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Introduction

- ❖ Ketamine has emerged as a promising pharmacotherapy for major depressive disorder (MDD) and other mental illnesses.¹⁻⁴
- ❖ Intramuscular (IM) ketamine treatment is more convenient than intravenous ketamine for outpatient administration.
- ❖ IM ketamine treatment is offered at many North American outpatient psychiatric clinics.
- ❖ The outpatient population receiving IM ketamine treatment has not been characterized, and real-world evidence on the mental health outcomes and safety of patients treated with IM ketamine are limited.

Aim

To describe the clinical characteristics, treatment patterns, clinical outcomes, and adverse events of patients receiving IM ketamine treatment at a private outpatient psychiatric clinic.

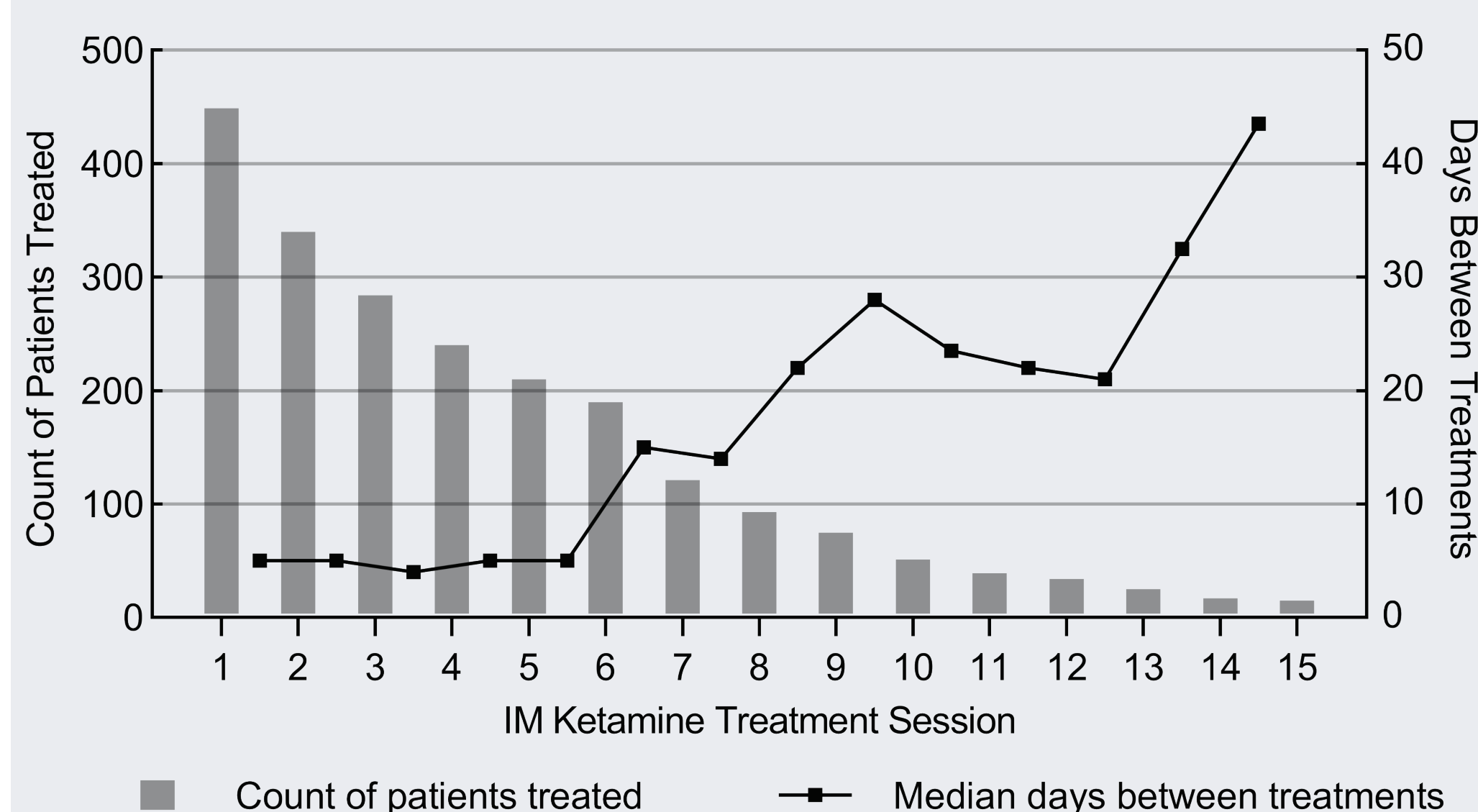
Methods

- ❖ Patient data from a private outpatient psychiatric clinic's EHR system were collected and analyzed retrospectively.
- ❖ **Inclusion criteria:** patients 18 years or older who received IM ketamine treatment between January 2018 and June 2021.
- ❖ **Exclusion criteria:** patients who received ketamine or esketamine by a non-IM route of administration from the psychiatric clinic during the study period.
- ❖ **Clinical outcomes:** Patient Health Questionnaire (PHQ-9) depression score, suicidal ideation (SI) score (PHQ-9 item 9) and Generalized Anxiety Disorder (GAD-7) score.
- ❖ **Statistical analyses:** descriptive statistics were utilized to characterize the study population. Paired t-tests were conducted to compare clinical outcomes from baseline to last treatment session.

Patient Characteristics and Treatment Patterns

- ❖ 452 patients were included in the cohort: 51% were female, 95% were white and non-Hispanic, and the median age was 37 (IQR 20) years.
- ❖ Patients had an average of 2.8 (SD 1.4) psychiatric diagnoses.
- ❖ The most common diagnoses were MDD (420/452, 93%), generalized anxiety disorder (243/452, 54%), and post-traumatic stress disorder (126/452, 28%).
- ❖ Patients had prescriptions for an average of 3.1 (SD 2.9) different concomitant psychiatric medications at first visit.

Figure 1. Number of patients receiving multiple ketamine treatments and frequency of ketamine treatments



