

Cost-Effectiveness of Individualized Occupational Therapy for Schizophrenia: Results from a Two-Year Randomized Controlled Trial

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Abstract: Objective: To evaluate the cost-effectiveness of adding individualized occupational therapy (IOT) to group occupational therapy (GOT) as standard care versus GOT alone for prevention of rehospitalization for patients with schizophrenia.

Methods: Data were collected from our previous randomized controlled trial from baseline psychiatric discharge to 2-year follow-up. The effectiveness was measured as the number of patients who were not rehospitalized, and the cost outcome was defined as direct medical costs.

Results: A total of 109 patients were included: 53 in GOT + IOT and 56 in GOT alone. The number of patients who avoided rehospitalization was significantly higher in the GOT + IOT ($n = 37$) condition compared with the GOT alone condition ($n = 16$) ($p < .001$). Adding IOT to GOT was associated with a 56.76% probability of being more effective at reducing the rehospitalization rate and a 26.93% probability of being less costly than GOT alone. GOT + IOT had high outpatient costs, but lower inpatient costs due to the lower rehospitalization rate; as a result, total medical costs were lower than for GOT alone.

Conclusions: Our results demonstrate that adding IOT to GOT is likely to reduce costs and the rehospitalization rate; thus, GOT + IOT is more cost-effective than GOT alone.

Keywords: schizophrenia, cost-effectiveness, rehabilitation, occupational therapy

(*Asian J Occup Ther* 16: 29–34, 2020)

Introduction

In the treatment of schizophrenia, it is important not only to reduce psychiatric symptoms but also to improve cognition and to prevent relapse and rehospitalization. To accomplish these aims, individualized intervention in occupational therapy (OT) is needed. However, the existing medical fee system for psychiatric OT in Japan

considers group treatment as standard practice. To improve the current situation of psychiatric OT in Japan, it is necessary to demonstrate the effectiveness of individually tailored OT intervention.

The individualized occupational therapy (IOT) program was developed to facilitate proactive participation in treatment and improve outcomes for patients with schizophrenia [1–3]. To evaluate the effect of adding IOT to group occupational therapy (GOT) as standard care, we conducted a multicenter, single-blind, randomized controlled trial, in which we assessed cognition using the Brief Assessment of Cognition in Schizophrenia (BACS) [4, 5] and the Schizophrenia Cognition Rating Scale (SCoRS) [6, 7], intrinsic motivation using the Intrinsic Motivation Inventory (IMI) [8], social

Received: 22 July 2019, Accepted: 25 February 2020

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functioning using the Global Assessment of Functioning (GAF) [9], psychiatric symptoms using the Positive and Negative Syndrome Scale (PANSS) [10], and treatment satisfaction using the Client Satisfaction Questionnaire (CSQ-8) [11, 12] among patients with schizophrenia. Furthermore, we utilized a multicenter 2-year prospective cohort study to evaluate the impact of the type of occupational therapy (GOT + IOT or GOT alone) that patients received on their subsequent rehospitalizations [3]. Findings of these studies demonstrated that adding IOT to GOT resulted in significant improvements in cognition and intrinsic motivation [2] and could prolong the time to rehospitalization and reduce the risk of rehospitalization in comparison to GOT alone, in addition to supporting good cognition at discharge and favorable medication adherence [3]. Details of the IOT study have been published [1–3].

Therefore, the costs associated with rehospitalization for patients receiving GOT + IOT may decrease, but the outpatient cost associated with averted rehospitalization may increase compared with GOT alone. However, the cost-effectiveness of adding IOT to standard care has been not examined. This study evaluated cost-effectiveness from the perspective of the health care system using our previous study data [2, 3] for GOT + IOT and GOT alone during a 2-year follow-up.

Methods

Participants and sites

Eligibility criteria for this study and patient disposition have already been reported [2, 3]. Of 260 patients who were assessed for eligibility, 136 patients with schizophrenia or schizoaffective disorder (DSM-5) who were recently hospitalized in a psychiatric hospital met the criteria for the previous study and, of these, 68 were randomly assigned to each of the GOT + IOT and GOT alone groups [2]. Seven of these participants dropped out at different points in that study [2]. Of those who completed the intervention, 18 did not meet the criteria [3]: 13 were hospitalized for over 1 year, 4 emigrated to other regions after discharge, and 1 was excluded for another reason [3]. In addition, two were excluded during the 2-year follow-up period. Therefore, 109 patients comprised the final sample used for analysis. Of them, 53 (48.62%) were from the GOT + IOT and 56 (51.38%) from the GOT alone groups.

