Monitoring for abnormal movements associated with tardive dyskinesia in routine care: a retrospective analysis of electronic health records

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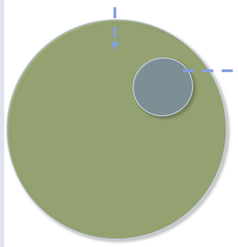
Background

- People treated with antipsychotics are at risk of movement side effects, including tardive dyskinesia (TD).
- Regular monitoring of involuntary movements using standardised assessments, such as the Abnormal Involuntary Movements Scale (AIMS), are recommended within clinical guidelines[1]. Timely diagnosis of TD may facilitate appropriate treatment with VMAT-2 inhibitors[2].
- Cross-sectional analyses of real-world clinical data indicate AIMS are inconsistently implemented in clinical practice, and TD is underdiagnosed[3,4]. Longitudinal patterns are not well characterised.

Study aim: characterise longitudinal use of AIMS assessments and involuntary movement trajectories among patients with severe psychiatric disorders who are prescribed antipsychotics

Study population:

N = 159,615 adults treated with antipsychotics, no history of tardive dyskinesia or other movement disorders (diagnosed or treated) prior to initiation of AIMS monitoring



10.5% (N = 16,748) with >1 AIMS assessment

7.1% (N = 1,193) of patients had a non-zero initial AIMS total score

Five trajectories identified:

1. **Persistently low** N = 14,159 (84.5%)
2. **Early rapid decrease** N = 790 (4.7%)
3. **Increase then decrease** N = 866 (5.2%)
4. **Late and rapid increase** N = 460 (2.7%)
5. **Persistently high** N = 473 (2.8%)

	Class 1	Class 2	Class 3	Class 4	Class 5
AIMS assessments per patient *(Median, IQR)*	3 (2,6)	4 (2,6)	4 (3, 6)	6 (4,9)	5 (3,9)
Months between AIMS assessments *(Mean, SD)*	0.7 (0.8)	0.7 (0.8)	0.6 (0.6)	0.9 (0.8)	0.8 (0.8)
Years of total follow-up *(Median, IQR)*	3.8 (1.6, 4.9)	3.2 (1.3, 4.8)	3.6 (1.5, 4.9)	4.8 (3.8, 5.0)	4.8 (3.0, 5.2)

Table 2. Description of follow-up data availability, stratified by trajectory class.

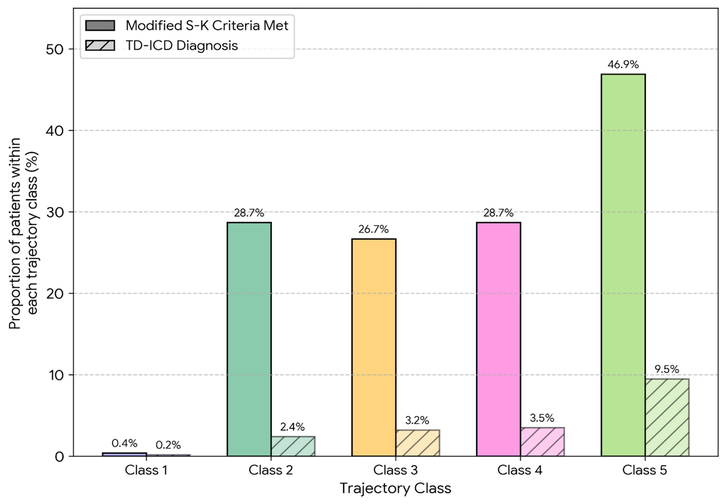
The overall population was predominantly male (61.2%) and Black or African American race (57.3%), with a median age of 37 years. AIMS assessments were most frequently initiated within outpatient settings (61.9%).

Patients exhibiting the most severe and persistent involuntary movements (Class 5) had the proportionally highest frequency of known risk factors for TD, compared to the overall population, including:

- Older age: Median 52 years vs. 37 years.
- Complex comorbidities: 18.6% with diabetes vs. 9.8%.
- First-generation antipsychotic treatment: 14.6% prescribed first-generation LAIs vs. 6.3%.

Evidence of TD was highest among groups with highest and most persistent involuntary movement burden. However, TD-ICD diagnosis was recorded less frequently than Schooler-Kane criteria being met.

