

# Real-world pilot of case management in schizophrenia: exploring factors influencing patient participation, potential for relapse prevention and effects on diverse clinical outcomes

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**To cite:** Zhang X, Geng T, Yu L, *et al.* Real-world pilot of case management in schizophrenia: exploring factors influencing patient participation, potential for relapse prevention and effects on diverse clinical outcomes. *General Psychiatry* 2025;**38**:e101864. doi:10.1136/gpsych-2024-101864

► Additional supplemental material is published online only. To view, please visit the journal online (<https://doi.org/10.1136/gpsych-2024-101864>).

XZ and TG are joint first authors.

Received 05 September 2024  
Accepted 21 March 2025



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## To the editor:

Schizophrenia is a chronic and severe mental disorder characterised by profound disruptions in thinking, affecting language, perception and the sense of self.<sup>1</sup> These disruptions can significantly impair an individual's ability to function socially and occupationally,<sup>2</sup> leading to a high burden on both the individuals affected and society as a whole.<sup>3</sup> Managing patients with schizophrenia to reduce relapse risk, improve social adjustment and enhance self-efficiency remains a complex issue with no definitive solution. Case management (CM) is a comprehensive intervention model, where a case manager or a multidisciplinary team provides long-term, individualised services to patients.<sup>4</sup> However, the specific aspects and extent to which CM is effective, and whether it can prevent relapse, remain controversial.<sup>5</sup> Previous studies have shown that relapse prevention programmes, including weekly monitoring and group therapy, significantly reduce relapse and rehospitalisation rates compared with treatment as usual in outpatients with schizophrenia.<sup>6</sup> While CM has been found to improve negative symptoms and social functioning, its ability to prevent relapse remains uncertain, particularly in real-world settings.<sup>7</sup>

Our hospital's rehabilitation centre delivers a strengths-based CM model through a multidisciplinary team focusing on patients' strengths, abilities and community resources. In clinical practice, we have observed that participation in CM is influenced by factors such as illness insight, stigma, economic conditions

and social support. Therefore, this study first aimed to identify the characteristics of patients who chose to participate in CM services versus those who did not. It also aimed to compare individuals who remained in their initial group with those who switched or withdrew, exploring the demographic and clinical factors influencing these treatment choices. Furthermore, by evaluating the impact of CM in a real-world setting, beyond patient choice alone, this study provides novel insights into its efficacy in preventing relapse and enhancing patients' social adjustment and self-efficacy. These findings can inform evidence-based strategies for enhancing patient care and addressing the challenges of managing schizophrenia in diverse clinical contexts.

## METHODS

### Participants and intervention

This real-world, longitudinal pilot study recruited participants from the outpatient department at Peking University Sixth Hospital between 2015 and 2017. Eligible individuals were aged 16–60 years; diagnosed with schizophrenia according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10); and in a stable phase of treatment. Exclusion criteria included co-occurring severe mental or physical disorders and high-risk behaviours. Participants were assigned to either the CM or the care-as-usual (CAU) group based on their preference.

Participants in the CAU group received no additional interventions beyond regular assessments. CM group members received case management services from a multidisciplinary team, requiring at least 1 monthly CM session. Failure to meet this requirement resulted in exclusion from outcome analyses. The study included three assessment time points: baseline, 3 months and 6 months. We also offered group therapy services, which were optional for the CM group but led to exclusion from the CAU group if chosen. For more detailed information, see online supplemental methods.

### Treatment choice analysis

We conducted an exploratory analysis to examine factors influencing participants' treatment choices, including initial decisions and subsequent changes. First, we compared participants' demographic and clinical characteristics in the two groups based on their initial choice at baseline and adherence at 3-month and 6-month follow-ups. Second, we analysed the characteristics of individuals who initially chose CM but later withdrew compared with those who adhered to the intervention. Third, we examined those who initially selected CAU but later opted for CM services against those who consistently adhered to CAU. This analysis aimed to identify factors associated with accepting and persisting with the service versus rejecting or withdrawing from it. For the comparisons mentioned,  $\chi^2$  tests were used for categorical variables, and independent samples t-tests were applied for continuous variables.