This study was conducted between February 2016 and March 2019 at six Japanese psychiatric hospitals: one prefectural hospital, one general hospital department of psychiatry, and four private hospitals in Nagano, Japan. This study was approved by the ethics committees of the School of Medicine, Shinshu University

(3256); Medical Corporation Seitakai Mental Support Soyokaze Hospital; North Alps Medical Center Azumi Hospital; Nagano Prefectural Mental Wellness Center Komagane; Social Medical Corporation Ritsuzankai Iida Hospital; Medical Corporation Aiseikai Matsuoka Hospital; and Medical Corporation Akitsukai Nanshin Hospital. All participants provided written informed consent. This study was registered in the University Hospital Medical Information Network Clinical Trials Registry (UMIN-CTR) (UMIN000019569).

Interventions

The OT intervention methods have been reported elsewhere [1–3]. We only describe the main features here. The IOT is part of the hospital treatment that is provided via a one-on-one approach by occupational therapists. It consists of a combination of motivational interviews, self-monitoring, individualized visits, craft activities, individualized psychoeducation, and discharge planning. The main component of the program specific to the OT profession was the incorporation of craft activities with individualized coaching by occupational therapists, which is designed to address and improve cognition, the details of which were described in our previous study [2]. The GOT is a standard activity-oriented group treatment that was already being implemented at each study site and included the following programs: physical fitness, handicraft activities, cooking, music, recreation, and psychoeducation [2]. The patients voluntarily selected any desired program from among these options and participated at an individualized rate. Craft activities are also used in the GOT program; however, each patient voluntarily completes the craft activities based on their preferences, and occupational therapists assist only when the patient requests it.

Outcome measures

Clinical data on rehospitalization

Clinical data consisted of our previous study data [2, 3]. The primary clinical outcome was the number of patients who were not rehospitalized. This was calculated as the patients who did not rehospitalize from baseline psychiatric discharge to the 2-year follow-up.

Service use

Service uses and medication (antipsychotics) were investigated through diverse medical resources of inpatient and outpatient care.

Cost data

Cost data were defined from the mental health care

system perspective and involved only direct medical costs, which were defined using receipts collected by each study site collaborator. When a patient did not rehospitalize, the total cost was calculated as only the outpatient cost. When a patient rehospitalized, the total cost was calculated by adding the inpatient cost due to rehospitalization to the outpatient cost. If a patient experienced multiple rehospitalizations during the follow-up period, all inpatient and outpatient costs were included. These were collected separately for inpatient and outpatient costs. Costs were collected as Japanese Yen (JPY) based on the reference year from 2016 to 2018, and were then converted to US dollars using the exchange rate for the reference year June 7, 2019 (US\$ 1.00 equals to JPY 108.43).

Statistical analyses

The calculation of the planned sample size was described in our previous study [2]; it indicated that 150 patients with 75 patients randomly allocated to each group were needed.

The Mann-Whitney U test for continuous variables and χ^2 analyses for the categorical variables were used to compare the groups with regard to demographic and clinical values. The analysis of cost-effectiveness assessed the average direct medical costs per patient. Analyses of service use, cost components, and total costs compared GOT + IOT and GOT alone groups on average costs per patient from baseline psychiatric discharge to 2-year follow-up. If the GOT + IOT group as the experimental condition had higher cost outcomes than the GOT alone group as the control condition, the incremental cost-effectiveness ratio (ICER) was calculated as the difference in the average annualized total costs per patient divided by the difference in effectiveness (the number of patients who were not rehospitalized). The ICER was calculated as $(C_{\text{GOT + IOT}} - C_{\text{GOT alone}})/(E_{\text{GOT + IOT}} - E_{\text{GOT alone}})$, where C is the average per patient cost and E is the effectiveness. The uncertainty of differences in the effectiveness and cost data was estimated using 95% confidence intervals (CIs).