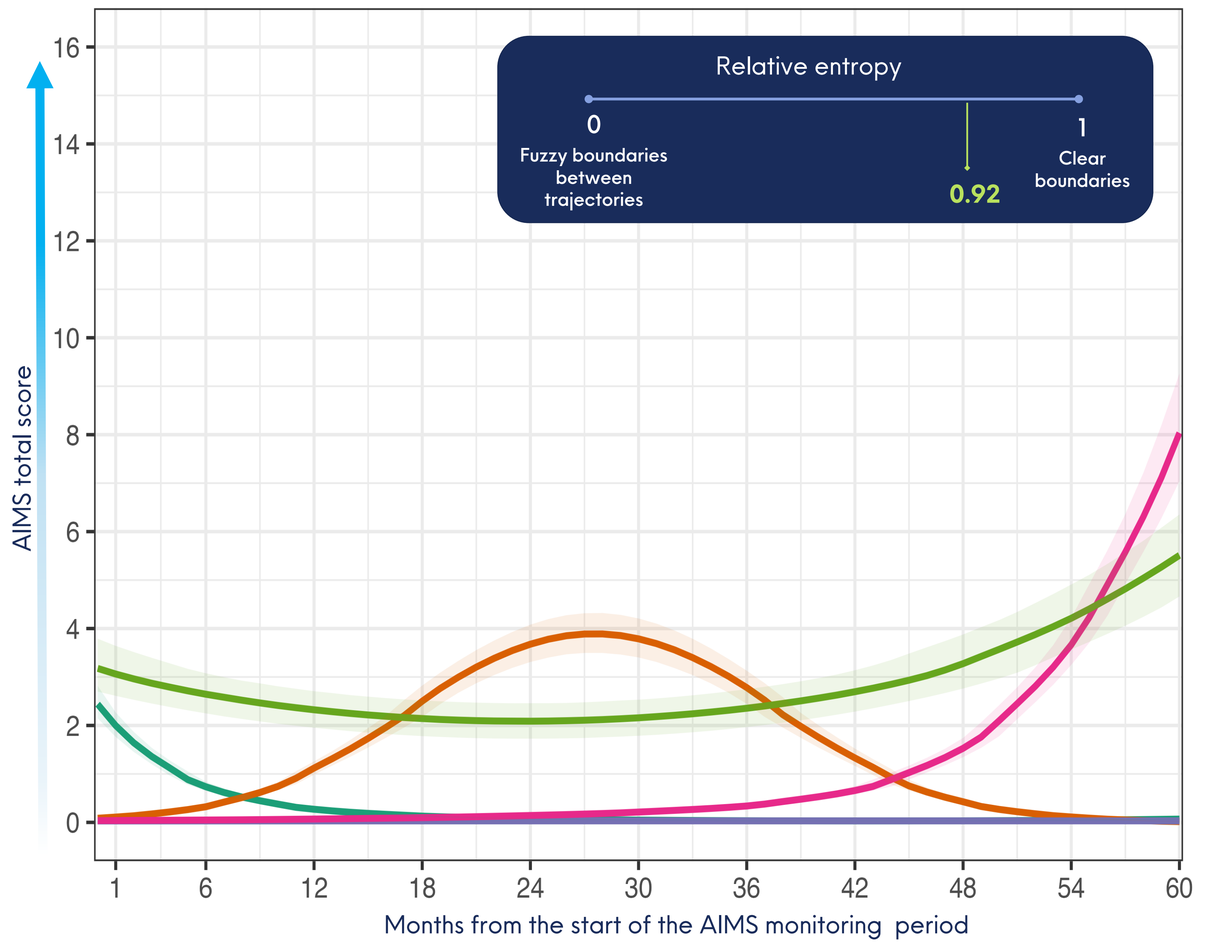
Note: conclusions remain the same following adjustment for variable follow-up between groups. Data not presented on this poster.



Method

- **Design:** Retrospective analysis of NeuroBlu Data version 25R1; aggregated from electronic health record data sourced from healthcare networks spanning the United States.
- **Study period:** Patients meeting eligibility criteria between 1994–2024, with follow-up extending up to 5 years from the first recorded AIMS assessment (index date).
- **Study population:** Adult patients (≥18 years) diagnosed with a schizophrenia spectrum or mood disorder with psychotic features and treated with antipsychotics. Exclusion criteria: Patients with diagnosed and/or treated TD before the first AIMS assessment; patients with any other disorders characterised by involuntary movements or for which VMAT-2 inhibitors are indicated (Huntington's, Parkinson's, Wilson's, tic disorders, or dystonias).
- **Statistical analysis:**
  - Trajectory modelling: Latent class mixed modelling was used to identify distinct AIMS total score trajectories up to five-years following the first recorded AIMS assessment.
  - Trajectory group characterisation: Demographics and the prevalence of TD-ICD diagnoses, medication utilisation for TD (VMAT-2 inhibitors) and extrapyramidal side effects (anticholinergics) were described across the identified trajectory groups.

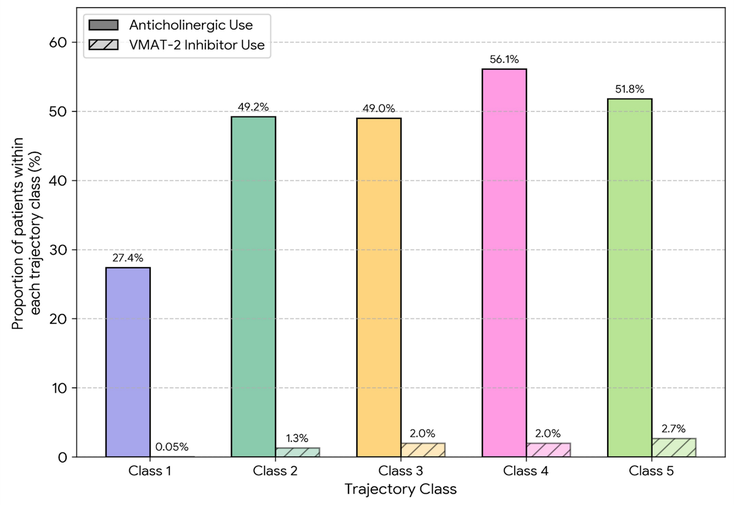
Figure 1. Trajectories of involuntary movements in patients with schizophrenia spectrum or severe mood disorders with psychosis treated with antipsychotics (N = 16,748)



Model selection and classification metrics provided strong support for the identified trajectories as a meaningful representation of longitudinal heterogeneity in AIMS total scores.