### Primary outcome

Data were analysed using R software, with a significance level of  $p < 0.05$ . The primary outcome—relapse—was defined by any of the following: psychiatric hospitalisation; a 25% increase in Positive and Negative Syndrome Scale (PANSS) score or a 10-point increase if the baseline PANSS score was below 40; significant self-harm; clinically significant suicidal or homicidal ideation; or violent behaviour causing injury or property damage. Logistic regression was used to evaluate relapse at the 3-month follow-up. At 6 months, with only one recurrence, regression analysis was deemed unnecessary, but the results are provided in the online supplemental materials for reference. Covariates included group assignment, age, sex, education, onset age, illness duration, hospitalisation, diagnosis type and employment status; these were selected based on their reported associations with treatment outcomes in prior literature and observed relevance in our dataset.

### Secondary outcomes

The secondary measures aimed to determine whether CM can improve clinical outcomes, social functioning, self-efficacy, and so on. Clinical outcomes

were assessed using the PANSS for symptoms, body mass index (BMI) for weight gain and the 6-item Simpson-Angus Scale (SAS) for extrapyramidal side effects. Social functioning was evaluated with the Work and Social Adjustment Scale (WSAS), which assesses work and social adaptation. Self-efficacy was evaluated by the General Self-Efficacy Scale (GSES). Generalised estimating equations were used to assess the impact of case management on the values or scale scores of the PANSS, BMI, SAS, WSAS and GSES, with case management participation and visit points as independent variables. Covariates included age, sex, education, onset age, illness duration, hospitalisation history, diagnosis type and employment status.

## RESULTS

### Sample overview

A total of 111 patients with schizophrenia were recruited and categorised into the CM group ( $n=66$ ) or the CAU group ( $n=45$ ) based on voluntary self-selection. At the 3-month follow-up, 53 CM participants were successfully contacted, with 30 maintaining the required case management frequency and included in primary and secondary outcome analyses. At the 6-month follow-up, 26 CM participants remained reachable, and 16 met the case management criteria for inclusion. In the CAU group, 33 participants were available at 3 months, with 28 consistently abstaining from CM; 21 remained reachable at 6 months, with 16 included in the analyses. For further details, see figure 1A.

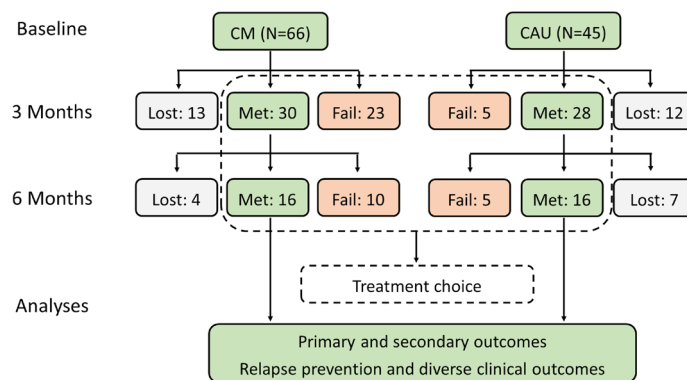
### Characteristics influencing treatment choices

Participants in the CM group generally exhibited more severe clinical characteristics than those in the CAU group. These included significantly longer illness duration, lower employment rates, younger onset age and more hospitalisations at baseline, trends that persisted at the 3-month and 6-month follow-ups. More detailed information is presented in table 1 and online supplemental table S1. In the CAU group, participants who transitioned to receiving services were more likely to have unstable employment (1/5 vs 20/28,  $\chi^2=4.849$ ,  $p=0.028$ ) and poorer WSAS scores ( $t=2.213$ ,  $p=0.034$ ) at the 3-month follow-up. This indicates that individuals with poorer functioning are more inclined to seek services. Furthermore, patients with paranoid-type psychotic disorders showed a greater likelihood of accepting services by the 6-month follow-up. No other significant findings were noted (see online supplemental table S2).