Results

Participant characteristics

Data on participant characteristics were collected at the baseline (psychiatric discharge) and during a 2-year follow-up after discharge. Of 109 patients (53 GOT + IOT, 56 GOT alone), which were collected with 2-year follow-up, were used in this study [2, 3]. The GOT + IOT group was significantly lower age ($p = 0.03$) and rehospitalization rate ($p < .001$) than GOT alone group, and scores of BACS composite ($p = 0.01$), IMI ($p < .001$), PANSS ($p < .001$), and CSQ-8 ($p < .001$) were significantly higher in the GOT + IOT group than in the GOT alone group.

.001), PANSS ($p < .001$), and CSQ-8 ($p < .001$) were significantly higher in the GOT + IOT group than in the GOT alone group.

Outcomes

A total of 53 (48.62%) patients were not rehospitalized during the 2-year follow-up period, of whom 37 (69.81%) were from the GOT + IOT group and 16 (30.19%) from the GOT alone group. GOT + IOT group patients experienced significantly lower rehospitalization frequency during the 2-year follow-up period than did the GOT alone group ($\chi^2 = 18.54$, $p < .001$).

Service use

Measures of service use by treatment group (GOT + IOT; GOT alone) are described in Table 1. For mental health inpatients, all inpatient days and occupational therapy times for the GOT + IOT group were significant shorter than those in the GOT alone group. In addition, for mental health outpatients, all outpatient days, consultation with psychiatrists times, and home visit nursing times were significantly longer in the GOT + IOT group than those in the GOT alone group.

Costs

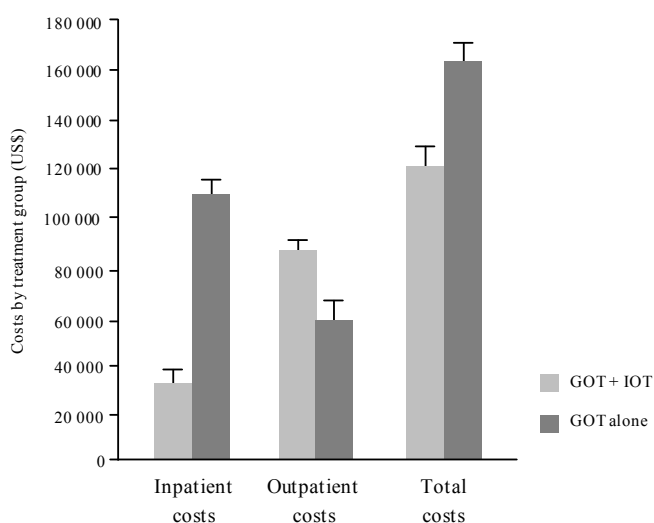
Measures of service use and related costs by treatment group (GOT + IOT; GOT alone) are summarized in Table 2. The GOT + IOT group generated significantly lower costs (US\$ 116 454.66; 95% CI = 106 088.42–126 820.89) than did the GOT alone condition (US\$ 159 379.89; 95% CI = 146 579.61–172 180.18), representing a significant cost reduction of US\$ 42 925.24 per patient ($p < .001$) (Fig. 1). GOT alone generated higher total costs than GOT + IOT, with 26.93% of the increased costs attributable to increased inpatient service costs (Table 2). There was a significant difference ($U = 212.0$, $p = .020$) between patients who were rehospitalized following GOT + IOT ($n = 16$; US\$ 162 137.07; SD = 30 857.44) versus those hospitalized following GOT alone ($n = 40$; US\$ 183 739.39; SD = 31 452.93). Costs associated with patients without rehospitalization did not differ significantly ($U = 224.0$, $p = .154$) between GOT + IOT ($n = 37$; US\$ 95 465.44; SD = 16 188.75) and GOT alone ($n = 16$; US\$ 96 958.69; SD = 16 501.89). Total inpatient costs for GOT + IOT were US\$ 32 952.24 (95% CI = 18 334.90–47 569.58) significantly lower than inpatient costs associated with GOT alone (US\$ 107 166.53; 95% CI = 86 387.54–127 945.53) ($p < .001$). Total outpatient costs for GOT + IOT were US\$ 83 502.42 (95% CI = 78 056.27–88 948.56) significantly greater than those for GOT alone (US\$ 52 213.36; 95% CI = 43 906.32–60 520.40) ($p < .001$). The difference between GOT + IOT and GOT alone in services re-

Table 1 Measures of service use by treatment group (GOT + IOT; GOT alone).