	Class 1	Class 2	Class 3	Class 4	Class 5
APPA	0.98	0.88	0.90	0.90	0.89
OCC	8	155	155	222	243

Table 1. Performance metrics for the best performing 5-class model, APPA - average posterior probabilities (all classes > 0.80 threshold), OCC – odds of correct classification (all classes > 5.0 threshold).



Anticholinergic treatment was common during AIMS monitoring, and proportionally highest among groups with highest involuntary movement burden.

Conclusions

- Non-zero AIMS total scores at the first recorded assessment may indicate evidence of reactive care, where AIMS monitoring is initiated following emergence of involuntary movements rather than at the start of antipsychotic treatment.
- While most patients had persistently low AIMS total scores, we identified four distinct subgroups with elevated or fluctuating involuntary movement trajectories.
- Results provide preliminary evidence that persistent involuntary movements recorded across multiple AIMS assessments may not prompt TD diagnosis or evidence-based treatment.
- In contrast, anticholinergic treatment was relatively common among groups characterised by transient and persistent involuntary movement.

Limitations

- Only a small proportion of eligible patients had sufficient AIMS data for trajectory modelling, which limits generalisability. Results are not generalisable to populations with short-term or adjunctive antipsychotic use.
- The requirement for repeated AIMS assessments may have biased the sample toward patients with higher service engagement and more prominent or persistent symptoms.
- As data were collected during routine care and not for the purpose of research, we lacked granular information on several key TD risk factors, including neurological comorbidities, illness chronicity, early extrapyramidal symptoms and precise medication adherence.

Disclosures
KG, RS, LAB, MO, NL: employees and equity holders of KKT Technologies Pte. Ltd. or subsidiaries. CUC: Grant recipient (Intra-Cellular Therapies, Inc); institutional grant recipient (Boehringer Ingelheim, Janssen, Takeda); royalties recipient (UpToDate); consulting fees (AbbVie, Acadia, Adock Ingram, Alkermes, Allergan, Angelini, Aristo, Biogen, Boehringer Ingelheim, Bristol Meyers Squibb, Cardio Diagnostics, Cerevel, CNX Therapeutics, Compass Pathways, Darnitsa, Delpor, Denovo, Eli Lilly, Gedeon Richter, Hikma, Holmusk, Intra-Cellular Therapies, Jamjoom Pharm, Janssen/J&J, Karuna, LB Pharma, Lundbeck, MedInCell, MedLink, Merck, Mindpax, Mitsubishi Tanabe Pharma, Maplight, Mylan, Neumora Therapeutics, Neurocrine, Neurelis, Newron, Noven, Novo Nordisk, Otsuka, PPD Biotech, Recordati, Relmada, Reviva, Rovi, Sage, Saladax, Sanofi, Seqirus, SK Life Science, Sumitomo Pharma America, Sunovion, Sun Pharma, Supernus, Tabuk, Takeda, Teva, Terran, Tolmar, Vertex, Viatris, Xenon Pharmaceuticals); Payment or honoraria for lectures, presentations, speakers bureaus (AbbVie, Acadia, Adock Ingram, Alkermes, Allergan, Angelini, Aristo, Biogen, Boehringer Ingelheim, Bristol Meyers Squibb, Cardio Diagnostics, Cerevel, CNX Therapeutics, Compass Pathways, Darnitsa, Delpor, Denovo, Eli Lilly, Gedeon Richter, Hikma, Holmusk, Intra-Cellular Therapies, Jamjoom Pharm, Janssen/J&J, Karuna, LB Pharma, Lundbeck, MedInCell, MedLink, Merck, Mindpax, Mitsubishi Tanabe Pharma, Maplight, Mylan, Neumora Therapeutics, Neurocrine, Neurelis, Newron, Noven, Novo Nordisk, Otsuka, PPD Biotech, Recordati, Relmada, Reviva, Rovi, Sage Saladax, Sanofi, Seqirus, SK Life Science, Sumitomo Pharma America, Sunovion, Sun Pharma, Supernus, Tabuk, Takeda, Teva, Terran, Tolmar, Vertex, Viatris, Xenon Pharmaceuticals); payment for expert testimony (Janssen, Lundbeck, Otsuka); participation on a data safety monitoring board or advisory board (Compass Pathways, Denovo, Intra-Cellular Therapies, Lundbeck, Relmada, Reviva, Rovi, Supernus, Teva) stock or stock options (Cardio Diagnostics, Kuleon Biosciences, LB Pharma, MedLink Global, Mindpax, Quantic, Terran).

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