Need for Prescription Suggestions for Long-term Inpatients in the Psychiatric Ward

Kenji Shin, a, b Daisuke Kobayashi, a, c Takehiro Kawashiri, a Yuichi Ushijima, b Keita Moritaka, b Hiroshi Yanai, b Yuko Ichiki, a Aya Murakami, a Yasunori Kanazawa, b Hidetoshi Kamimura, c and Takao Shimazoe a

a Department of Clinical Pharmacy and Pharmaceutical Care, Graduate School of Pharmaceutical Sciences, Kyushu University; 3–1–1 Maidashi, Higashi-ku, Fukuoka 812–8582, Japan; b Department of Pharmacy, Iizuka Hospital; 3–83 Yoshio-machi, Iizuka, Fukuoka 820–8505, Japan; and c Department of Pharmacy, Fukuoka University Hospital; 7–45–1 Nanakuma, Jonan-ku, Fukuoka 814–0108, Japan.

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Additional fees for ward pharmacists’ services have been valued for hospitals in Japan. However, the calculation period for services provided to inpatients in the psychiatric ward is limited to 8 weeks. This study aimed to reveal the need for the services of pharmacists in the hospital ward for inpatients hospitalized for >8 weeks in the psychiatric ward. Patients who were hospitalized in the psychiatric ward from September 2016 to February 2017 were analyzed retrospectively. The pharmacists suggested prescriptions for inpatients admitted for >8 weeks, similar to those admitted for <9 weeks, and this supported pharmacotherapy without exacerbating patient outcomes. Moreover, significant decreases in benzodiazepine doses were found between the prior and post prescription suggestions of the pharmacist for inpatients >8 weeks of admission. Healthcare expenditures were also reduced. These results suggest that the prescriptions suggested by pharmacists for inpatients admitted for >8 weeks in the psychiatric ward were useful. In conclusion, our findings show that ward pharmacists’ services were necessary not only for the inpatients hospitalized for <9 weeks, but also for those hospitalized for >8 weeks.

Key words—psychiatric ward; long-term inpatient; prescription suggestion; benzodiazepine; healthcare expenditure

INTRODUCTION

Additional fees for ward pharmacists’ services were reviewed in the medical fee revision in the 2012 fiscal year in Japan. Hospital pharmacists are valued on their performance with regards to the improvement of efficacy and safety in pharmacotherapy in the wards. The general ward was not limited in the calculation period of additional fees for ward pharmacists’ services in terms of the duration of hospitalization. In contrast, the psychiatric and recuperation wards were limited to 4 weeks from the day of hospitalization. In the medical fee revision for the 2014 fiscal year, the additional fees for ward pharmacists’ services were reviewed to promote team-based medical care. Consequently, the calculation period for the psychiatric and recuperation wards was extended from 4 to 8 weeks because of pharmacists’ continued pharmacotherapy support for inpatients for >3 weeks in these wards. However, the calculation period remains limited to 8 weeks.

In Iizuka Hospital, additional fees for ward pharmacists’ services were implemented in April 2012. Although the calculation period for pharmacists’ services provided in the psychiatric ward is limited to 8 weeks, pharmacists are actively involved in pharmacotherapy for inpatients beyond 8 weeks, adhering to high-quality pharmaceutical management.

Several studies have reported the importance of ward pharmacists’ services in the general ward 1-5 and psychiatric ward. 6-9 However, few studies have reported the value of pharmacist interventions for inpatients beyond 8 weeks, 10 and it has not been reported in the psychiatric ward.

In this study, we evaluated the effect of prescription suggestions by pharmacists to show the need for ward pharmacists’ services beyond 8 weeks for inpatients in the psychiatric ward.

METHODS

Subjects The subjects were 69 inpatients hospitalized between September 2016 and February 2017 in the psychiatric ward at Iizuka Hospital. If a patient had problems with efficacy and safety in pharmacotherapy, a pharmacist made prescription suggestions to doctors. Four pharmacists in charge of the
pharmacist interventions in inpatients of psychiatric ward provided prescription suggestions. The study was approved by the Ethics Committees of both Kyushu University and Iizuka Hospital. The approval numbers were 17096 and 29-284, respectively.