	GOT + IOT (n = 53)	GOT alone (n = 56)	Statistic ^a	Effect size ^b	<i>p</i>
	Mean (SD)	Mean (SD)			
Mental health medical inpatient					
All inpatient days	93.30 (160.90)	331.79 (249.53)	712.5	0.49	< .001**
Occupational therapy times	53.24 (90.90)	167.02 (136.70)	783.0	0.45	< .001**
Mental health medical outpatient					
All outpatient days	636.70 (160.90)	398.21 (249.53)	712.5	0.49	< .001**
Consultation with psychiatrist times	44.78 (12.39)	30.96 (22.27)	819.0	0.43	< .001**
Outpatient occupational therapy times	41.48 (59.50)	35.58 (54.80)	1526.0	0.01	.937
Day care times	57.11 (122.59)	33.89 (74.31)	1499.5	0.03	.775
Home visit nursing times	30.11 (23.45)	22.11 (18.78)	1250.0	0.17	.085

^a Comparison of GOT + IOT and GOT alone was conducted with Mann–Whitney U test.^b Effect sizes were calculated using *r* coefficient.** *p* < 0.01**Table 2** Measures of costs by treatment group (GOT + IOT; GOT alone).

	GOT + IOT (n = 53)	GOT alone (n = 56)	Statistic ^a	Effect size ^b	<i>p</i>
	Mean (SD)	Mean (SD)			
Mental health medical inpatient costs, US\$					
Occupational therapy	1,080.23 (1,844.23)	3,388.72 (2,773.67)	783.0	0.45	< .001**
Medication	10,879.23 (18,782.21)	38,720.50 (29,120.22)	712.5	0.49	< .001**
Inpatient total costs	32,952.24 (53,553.68)	107,166.53 (78,312.09)	725.0	0.49	< .001**
Mental health medical outpatient costs, US\$					
Outpatient occupational therapy	858.55 (1,214.88)	721.88 (1,111.90)	1519.0	0.01	.903
Day care	3,370.94 (7,235.61)	2,000.61 (4,385.84)	1499.5	0.03	.775
Home visit nursing	1,604.72 (1,258.81)	1,182.43 (1,004.73)	1258.0	0.16	.094
Medication	75,024.21 (18,600.81)	46,471.97 (29,120.22)	695.0	0.50	< .001**
Outpatient total costs	83,502.42 (19,953.09)	52,213.36 (31,307.65)	766.0	0.44	< .001**
Total costs, US\$	116,454.66 (37,978.86)	159,379.89 (48,241.85)	717.0	0.47	< .001**

^a Comparison of GOT + IOT and GOT alone was conducted with Mann–Whitney U test.^b Effect sizes were calculated using *r* coefficient.** *p* < 0.01**Fig. 1.** Comparison of inpatient total costs, outpatient total costs, and total costs by treatment group (GOT + IOT; GOT alone). Means ± standard error.

ceived is partly explained by the lower rehospitalization rate in the GOT + IOT group and the higher inpatient service use costs in GOT alone group.

Discussion

Main findings

This is, to our knowledge, the first study to evaluate the cost-effectiveness of adding IOT to GOT in comparison to GOT alone. Our results of cost-effectiveness analyses demonstrated that adding IOT to GOT had greater potential cost-effectiveness than GOT alone. This cost saving was brought about by the addition of IOT to GOT, which improved cognitive functioning and intrinsic motivation [2] and reduced rehospitalization rates [3]. GOT + IOT had high outpatient costs, but lower inpatient costs with a lower rehospitalization rate; consequently, total medical costs were lower than for

GOT alone. The main drivers of differences in costs between GOT + IOT and GOT alone were inpatient costs due to rehospitalization (Table 2). Furthermore, GOT + IOT cost US\$ 42 925.24 less per patient than GOT alone, representing 26.93% more cost-effectiveness of the former approach. Sensitivity analyses, using 95% CIs, attested to the robustness of the findings of benefits and costs for IOT. Therefore, adding IOT to standard care during hospitalization should be recommended not only in terms of prevention of rehospitalization [3] but also in terms of cost-effectiveness.