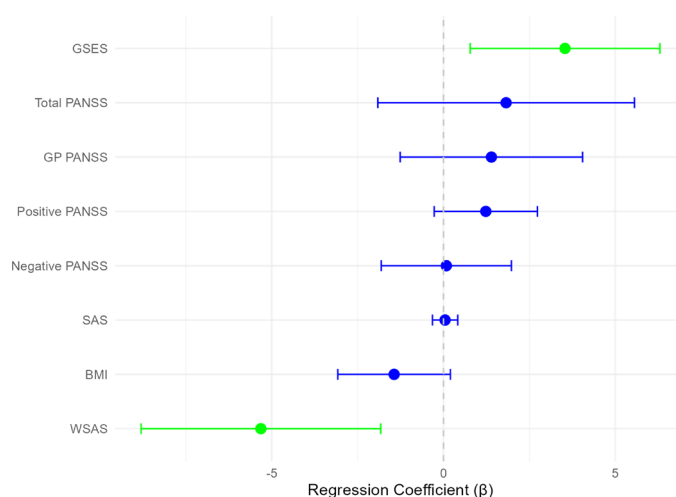
### Primary outcome

The primary objective was to evaluate the efficacy of CM in reducing relapses in real-world settings. At the

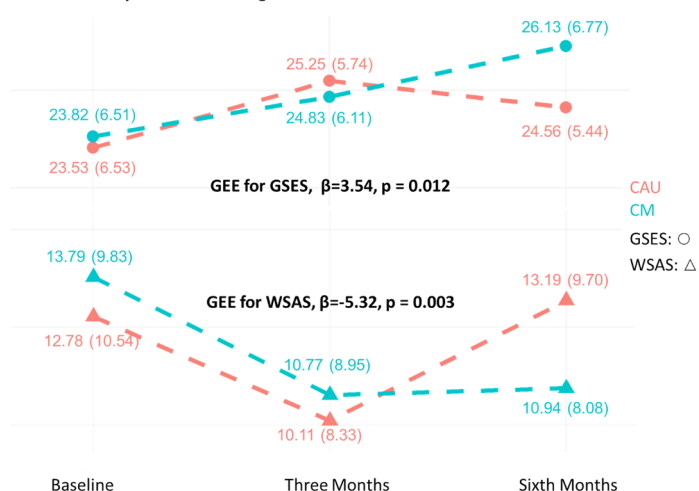
## A: Study design flowchart



## B: Impact of case management on clinical indicators



## C: Time-dependent changes in GSES and WSAS scores



**Figure 1** Study design flowchart and the impact of case management on self-efficacy and social functioning. (A) Study design flowchart: this subfigure outlines the study design, including participant recruitment, group assignment (CM vs CAU), follow-up at 3 and 6 months and analysis outcomes. 'Met' refers to adherence to group criteria, 'Fail' to non-adherence and 'Lost' to follow-up loss. (B) Impact of CM on clinical indicators: this subfigure presents estimated coefficients ( $\beta$ ) and 95% CIs for the impact of CM intervention on clinical and functional outcomes, analysed using GEE. Significant improvements are observed in self-efficacy (GSES) and social functioning (WSAS). Non-significant outcomes include BMI, SAS, and PANSS. (C) Time-dependent changes in GSES and WSAS Scores: this subfigure depicts trends in GSES and WSAS scores across baseline, 3 months, and 6 months for CM and CAU groups. Mean scores for adherent participants are connected by dashed lines, with colours distinguishing groups. BMI, body mass index; CAU, care-as-usual; CM, case management; GEE, generalised estimating equations; GP, general psychopathology; GSES, General Self-Efficacy Scale; PANSS, Positive and Negative Syndrome Scale; SAS, Simpson Angus Scale; WSAS, Work and Social Adjustment Scale.

