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Impact of pharmacist-led order-entry support for patients' own medications at admission on prescription optimization and physician workload: A single-institution before-and-after study

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Abstract

Background

Task shifting/sharing is increasingly recommended to reduce physicians' long working hours in Japanese healthcare institutions. Although pharmacist-led order-entry support for patients' own medications at admission may improve prescription appropriateness and reduce physicians' workloads, evidence regarding its effectiveness remains limited. This study evaluated the impact of pharmacist-led order-entry support for patients' own medications at admission on prescription optimization, medication-related incidents, and physician workload at a university hospital.

Methods

This was a single-institution, before-and-after comparative study. Patients admitted to a 98-bed mixed ward comprising orthopedic surgery, neurology, and neurosurgery departments at Mie University Hospital were included. Outcomes were compared between the pre-implementation (April–September 2022) and post-implementation (April–September 2023) periods. Study outcomes were (1) the monthly number of prescription queries, categorized as prescription errors or pharmaceutical interventions, and the time required for order-entry support; (2) number of medication-related incident reports; and (3) physician perceptions of pharmacist-led order-entry support for patients' own medications at admission, assessed using a questionnaire.

Results

A total of 1,295 cases of order-entry support were performed during the 6-month post-implementation period. (1) The total number of monthly prescription queries decreased significantly from 85 to 52 (p = 0.037). Among them, the number of queries related to pharmaceutical interventions decreased significantly from 36 to 20 (p = 0.029). The total time required for order-entry support was 2,715 min per month when performed by two pharmacists. (2) The number of medication-related incident reports decreased from 6 to 4, and no contraindicated prescriptions or dosing/unit errors were observed during the post-implementation period. (3) Most surveyed physicians (90.3%) rated the pharmacist-led order-entry support for patients' own medications on admission as "very useful." Moreover, 80.6% of physicians reported that the burden of prescription order entry after protocol implementation was "greatly reduced." The most frequently reported benefit of the intervention was "improved work efficiency" (32.3%), followed by "increased time available for clinical practice" (29.0%) and "reduction in overtime work" (25.8%).

Conclusions

Pharmacist-led prescription order-entry support for patients' own medications at admission significantly reduced the number of prescription queries, suggesting improved prescription appropriateness and a potential alleviation of physician workloads.

Background

As physician overwork has become a major issue in Japan,[1)] regulations regarding overtime were implemented in April 2024 as part of nationwide labor reforms.[2)] Consequently, promoting task shifting/sharing among healthcare workers has become essential for establishing a sustainable healthcare system.[3)] In the United States, pharmacists are legally authorized to prescribe medications, adjust dosages, and order laboratory tests under collaborative practice agreements with physicians.[4)] Similarly, Japan has established Protocol-Based Pharmacotherapy Management (PBPM), in which pharmacists participate in pharmacotherapy based on physician-approved protocols. Recent studies indicate that PBPM contributes to both the optimization of pharmacotherapy and reduction of physician workload.[5–7)]

Medication reconciliation and the continuation of patients' own medications upon admission are essential clinical tasks. However, prescription order-entry and review are time-consuming and place a significant workload on physicians.[8)] Furthermore, continuing patients' own medications after hospitalization frequently results in errors in prescription order-entry and omissions of continuation orders,[9)] potentially leading to medication-related incidents. To address these challenges, pharmacist involvement in medication reconciliation and prescription proposals has been demonstrated to contribute to prescription optimization and improve patient safety.[10)] Furthermore, pharmacist participation in prescription order support is anticipated to alleviate physician workload.[11)]