Clinical and cost-effectiveness relevance

Treatment choices to improve outcomes for schizophrenia have been explored to alleviate personal suffering and to reduce the high health care costs associated with the illness [13]. Schizophrenia is associated with frequent rehospitalization during its clinical course, with considerable economic burden [14–20]. Hospitalization has been identified as a significant cost driver [21, 22]. Estimates of the annual economic burden of schizophrenia in Japan in 2008 were JPY 2.77 trillion (US\$ 23.8 billion) for total costs, while the total cost per patient was JPY 3 538 751 million (US\$ 30 298) [18]. Hence, rehospitalization prevention is an important element in schizophrenia treatment, not only in terms of functional improvement [23–25], but also with respect to cost-effectiveness.

Adding IOT to standard care might help prevent rehospitalization [2, 3]; as IOT intervention during hospitalization is cost-effective and perhaps even cost saving, IOT should readily be accepted as a component of schizophrenia treatment.

Issues of medical fee system

The existing medical fee system for psychiatric OT in Japan considers group treatment as standard. For this reason, GOT intervention is widely practiced for patients with schizophrenia in many Japanese psychiatric hospitals, but IOT is rarely implemented in Japan. To improve the current situation, it is necessary to demonstrate the effectiveness of individually tailored OT interventions.

In our clinical experience, the number of patients who can be treated with OT in the time permitted by the medical fee system is 10–12 for GOT, but only 2–3 for IOT. Therefore, it is necessary to ensure IOT is added to the medical fee system to ensure that IOT is practical in psychiatric hospitals in Japan. As shown in our previous studies [2, 3] and this study, our findings provide robust evidence for shifting from traditional OT, which is based on group treatment, to individualized OT, not only to improve rehospitalization rates of patients with schizophrenia but also for cost savings due to less frequent

rehospitalization.

Limitations

Some limitations should be noted. First, our method for determining the costs was a simple comparison of direct medical costs of GOT + IOT and GOT alone groups. For cost-effectiveness analysis, although the Quality Adjusted Life Year (QALY) is recommended as the outcome variable, we could not use QALY, because quality of life values were not obtained in this study. Second, we measured only direct medical costs in this study, and did not include direct non-medical costs and indirect costs. The analysis was conducted from the perspective of the health care system, and thus did not address costs incurred by patients' families or other social welfare systems. In addition, costs for medications other than antipsychotics were not measured. Therefore, costs might be slightly underestimated and savings slightly overestimated. Third, because IOT is provided one-on-one with an occupational therapist, the case load during hospitalization of adding IOT to GOT is less than that for GOT. However, the cost due to the difference in case load for GOT + IOT versus GOT alone was not collected. Therefore, it was not possible to investigate whether conditions differed in terms of health service utilization at the start of the trial. Finally, because this study was conducted in Japan, the results may not be generalizable to countries that have different health care systems.

Conclusion

This study provides support that adding IOT to standard care results in reduced rehospitalization rates at lower cost. Cost savings appeared probable for most of the study participants. Although further confirmation is needed, the results of our studies of IOT provide data that encourage the revision of Japanese psychiatric occupational therapy's medical fee system.

Acknowledgments

This study was supported by the Japanese Association of Occupational Therapists (2016–01). The authors declare no conflicts of interest. The authors would like to express their gratitude to the participants for their cooperation. We would also like to acknowledge the support received from the following individuals: Tokiji Hanihara, MD, PhD; Ai Nishi, OTR; Tomotaka Yoshida, MD; Akane Machida, OTR; Shiho Murata, MD; Rumiko Arai, OTR; Tadahiko Hikake, MD; Miki Nakamura, OTR; Yasushi Haebara, MD; Ayumi Terashima, OTR; Takashi Muto, MD; Maki Ueki, OTR; Koichi Matsuoka, MD; and Shinichi Noto, OTR, PhD. We are also grateful for the cooperation and assistance of the following or-

ganizations: Mental Support Soyokaze Hospital, North Alps Medical Center Azumi Hospital, Nagano Prefectural Mental Wellness Center Komagane, Iida Hospital, Nanshin Hospital, and Matsuoka Hospital.

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