**Table 1** Baseline and 3-month follow-up demographic and disease characteristics based on patients' selection of case management (CM) or care-as-usual (CAU) groups

	Baseline				3-month follow-up			
	CM	CAU	Statistic*	P value	CM	CAU	Statistic*	P value
Sex† (M/F)	27/39	18/27	0.009	0.924	11/19	13/15	0.569	0.451
Education level†‡	4/22/40	7/12/26	2.858	0.240	1/11/18	4/6/18	3.205	0.201
Employed †§ (Y/N)	27/39	27/18	3.904	0.048	9/21	20/8	9.943	0.002
Paranoid/others†	43/23	27/18	0.305	0.581	16/14	16/12	0.085	0.771
Age	34.02 (10.05)	32.20 (9.75)	0.945	0.347	33.43 (9.83)	31.29 (9.04)	0.864	0.391
Education years	14.21 (2.93)	13.60 (4.19)	0.849	0.399	14.40 (2.92)	14.07 (3.49)	0.390	0.698
Illness duration	10.56 (8.01)	5.22 (4.79)	4.385	<0.001	9.17 (8.54)	4.29 (4.26)	2.782	0.008
Onset age (years)	21.94 (5.96)	25.53 (8.08)	2.698	0.008	22.80 (5.14)	25.57 (8.19)	1.555	0.126
Hospitalisation	1.67 (1.88)	0.84 (1.11)	2.632	0.010	1.47 (1.89)	0.68 (0.91)	2.047	0.047
BMI	25.09 (3.69)	25.53 (4.86)	0.545	0.587	25.47 (4.04)	25.37 (3.97)	0.094	0.926
GP PANSS	21.47 (3.80)	20.96 (3.91)	0.691	0.491	21.30 (4.49)	20.37 (5.51)	0.701	0.486
Positive PANSS	9.67 (3.26)	9.11 (2.74)	0.939	0.350	9.97 (3.67)	8.85 (3.07)	1.235	0.222
Negative PANSS	13.00 (5.02)	11.80 (3.89)	1.416	0.160	11.13 (3.67)	11.30 (3.65)	0.168	0.867
Total PANSS	44.14 (8.86)	41.89 (8.71)	1.321	0.189	42.47 (8.50)	41.26 (8.44)	0.537	0.593
SAS	0.88 (1.34)	0.44 (0.62)	2.292	0.024	0.57 (0.74)	0.44 (0.75)	0.631	0.531
GSES	23.82 (6.51)	23.53 (6.53)	0.226	0.822	24.83 (6.11)	25.25 (5.74)	0.267	0.790
WSAS	13.79 (9.83)	12.78 (10.54)	0.516	0.607	10.77 (8.95)	10.11 (8.33)	0.290	0.773

Please refer to online supplemental table S1 for the 6-month follow-up information.

\*Absolute value.

†These variables were compared using  $\chi^2$  test and ANOVA.

‡Education level: below high school/high school/college and above.

§If the participant is in full-time education, the answer to this question is also 'Yes'.

ANOVA, analysis of variance; BMI, body mass index; CAU, case-as-usual; CM, case management; F, female; GP, general psychopathology; GSES, General Self-Efficacy Scale; M, male; N, no; NA, not applicable; PANSS, Positive and Negative Syndrome Scale; SAS, Simpson-Angus Scale; WSAS, Work and Social Adjustment Scale; Y, yes.

3-month follow-up, 4 of 30 participants in the CM group and 6 of 28 in the CAU group experienced a relapse. At 6 months, only one participant in the CAU group relapsed. Logistic regression analysis showed no statistically significant results, and additional variables in the model also failed to yield significant outcomes. Detailed results are provided in online supplemental table S3.

### Secondary outcomes

Overall, the intervention showed significant positive outcomes in the GSES ( $\beta=3.54$ , Wald  $\chi^2=6.303$ ,  $p=0.012$ ) and the WSAS ( $\beta=-5.32$ , Wald  $\chi^2=8.928$ ,  $p=0.003$ ), while other measures were not significant (see figure 1B, (online supplemental table S4), with detailed comparisons for GSES and WSAS scores across baseline, 3 months and 6 months presented in figure 1C. The generalised estimating equations analysis results for all secondary outcomes are presented in the online supplemental table S5-S12.