Clinical Data Collection We retrospectively investigated the clinical data of enrolled inpatients using their electronic medical records. Precise information was obtained on age, sex, primary disease, hospitalization period, contents of prescription suggestions by the pharmacists, and patient outcomes.

Investigations on Prescription Suggestions We compared the percentage of patients with prescription suggestions in patients with <9 weeks hospitalization and in those with >8 weeks. We investigated the number of prescription suggestions for inpatients of <9 weeks and those of >8 weeks, and we examined the percentage of the adopted prescription suggestions by the doctor relative to the number of prescription suggestions. Similarly, for high-risk drugs,11 we examined the percentage of the adopted prescription suggestions by the doctor relative to the number of prescription suggestions.

The characteristics of adopted prescription suggestions were analyzed for the following items: drug class, intervention factor, intervention content, and patient outcomes. We classified the drug class according to the type of psychotropic drug. The intervention factors were categorized into “symptom”, “side effect”, “unrequired because of symptom improvement”, “excessive dosage or polypharmacy”, “insufficient effect”, “contraindication”, and “improvement in feeling of taking medicine”. The intervention contents were categorized into “addition of drugs”, “dosage increase”, “dose reduction or discontinuation”, “administration change”, and “change in dosage form”. Patient outcomes were determined using the judgments of doctors or laboratory values of the medical records as follows: “improvement”, “unchanged”, or “exacerbation”.

Investigations on Prescription Change We analyzed prescription changes between prior and post pharmacist interventions in inpatients of >8 weeks hospitalization. We set the day before the pharmacist interventions to September 1, 2016, which was the first day of the investigation period. The day after the pharmacist intervention was set to March 1, 2017, which was the day after the final day of the investigation period. In the cases where the patient left the hospital before March 1, 2017, we considered the prescription at discharge as the one after the intervention. Dose equivalents of antipsychotics, anxiolytics/hypnotics, and anti-Parkinson’s drugs, based on previous reports, were used.12,13

Estimation of Reduced Healthcare Expenditures We calculated the reduced drug costs per inpatient of <9 weeks and >8 weeks for the “dose reduction or discontinuation” intervention content. The reduced drug costs were calculated per day. Tasaka et al.14 reported reduced healthcare expenditures based on a relief system provided by the Pharmaceuticals and Medical Devices Agency for sufferers of adverse drug reactions. Thus, we assumed that reduced healthcare expenditures were 2,140,000 yen per number with the avoidance of clinically significant adverse reactions or serious cases, 84,000 yen per number for high-risk drugs, and 56,000 yen per number for “non-high-risk drugs”. We calculated per inpatient in accordance with the case of reduced drug costs.

Statistical Analysis Percentages were compared using Chi-squared test or Fisher’s exact test, as appropriate. Wilcoxon signed-rank test was used for the statistical comparisons of each item in the prescription change suggested by the pharmacists to inpatients of >8 weeks. All statistical analyses were performed using JMP Pro 13 software (SAS Institute Inc., Cary) and statistical significance was assumed at p < 0.05.

RESULTS

Patient Characteristics Table 1 shows the characteristics of the patients. The median age of the 22 males and 47 females was 65 years. The primary disease of 44 of the patients was “schizophrenia, schizotypal, and delusional disorders” based on the International Statistical Classification of Diseases and Related Health Problems, 10th Revision. The patients with prescription suggestions of <9 weeks comprised 2 males and 6 females (median age, 61 years), and the median hospitalization period was 35.5 d. The primary disease in 5 of the patients was “schizophrenia, schizotypal, and delusional disorders”. Patients with prescription suggestions for >8 weeks comprised 9 males and 23 females (median age, 64.5 years), and the median hospitalization period was 1227 d. The primary disease in 23 of the patients was “schizophrenia, schizotypal, and delusional disorders”. There were no significant differences between the sex, age, and primary disease of the inpatients of <9 weeks.
Table 1. Characteristics of Patients

