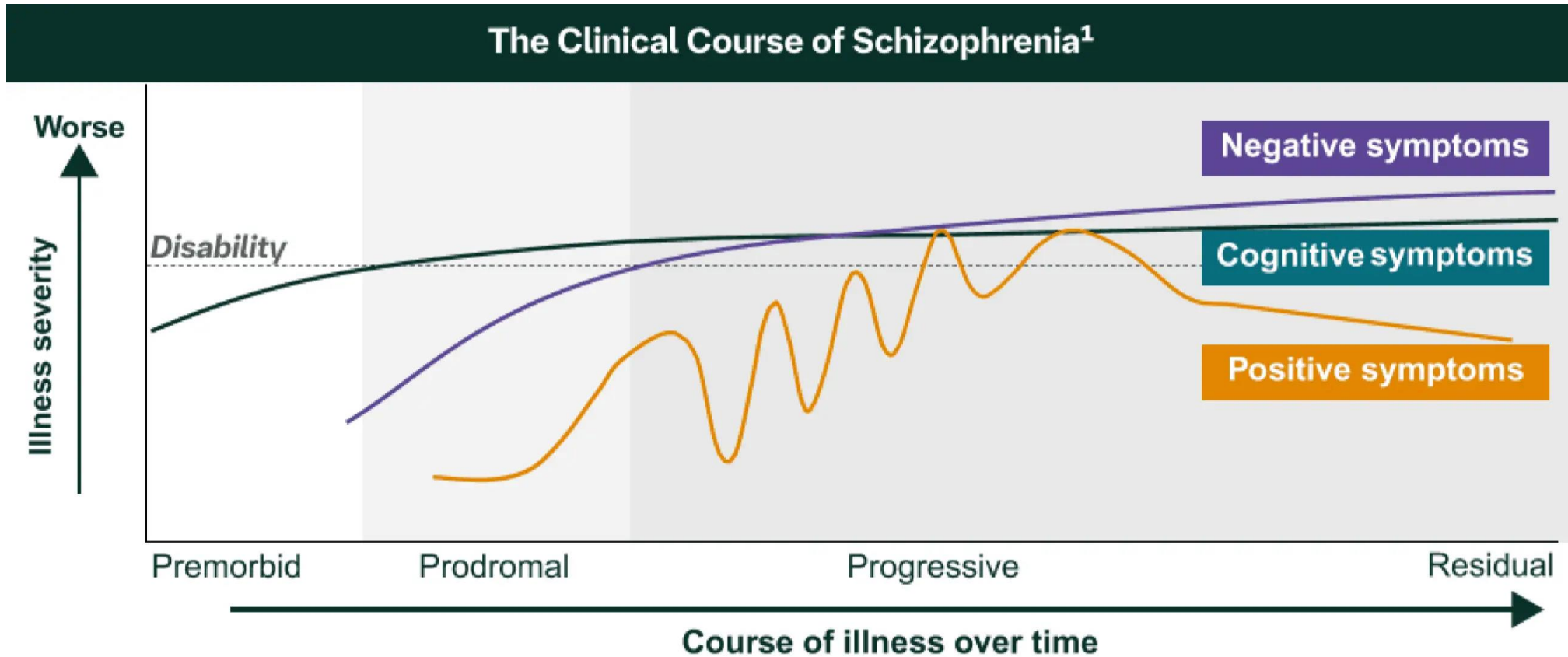
Numbers!?

Symptom spectrums

- Affective symptoms
- Psychomotoric symptoms (catatonic)
- Negative symptoms
- Psychotic symptoms

Spectrum approach can provide us numbers

Trait vs. State markers



Correll CU and Schooler NR. Neuropsychiatr Dis Treat. 2020;16:519-534.

CPAN

Catatonia

0 1 2 3 4

Psychosis

0 1 2 3 4

Disorganisation

Episodic/continuous

Bizarre

Affective symptoms

0 1 2 3 4

Bipolarity

Fluctuation within a day

Negative/neurodevelopmental symptoms

0 1 2 3 4

Childhood onset

Prodromal onset

Other specifiers

Intermittent course

Progressive course

Anosognosia

ECT responder

Clozapine responder

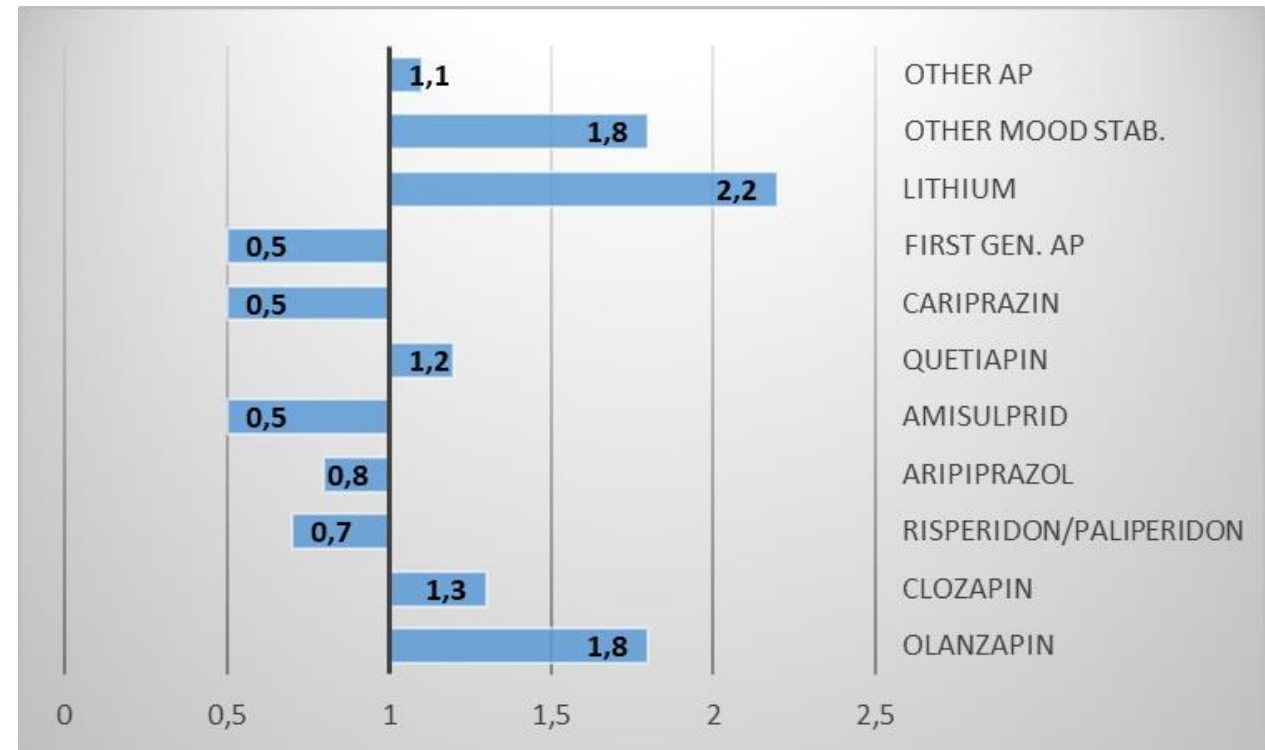
ICD-11, DSM-5 diagnosis:

Medications:

Functionality (0-100):

How can we use it?

- More accurate prognosis prediction
- Destigmatisation
- Personalised treatment
- CPAN app
 - Easy-to-use
 - Own database
 - Personalised AI suggestions
 - Similar patient concept
 - Which medication to choose?



Thank you for your attention