## DISCUSSION

### Principle findings

This study provides important insights into patients' treatment choices and the role of CM in improving outcomes for patients with schizophrenia. First, patients with more severe clinical profiles were more likely to choose CM, whereas those with better functioning tended to discontinue the service. Second, unstable employment and higher WSAS scores were significantly associated with switching to CM or group therapy, suggesting that reduced work capability and employment instability increase the demand for structured support. Third, although CM did not significantly reduce relapse rates, it demonstrated significant improvements in self-efficacy and social functioning across follow-up visits. These findings highlight CM's pivotal role in enhancing self-efficacy and social adaptability, reinforcing its value as an essential component of comprehensive schizophrenia care.



### Reflection on treatment choices

Our study's findings align with existing literature that suggests patients with more significant needs are more inclined to engage with intensive services.<sup>8</sup> In other words, patients who are functioning better might not feel the need for ongoing intensive care. This pattern aligns with research showing that those who see their condition as less severe are less likely to continue with structured interventions.<sup>9</sup> Individuals with unstable employment were more likely to make a transition from CAU to CM, likely driven by the stress and uncertainty of job instability, which may exacerbate existing mental health issues or create new stressors.<sup>10</sup> Schizophrenia is a chronic and severe mental illness with a high risk of relapse, making it crucial to incorporate patients' treatment preferences into decision-making to improve long-term outcomes and treatment adherence.<sup>11</sup> These findings highlight the need for educational efforts to promote early CM engagement, helping patients and families to manage the disease better, prevent relapses and improve quality of life.<sup>12</sup>

### Impact on relapse, self-efficacy and social functioning

Although the CM group exhibited a numerically lower relapse rate in this study, logistic regression analysis revealed that CM was not a significant predictor of relapse prevention. The non-significant findings for relapse prevention may reflect the limited follow-up period and sample size. Future studies with extended follow-ups and larger cohorts are needed to clarify these effects. Our study found that participation in CM was associated with significant improvements in self-efficacy; this was likely due to the personalised support, resource coordination and ongoing follow-up provided by CM.<sup>13</sup> Improving self-efficacy is crucial for enhancing treatment engagement and quality of life, as individuals with higher self-efficacy are better equipped to manage symptoms and navigate life challenges. Therefore, CM interventions not only improve self-efficacy but also support overall recovery.<sup>14</sup> The improvement in social functioning aligns with findings from studies on intensive home treatment and structured interventions, such as Wellness Recovery Action Planning,<sup>15</sup> highlighting the critical role of social outcomes in recovery and long-term well-being.

### Limitations and future directions

Despite the valuable insights gained from this study, several limitations should be acknowledged. First, the small sample size and high attrition rate limit the generalisability of our findings. Second, the voluntary nature of treatment choice introduces potential selection bias, as participants who chose CM may differ in significant ways from those who selected CAU. Third, the 6-month follow-up period may not be

sufficient to fully capture the long-term effects of CM. Fourth, conducting this study at a single hospital in China limits the applicability of the findings to other settings or populations. Fifth, the real-world setting of this study made it difficult to fully distinguish the effects of CM from those of group therapy. Sixth, the data were collected between 2015 and 2017, which may impact the current applicability of the findings. Future studies should include larger, more diverse samples with extended follow-up periods, ideally conducted across multiple sites, to improve generalisability and better evaluate the long-term and distinct effects of CM.

**Acknowledgements** We gratefully acknowledge the grant support for this study. We also extend our sincere thanks to all the participants for their time and cooperation.

**Contributors** JC and GY conceived and designed the study. TG, LY, JL, DH, JX, TW, GY and JC contributed to or supervised data acquisition, while TG, RY and XZ conducted the data analysis. XZ, TG and JC drafted or revised the manuscript, ensuring its critical intellectual content. All authors reviewed and approved the final version of the manuscript, and JC serves as the guarantor of the study.

**Funding** This study was funded by Peking University Sixth Hospital (BDLYLZL2024-01) and the Capital Health Development Research Project Program of China (2014-4-4112).

**Competing interests** None declared.

**Patient consent for publication** Not applicable.

**Ethics approval** This study involves human participants and was approved by Ethics Committee of Peking University Sixth Hospital (2013-Youth-22). Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available upon reasonable request by contacting the corresponding author.

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