(A) Characteristics of all enrolled patients

| Characteristics                          | Patient numbers (n = 69) |
|------------------------------------------|-------------------------|
| Sex (n)                                  |                         |
| Male/Female                              | 22/47                   |
| Age (years)                              |                         |
| Median (min–max)                         | 65 (23–90)              |
| Primary disease† (n)                     |                         |
| F00–09 Organic, including symptomatic, mental disorders | 6 |
| F10–19 Mental and behavioral disorders due to psychoactive substance use | 2 |
| F20–29 Schizophrenia, schizotypal, and delusional disorders | 44 |
| F30–39 Mood affective disorders          | 17                      |

(B) Characteristics of patients for prescription suggestions

| Characteristics                          | Length of hospital stay | p-value |
|------------------------------------------|-------------------------|---------|
|                                          | Less than 9 weeks (n = 8) | Greater than 8 weeks (n = 32) |
| Sex (n)                                  |                         |         |
| Male/Female                              | 2/6                     | 9/23    | 1.00   |
| Age (years)                              |                         |         |
| Median (min–max)                         | 61 (23–75)              | 64.5 (23–81) | 0.44   |
| Primary disease† (n)                     |                         |         |
| F00–09 Organic, including symptomatic, mental disorders | 1 |
| F10–19 Mental and behavioral disorders due to psychoactive substance use | 2 |
| F20–29 Schizophrenia, schizotypal and delusional disorders | 5 |
| F30–39 Mood affective disorders          | 2                       | 5       | 0.82   |
| Length of hospitalization (d)            |                         |         |
| Median (min–max)                         | 35.5 (1–56)             | 1227 (57–13006) | <0.01* |

† International Statistical Classification of Diseases and Related Health Problems, 10th Revision. Sex: Fisher’s exact test; Age and Length of hospitalization: Wilcoxon rank sum test; Primary disease: Chi-squared test. *p < 0.05.

and those of >8 weeks. In the cases where patients did not receive prescription suggestions from the pharmacists, it was either the doctor had changed the prescription before the pharmacist made the prescription proposal or there was no need for the prescription suggestion.

States of Prescription Suggestions  The number of prescription suggestions and the percentage of adoption are shown in Table 2. The number of inpatients hospitalized of <9 weeks and >8 weeks were 24 and 58, respectively. Of these, 13 patients belonged to both periods of hospitalization. The percentages of patients with prescription suggestions for inpatients <9 weeks and >8 weeks were 33.3% and 55.2%, respectively. The percentages of adopted prescription suggestions for inpatients <9 weeks and >8 weeks were 94.4% and 98.2%, respectively. Moreover, the percentages of prescription suggestions of high-risk drugs relative to the total prescription suggestions in the two groups were 61.1% and 51.4%, respectively.

The doctors adopted all prescription suggestions for high-risk drugs. There were no significant differences between the inpatients of <9 weeks and >8 weeks. However, the percentage of inpatients for prescription suggestions of >8 weeks tended to be higher than that for inpatients <9 weeks (p = 0.07).

The number and percentage of drug class, intervention factor, and intervention content for adopted prescription suggestions are shown in Table 3. In both the inpatients of <9 weeks and >8 weeks, antipsychotics were the drug class with the highest prescription suggestion, and the number of antipsychotics was 11 (64.7%) and 37 (34.6%), respectively. The prescription suggestions for antipsychotics and drugs for schizophrenia were 11 (100%) and 34 (91.9%), respectively. The highest number of intervention factors was 4 (23.5%), which was for both “insufficient effect” and “improvement in feeling of taking medicine” for inpatients of <9 weeks. Among inpatients of >8 weeks, the highest number was 33 (30.8%).
Table 2. Number and Percentage of Prescription Suggestions

| Item                                | Length of hospital stay |       |       |       |       |       |
|-------------------------------------|-------------------------|-------|-------|-------|-------|-------|
|                                     | <9 weeks (n = 24)       | ≥8 weeks (n = 58)* | p-value |
|                                     | Number (n) | Percentage (%) | Number (n) | Percentage (%) |
| Patients for prescription suggestionsb | 8       | 33.3     | 32      | 55.2     | 0.07   |
| Prescription suggestions             | 18      | 100.0    | 109     | 100.0    |        |
| Adopted prescription suggestionsc    | 17      | 94.4     | 107     | 98.2     | 0.37   |
| Prescription suggestions for high-risk drugsd | 11      | 61.1     | 56      | 51.4     | 0.44   |
| Adopted prescription suggestions for high-risk drugs e | 11      | 100.0    | 56      | 100.0    | 1.00   |