Results

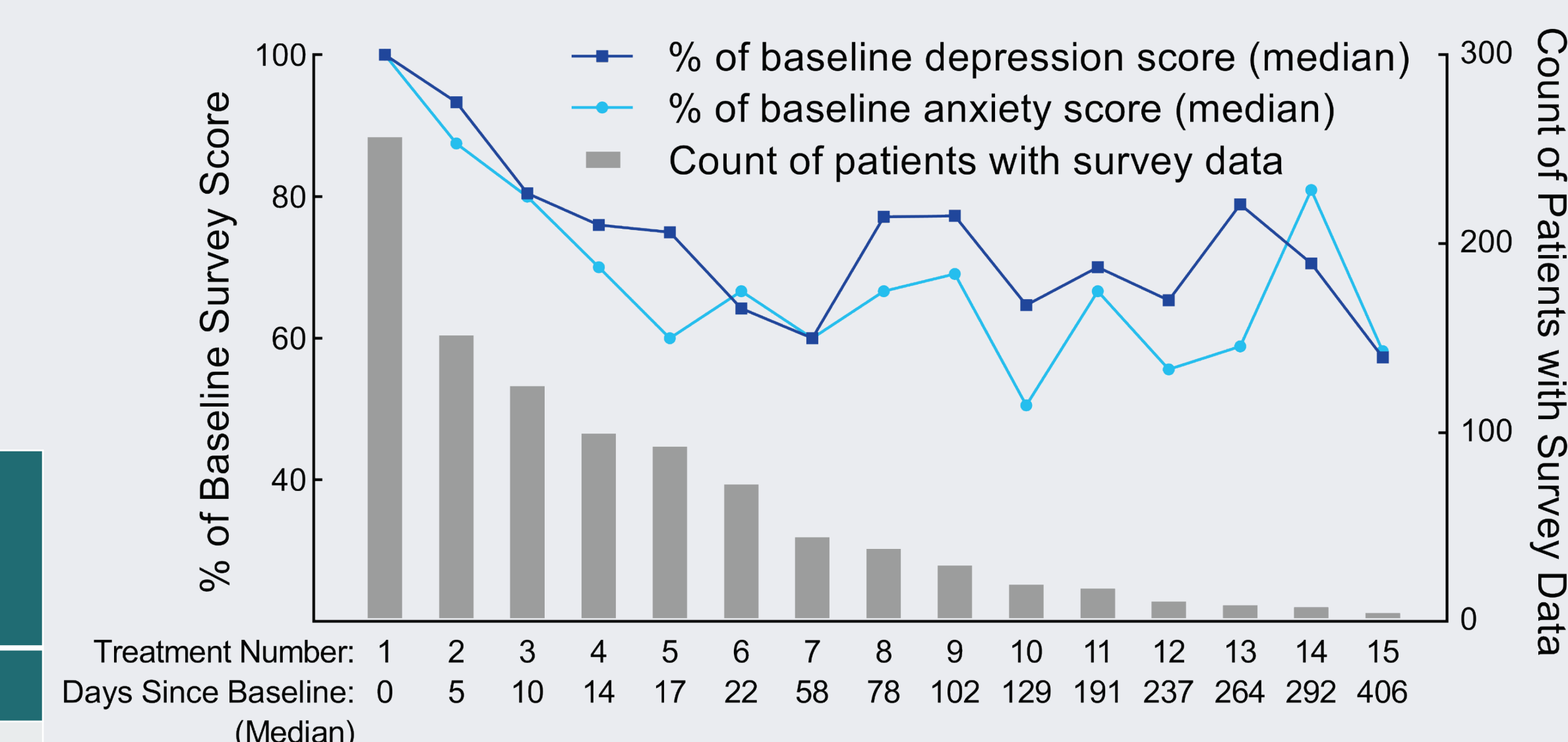
Effectiveness of IM Ketamine

- ❖ Average depression, suicidal ideation, and anxiety symptoms significantly improved ($p < .001$) from baseline to patients' last ketamine treatment (Table 1).

Table 1. Depression (PHQ-9), suicidal ideation (PHQ-9 item 9) and anxiety (GAD-7) scores stratified by number of IM ketamine treatments received.

	N	Score at Baseline Mean (SD)	Score at Last Treatment Mean (SD)	p-value
Depression – PHQ-9				
All treatment lengths	112	16.3 (6.7)	10.8 (5.9)	<.001
Patients w/ 1 treatment	66	14.4 (7.3)	N/A	N/A
Patients w/ 2-4 treatments	30	14.4 (7.1)	11.4 (6.1)	<.001
Patients w/ 5-6 treatments	38	16.6 (6.9)	10.2 (6.1)	<.001
Patients w/ 7-10 treatments	29	16.3 (6.4)	11.3 (5.9)	<.001
Patients w/ 11-48 treatments	15	19.1 (5.4)	10.2 (5.7)	<.001
Suicidal ideation – PHQ-9 item 9				
All treatment lengths	112	1.13 (1.16)	0.58 (0.76)	<.001
Patients w/ 1 treatment	66	1.02 (1.06)	N/A	N/A
Patients w/ 2-4 treatments	30	0.90 (1.03)	0.63 (0.77)	.044
Patients w/ 5-6 treatments	38	1.29 (1.25)	0.63 (0.79)	<.001
Patients w/ 7-10 treatments	29	1.14 (1.12)	0.45 (0.63)	<.001
Patients w/ 11-48 treatments	15	1.13 (1.30)	0.60 (0.91)	.036
Anxiety – GAD-7				
All treatment lengths	80	12.8 (5.7)	8.4 (5.5)	<.001
Patients w/ 1 treatment	50	11.0 (6.1)	N/A	N/A