Accordingly, pharmacist-led order-entry support for patients' own medications at admission was implemented in January 2023 at Mie University Hospital for patients admitted to a mixed ward comprising orthopedic surgery, neurology, and neurosurgery. The pharmacist-led order-entry support protocol was developed under collaborative practice agreements between pharmacists and physicians and formally approved by the institution. Previous studies demonstrated the effectiveness of pharmacist-led interventions involving the management of patients' own medications and prescription order-entry support upon admission. However, these studies were conducted in single-department settings, specifically in respiratory medicine[10)] and neurosurgery,[11)] and evidence regarding the effectiveness of pharmacist-led order-entry support for patients' own medications at admission in mixed wards comprising multiple clinical specialties remains limited. In mixed wards, pharmacists must manage diverse and complex pharmacotherapeutic regimens across multiple disciplines, including perioperative management. Therefore, order-entry support systems may be particularly valuable in mixed-specialty wards compared with single-specialty wards, although their usefulness in mixed medical and surgical wards has not yet been adequately evaluated. Moreover, limited studies have

comprehensively assessed the effects of pharmacist-led order-entry support for patients' own medications at admission on patient safety and physician workload.

This study aimed to clarify the impact of pharmacist-led order-entry support for patients' own medications at admission on prescription optimization, medication-related incidents, and physician workload in a mixed ward.

Methods

1. Pharmacist-led order-entry support based on patients' own medications at admission

At Mie University Hospital, pharmacist-led order-entry support for patients' own medications at admission was implemented in January 2023 for patients admitted to a 98-bed mixed ward comprising orthopedic surgery, neurology, and neurosurgery, which was defined as the target ward. Eligible patients were those who brought their own medications to the hospital upon admission.

An overview of the order-entry support workflow is presented in Fig. 1. Before protocol implementation, ward pharmacists reviewed the patients' medications at admission and documented this information in the electronic medical record (EMR). Subsequently, physicians entered continuation prescription orders based on medication information documented by the pharmacists, and ward pharmacists reviewed the prescriptions before dispensing medication. Following protocol implementation, ward pharmacists continued to perform medication reconciliation and documented the patients' own medications in the EMR, as they had done previously. However, ward pharmacists designated to the target ward provisionally entered continuation prescription orders after confirming dosages and administration schedules and proposed alternative medications, when necessary. The physicians subsequently reviewed the provisionally entered prescriptions, modified them as necessary based on clinical judgment, and provided final approval. Following physician approval, another pharmacist, independent from the one who performed the provisional entry, reviewed the final prescriptions before dispensing. Details of the pharmacist-led order-entry support protocol are outlined in Supplementary Method 1. Regular prescriptions in the target ward were generally scheduled to commence on Fridays. Prescriptions were issued on Wednesdays, and medications were dispensed to the patients on Thursdays. During order entry support, pharmacists confirmed the remaining supply of the patients' own medications and provisionally entered continuation prescription orders to ensure that hospital prescriptions commenced on the next scheduled start date. Pharmacists consulted physicians when necessary during the order-entry process. When the remaining supply of a patient's own medication was insufficient to reach the next regular prescription date, temporary prescription orders were provisionally entered.

2. Study Design and Participants

This was a single-institution, before-and-after comparative study and included all patients admitted to the target ward. The period before protocol implementation was defined as April to September 2022, and the post-implementation period was from April to September 2023. To assess the comparability between the two study periods, ward- and prescription-related characteristics were compared, including the monthly number of inpatients, bed occupancy rate, length of hospital stay, patients' own medications, and prescription orders.