*a The 13 patients were included in both periods of hospitalization (<9 weeks and ≥8 weeks).
*b The percentage of patients for prescription suggestions = (Number of patients that received prescription suggestions/Total number of inpatients) × 100.
*c The percentage of adopted prescription suggestions = (Number of adopted prescription suggestions/Total number of prescription suggestions) × 100.
*d The percentage of prescription suggestions for high-risk drugs = (Number of prescription suggestions for high-risk drugs/Total number of prescription suggestions) × 100.
*e The percentage of adopted prescription suggestions for high-risk drugs = (Number of adopted prescription suggestions for high-risk drugs/Total number of prescription suggestions for high-risk drugs) × 100.

Chi-squared test or Fisher’s exact test.

Table 3. Number and Percentage of Drug Class, Intervention Factor, and Intervention Content for Adopted Prescription Suggestions

| Category                        | The number of adopted prescription suggestions |
|---------------------------------|-----------------------------------------------|
|                                 | Inpatients of <9 weeks (n = 17) | Inpatients of ≥8 weeks (n = 107) |
|                                 | Number (n) | Percentage (%) | Number (n) | Percentage (%) |
| Drug class                      |                                                      |
| Antipsychotics                  | 11         | 64.7         | 37         | 34.6         |
| Hypnotics                       | 1          | 5.9          | 19         | 17.8         |
| Mood-stabilizers                | 1          | 5.9          | 13         | 12.1         |
| Anxiolytics                     | 0          | 0.0          | 7          | 6.5          |
| Antidepressants                 | 0          | 0.0          | 4          | 3.7          |
| Anti-Parkinson’s drugs          | 0          | 0.0          | 3          | 2.8          |
| Antidementia drugs              | 0          | 0.0          | 1          | 0.9          |
| Antiepileptics                  | 0          | 0.0          | 1          | 0.9          |
| Non-psychotropic drugs          | 4          | 23.5         | 22         | 20.6         |
| Intervention factor             |                                                      |
| Insufficient effect             | 4          | 23.5         | 33         | 30.8         |
| Side effect                     | 2          | 11.8         | 30         | 28.0         |
| Symptom                         | 3          | 17.6         | 24         | 22.4         |
| Improvement in feeling of taking medicine | 4        | 23.5         | 9          | 8.4          |
| Excessive dosage or polypharmacy| 0          | 0.0          | 9          | 8.4          |
| Unrequired because of symptom improvement | 0    | 0.0          | 2          | 1.9          |
| Contraindication                | 1          | 5.9          | 0          | 0.0          |
| Others                          | 3          | 17.6         | 0          | 0.0          |
| Intervention content            |                                                      |
| Dose reduction/discontinuation   | 4          | 23.5         | 52         | 48.6         |
| Addition of drugs               | 4          | 23.5         | 24         | 22.4         |
| Dosage increase                 | 4          | 23.5         | 22         | 20.6         |
| Administration change           | 4          | 23.5         | 2          | 1.9          |
| Change in dosage form           | 1          | 5.9          | 2          | 1.9          |
| Others                          | 0          | 0.0          | 5          | 4.7          |
for insufficient effect, followed by 30 (28.0%) for side effects, and 24 (22.4%) for symptoms. The reasons for prescription suggestions due to side effects for inpatients of $<9$ weeks were extrapyramidal symptoms ($n=1$) and hypertension ($n=1$). Among inpatients of $>8$ weeks, the reasons were drowsiness or malaise ($n=8$), extrapyramidal symptoms ($n=7$), constipation or diarrhea ($n=6$), hepatic dysfunction ($n=2$), muscle relaxation ($n=2$), thirst ($n=2$), and others ($n=3$). For the intervention content, the highest number was 4 (23.5%) for dose reduction or discontinuation, addition of drugs, dosage increase, and administration change for inpatients of $<9$ weeks, whereas it was 52 (48.6%) for dose reduction or discontinuation for inpatients of $>8$ weeks. Drug class for prescription suggestions of dose reduction or discontinuation for inpatients $<9$ weeks was antipsychotics ($n=4$). Among inpatients of $>8$ weeks, drug classes were antipsychotics ($n=19$), hypnotics ($n=14$), anxiolytics ($n=4$), anti-Parkinson’s drugs ($n=2$), mood-stabilizers ($n=1$), antidepressants ($n=1$), and anti-Parkinson’s drugs ($n=10$).