Patients w/ 2-4 treatments	24	10.8 (5.8)	9.1 (5.6)	.066
Patients w/ 5-6 treatments	26	14.2 (4.9)	8.3 (6.3)	<.001
Patients w/ 7-10 treatments	20	11.6 (6.4)	7.6 (4.5)	.004
Patients w/ 11-48 treatments	10	16.8 (3.0)	8.7 (5.6)	<.001

Figure 2. Depression (PHQ-9) and anxiety (GAD-7) scores throughout the ketamine treatment course.



Safety of IM Ketamine

- ❖ An adverse event (AE) occurred during 59 out of 2,532 treatments (2.3%).
- ❖ AEs included nausea (1.9% of treatments), vomiting (1.0%), abnormal vital signs (0.16%), panic attacks (0.16%), hallucinations (0.16%), disorientation (0.12%), potentially unsafe movement (0.12%), and bladder pain (0.04%).
- ❖ All AEs resolved prior to patients leaving the clinic.

Conclusions

- IM ketamine is being utilized to treat psychiatric outpatients with a variety of mental illnesses not limited to MDD.**
- IM ketamine treatment appears to be well tolerated and effective for improving depression, suicidal ideation and anxiety symptoms in a general psychiatric outpatient population.**
- Further prospective studies are recommended to confirm the long-term efficacy and safety of IM ketamine treatments for patients with various mental illnesses.**

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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