The outcomes of patients with adopted prescription suggestions are shown in Table 4. Patient outcomes for inpatients $<9$ weeks were 29.4% and 70.6% for “improvement” and “unchanged”, respectively. For inpatients of $>8$ weeks, their outcomes were 47.7%, 50.5%, and 1.9% for “improvement”, “unchanged”, and “exacerbation”, respectively. With regards to patient outcomes, there was no significant difference between the inpatients of $<9$ weeks and those of $>8$ weeks.

**States of Prescription Change** Table 5 shows the prescription changes in the patients hospitalized for $>8$ weeks before and after the prescription suggestions. After the interventions, the diazepam equivalents of anxiolytics and hypnotics were significantly lower (median, 13.8 mg) than those before intervention (median, 20.0 mg).

**Estimation of Reduced Healthcare Expenditure** The estimation of reduced healthcare expenditures is shown in Table 6. Reduced daily drug costs per patient were 26 yen for inpatients $<9$ weeks and 45 yen for inpatients $>8$ weeks. Reduced healthcare expenditures per patient based on a relief system for sufferers of adverse drug reactions was 99,667 yen and 96,276 yen for inpatients $<9$ weeks and $>8$ weeks, respectively. Reduced healthcare expenditures per patient based on the avoidance of clinically significant adverse or serious reactions were 89,167 yen for inpatients $<9$ weeks and 36,897 yen for those $>8$ weeks.
Table 6. Estimation of Reduced Healthcare Expenditures

(A) Reduced daily drug costs

| Intervention factor                      | Duration of hospital stay | < 9 weeks \(n = 24\) | > 8 weeks \(n = 58\) |
|-----------------------------------------|---------------------------|------------------------|------------------------|
|                                         | Number \((n)\) | Reduced drug costs \((yen)\) | Number \((n)\) | Reduced drug costs \((yen)\) |
| Side effect                              | 2 | 75 | 25 | 1,012 |
| Insufficient effect                      | 0 | 0 | 16 | 1,477 |
| Excessive dosage or polypharmacy        | 0 | 0 | 9 | 77 |
| Unrequired because of symptom improvement | 0 | 0 | 2 | 72 |
| Contraindication                         | 1 | 517 | 0 | 0 |
| Others                                   | 1 | 25 | 0 | 0 |
| Total                                    | 4 | 617 | 52 | 2,638 |
| Per patient                              | 0.17 | 26 | 0.90 | 45 |

(B) Reduced healthcare expenditures based on relief system for sufferers of adverse drug reactions

| Intervention factor                              | Duration of hospital stay | < 9 weeks \(n = 24\) | > 8 weeks \(n = 58\) |
|--------------------------------------------------|---------------------------|------------------------|------------------------|
| Avoidance of clinically significant adverse or serious reactions | Number \((n)\) | Reduced healthcare expenditures \((yen)\) | Number \((n)\) | Reduced healthcare expenditures \((yen)\) |
| Side effect                                       | 0 | 0 | 1 | 2,140,000 |
| Insufficient effect                               | — | — | — | — |
| Excessive dosage or polypharmacy                  | — | — | — | — |
| Unrequired because of symptom improvement         | — | — | — | — |
| Contraindication                                  | 1 | 2,140,000 | 0 | 0 |
| Others                                            | 0 | 0 | 0 | 0 |
| Subtotal                                          | 1 | 2,140,000 | 1 | 2,140,000 |
| Per patient                                       | 0.04 | 89,167 | 0.02 | 36,897 |

| High-risk drugs |
|-----------------|
| Side effect     | 2 | 168,000 | 10 | 840,000 |
| Insufficient effect | 0 | 0 | 10 | 840,000 |
| Excessive dosage or polypharmacy | 0 | 0 | 1 | 84,000 |
| Unrequired because of symptom improvement | 0 | 0 | 0 | 0 |
| Contraindication | 0 | 0 | 0 | 0 |
| Others           | 1 | 84,000 | 0 | 0 |
| Subtotal         | 3 | 252,000 | 21 | 1,764,000 |
| Per patient      | 0.13 | 10,500 | 0.36 | 30,414 |

| Non-high-risk drugs |
|---------------------|
| Side effect         | 0 | 0 | 14 | 784,000 |
| Insufficient effect | 0 | 0 | 6 | 336,000 |
| Excessive dosage or polypharmacy | 0 | 0 | 8 | 448,000 |
| Unrequired because of symptom improvement | 0 | 0 | 2 | 112,000 |
| Contraindication    | 0 | 0 | 0 | 0 |
| Others              | 0 | 0 | 0 | 0 |
| Subtotal            | 0 | 0 | 30 | 1,680,000 |
| Per patient         | 0 | 0 | 0.52 | 28,966 |
| Total               | 4 | 2,392,000 | 52 | 5,584,000 |
| Per patient         | 0.17 | 99,667 | 0.90 | 96,276 |
| Per intervention    | — | 598,000 | — | 107,385 |
weeks. For high-risk drugs, reduced healthcare expenditures per patient were 10,500 yen for inpatients < 9 weeks and 30,414 yen for those > 8 weeks. In cases of “non-high-risk drugs”, reduced healthcare expenditures per patient were 28,966 yen for the inpatients of > 8 weeks. Reduced healthcare expenditures per intervention were 598,000 yen and 107,385 yen for inpatients < 9 weeks and > 8 weeks, respectively.

DISCUSSION

In this study, our analysis showed that the pharmacists suggested prescriptions without exacerbating patient outcomes for inpatients of both < 9 weeks and > 8 weeks. The doctors adopted all prescriptions suggested by the pharmacists for high-risk drugs at both periods of hospitalization. These results indicate that pharmacists could support doctor’s prescriptions regardless of the duration of hospital stay. Some patients did not receive prescription suggestions during the study period because the doctor had changed the prescription before the prescription suggestion from the pharmacists. In some cases, there was no need for prescription suggestion because the pharmacists evaluated the efficacy and safety of the drug therapy as satisfactory. The number of patients hospitalized for > 8 weeks was larger than that for < 9 weeks. We considered that some patients belonged to both duration of hospitalization and many patients had been hospitalized for > 8 weeks at the start of the study period.

Antipsychotics were the most suggested drug class for inpatients of both < 9 weeks and > 8 weeks. The main pharmacotherapy for schizophrenia is antipsychotics. In this study, more than 90% of prescription suggestions for antipsychotics involved interventions with drugs for schizophrenia. The results of this study suggest that pharmacists could support the pharmacotherapy of psychiatric disease regardless of the duration of hospital stay. The percentage of side effects was high among the intervention factors in the adopted prescription suggestion for patients > 8 weeks. It is important that in serious psychiatric diseases, the use of psychotropic drugs should be continued to prevent recurrence. However, it has been reported that side effects deteriorate adherence. Pharmacists’ intervention for side effects should mostly contribute not only to securing patients’ safety but also to the strengthening of adherence. The percentages of “insufficient effect” and “symptom” were also high among the intervention factors in the adopted prescription suggestions. Patient outcomes after prescription suggestions by the pharmacist showed significant improvement and were unchanged for both inpatients < 9 weeks and > 8 weeks. There was no significant difference in patient outcomes with regards to the duration of hospital stay. In other words, pharmacists could contribute to the support of pharmacotherapy without exacerbating patient outcomes regardless of the duration of hospital stay. These findings suggest that pharmacists might contribute to the improvement in medical care quality from the perspective of safety and efficacy.

The administration of diazepam equivalents for inpatients > 8 weeks was significantly lower before and after the pharmacists’ intervention. It has been reported that benzodiazepines are associated with a carry-over effect, anterograde amnesia, cognitive function disorder, and increased death rate. Furthermore, drug dependence has been indicated, and therefore, an unnecessary administration of benzodiazepines should be avoided. Meanwhile, the present study demonstrated that pharmacists contributed to a reduction in diazepam equivalents for long-term inpatients. This may reduce the risk of side effects and avoid the aimless administration of benzodiazepines. Ward pharmacists’ services for long-term inpatients led to the proper use of benzodiazepines.

Concerning healthcare expenditures, reduced drug costs per patient for inpatients of > 8 weeks were higher than those of < 9 weeks. Reduced healthcare expenditures of “high-risk drugs” and “non-high-risk drugs” based on the relief system for sufferers of adverse drug reactions were also higher. This may be due to the many prescription suggestions of “dose reduction or discontinuation” for inpatients of > 8 weeks. However, reduced healthcare expenditures per intervention for inpatients of > 8 weeks were lower than those of < 9 weeks. It may be due to the large number of interventions of “non-high-risk drugs”
for the inpatients of $>8$ weeks because of the long duration of hospital stays. Drug classes for many prescription suggestions of “dose reduction or discontinuation” of non-high-risk drugs were hypnotics and anxiolytics. We considered there were many cases to assess the need for continuing administration for these drugs. These findings suggest that supporting the reduction of hypnotics and anxiolytics in inpatients of $>8$ weeks might be more important than in inpatients of $<9$ weeks, and it would reduce healthcare expenditures. Recently, there has been a serious increase in healthcare expenditures, and it is therefore important that pharmacists develop an approach in consideration of the reduction of healthcare expenditures. It has been reported that the reduction of adopted medicines, infection control and prevention, and proper reuse of excess drugs can contribute to the reduction of healthcare expenditures. Murata et al. reported that the adjustment of antipsychotics in the psychiatric ward had an economic impact. In our findings, ward pharmacists’ services for long-term inpatients in the psychiatric ward seemed to reduce healthcare expenditures. Considering these results, prescription support for long-term inpatients is beneficial, and continued intervention by pharmacists is needed in the psychiatric ward.

The limitations of this study should be acknowledged. We cannot examine the versatility of the findings of only one hospital and the possibility of prescription suggestions for only schizophrenia patients. Meanwhile, the Department of Mental Health Policy, National Institute of Mental Health, National Center of Neurology and Psychiatry has reported that the length of stay for the majority of inpatients in psychiatric beds is over 1 year. Ministry of Health, Labour and Welfare has reported that the highest number of primary diseases in psychiatric beds is schizophrenia, schizotypal, and delusional disorders, followed by Alzheimer’s disease and mood [affective] disorders in this order. Similarly, our study found that prescription suggestions were provided for patients who had been in the hospital for more than 1 year. The primary disease was the same as reported. These findings suggest that ward pharmacists’ services for long-term inpatients in the psychiatric ward in Japan yielded similar results. The study is considered to be a useful report in terms of versatility.

The present study showed that pharmacists’ prescription suggestions could contribute to improvement in the safety and efficacy of pharmacotherapy and reduction of healthcare expenditures for inpatients of $>8$ weeks in the psychiatric ward. Therefore, the involvement of ward pharmacists in the pharmacotherapy of long-term inpatients is of high significance. The present study demonstrated the usefulness of ward pharmacists’ services for inpatients of $>8$ weeks as well as those of $<9$ weeks. It is important that pharmacists provide prescription support in the psychiatric ward in the same way as the general ward regardless of the duration of hospital stay.

**Conflicts of Interest** The authors declare no conflict of interest.

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