3. Outcomes

3.1 Prescription queries before and after implementation of order-entry support

Prescriptions for oral, topical, and self-injectable medications prescribed to inpatients in the target ward were included in the analysis. The following medications were excluded from pharmacist-led order-entry support: antineoplastic agents and narcotics, for which inventory is managed based on exact quantities; investigational drugs; medications requiring physician-specific authorization or registration before prescribing; self-injectable medications, which are not tracked by the medication administration record; and medications initiated after admission, that is, medications that were not part of the patients' own medications. However, these medications could be included in order-entry support upon specific request from the relevant clinical department. Monthly prescription data and prescription query classifications during the six-month periods before and after protocol implementation were retrospectively reviewed. For each study period, the number of prescription queries was aggregated by month. Each prescription query was counted individually even when multiple queries were associated with a single prescription order. The monthly number of total prescription queries, prescription errors, and pharmaceutical interventions during the six-month periods before and after protocol implementation were used for comparative analyses. Prescription queries were extracted from the EMR using the Healthcare Data Warehouse (CLISTA!, Medical Engineering Institute Inc., Osaka, Japan), based on standardized documentation templates routinely used by the Department of Pharmacy. Prescription queries were documented in the EMR by pharmacists using a standardized documentation template. Each query was classified as a prescription error, pharmaceutical intervention, or "other." Queries classified as "other" comprised operational or administrative queries that were not directly related to prescription appropriateness or pharmaceutical optimization, including formulary management or medication supply issues. The remaining queries were categorized into two groups:

1. (a) Prescription errors: Order-entry-related errors, such as incorrect dosage input, incorrect unit selection (e.g., mg vs. g), and duplicate medication entries within the same prescription order.
2. (b) Pharmaceutical interventions: Pharmacist recommendations made to optimize treatment, including renal dose adjustment, avoidance of drug interactions, and optimization of treatment duration.

The categorization of prescription queries was retrospectively reviewed by each study investigator. Cases in which the category was uncertain were reviewed by an additional investigator, and the final categorization was established through discussion and consensus.

3.2 Evaluation of time required for prescription order-entry support

The time required for pharmacist-led prescription order-entry support was prospectively evaluated. Patients admitted to the mixed ward between April 1 and April 30, 2024, were included. Two pharmacists assigned exclusively to the target ward measured the time required to provisionally enter continuation prescription orders for patients' own medications at admission using a stopwatch.

3.3 Evaluation of medication-related incident reports

Medication-related incidents reported by physicians from the orthopedic surgery, neurology, and neurosurgery departments before and after protocol implementation were retrospectively reviewed. Reports involving oral, topical, and self-injectable medications prescribed to hospitalized patients were included. The number of reports and incidents that resulted in actual patient harm, defined as accidents, was compared between the pre- and post-implementation periods, and the contents of the reports were analyzed.

3.4 Questionnaire survey for physicians

After implementing the protocol, an anonymous questionnaire survey was conducted among 59 physicians practicing in the target ward, including 28 orthopedic surgeons, 17 neurosurgeons, and 14 neurologists. The questionnaire was created using Google Forms (Google, Mountain View, CA, USA). Departmental secretaries distributed the survey URL via email to physicians belonging to the respective departments. The questionnaire items are listed in Table 1. Respondents who answered "No" to question 3, "Have you ever been involved in the care of patients who received pharmacist-led order-entry support for patients' own medications at admission?" were excluded from the analysis. The survey was conducted from January 17 to January 31, 2025. To increase the response rate, reminder emails were sent by the departmental secretaries on January 24, 2025.

Table 1
Questionnaire items regarding pharmacist-led order-entry support for patients' own medications at admission for physicians in the three departments.

1	**Contents**
	Department
	☐ Orthopedic Surgery ☐ Neurosurgery ☐ Neurology
2	Years of clinical experience
	☐ 1–5 years ☐ 6–10 years ☐ 11–20 years ☐ More than 20 years
3	Have you been involved in the care of patients who received pharmacist-led order-entry support for pre-admission medications for patients' own medications?
	☐ Yes ☐ No
4	Do you find pharmacist-led order-entry support for pre-admission medications useful?
	☐ Very useful ☐ Somewhat useful ☐ Neutral ☐ Not very useful ☐ Not useful ☐ Unsure
5	Did pharmacist-led support for continuation prescription order entry of patients' own medications reduce the burden of prescription order entry?
	☐ Greatly reduced ☐ Somewhat reduced ☐ Neither ☐ Not greatly reduced ☐Not reduced ☐ Unsure
6	What do you think is the most significant effect of pharmacist-led order-entry support for pre-admission medications?
	☐ Increased time available for clinical practice ☐ Increased time available for research ☐ Reduced overtime work ☐ Improved work efficiency ☐ Improved patient safety ☐ No particular effect ☐ Unsure
7	Do you think there is room for improvement in the current pharmacist-led order-entry support for pre-admission medications?
	☐ The current system is sufficient ☐ There is room for improvement ☐ Unsure
8	Please provide any comments or suggestions for improvement regarding pharmacist-led order-entry support for pre-admission medications.
	Free-text response:

4. Statistical analysis

Incident reports and the time required for order-entry support were descriptively analyzed. Monthly ward-related characteristics and the monthly number of total prescription queries, prescription errors, and pharmaceutical interventions during the six-month pre- and post-implementation periods were compared using the Mann–Whitney *U* test. Queries classified as "other" were analyzed descriptively. Statistical

analyses were performed using JMP® Student Edition version 18.2.2 (SAS Institute, Cary, NC, USA), and a *p*-value < 0.05 was considered statistically significant.

Results

1. Implementation of pharmacist-led order-entry support

During the six-month period following protocol implementation, pharmacist-led order-entry support for patients' own medications at admission was provided in 1,295 cases.

2. Changes in the number of prescription queries

Ward- and prescription-related characteristics before and after protocol implementation are summarized in Table 2. The median monthly number of inpatients was significantly higher following protocol implementation in both the North (primarily orthopedic surgery patients) and South wards (primarily neurology and neurosurgery patients). Moreover, the bed occupancy rate also increased significantly in the South ward. However, the total number of prescription orders did not significantly differ between the pre- and post-implementation periods. The number and classification of prescription queries across the three departments are shown in Fig. 2. The median monthly number of total prescription queries decreased significantly from 85 cases/month before protocol implementation to 52 cases/month post-implementation ($p = 0.037$) (Fig. 2A). Prescription queries related to prescription errors exhibited a decreasing trend, from a median of 23 cases/month before implementation to 12 cases/month following implementation ($p = 0.106$). Conversely, prescription queries related to pharmaceutical interventions significantly decreased from a median of 36 cases/month before protocol implementation to 20 cases/month after protocol implementation ($p = 0.029$) (Fig. 2B). Queries classified as "other" primarily pertained to operational issues rather than prescription appropriateness. Common examples included confirming substitutions between different strengths of the same formulary medication, modifying prescription duration, adding dispensing instructions (e.g., unit-dose packaging or ointment mixing), and substituting alternative medications owing to drug shortages.

Table 2
Comparison of ward- and prescription-related characteristics before and after implementation of PBPM.

Variable	Setting in a mix ward	Before-implementation	After-implementation	*p* value
Number of inpatients (n)	North ward	62 (54–88)	78 (73–90)	0.045
	South ward	56 (45–62)	69 (66–86)	0.005
Bed occupancy rate (%)	North ward	85.4 (78.1–93.3)	87.0 (84.2–89.7)	0.174
	South ward	68.7 (66.7–85.2)	87.7 (81.8–97.1)	0.020
Length of hospital stay (days)	North ward	16.8 (13.3–19.4)	14.5 (12.8–15.9)	0.053
	South ward	13.5 (11.8–16.7)	13.8 (10.9–15.0)	0.936
Patients' own medications (n)	North and South wards	108 (95–133)	123 (110–128)	0.128
Prescription orders (n)	North and South wards	953 (882–996)	867 (796–1,046)	0.128

Continuous variables are presented as the median (minimum–maximum) of the monthly values over the six-month study period.

PBPM, protocol-based pharmacotherapy management.

North ward admits primarily orthopedic Surgery patients.

South ward admits primarily neurology and neurosurgery patients.

3. Time required for order-entry support

Two pharmacists provided order-entry support for 220 cases, requiring a total of 2,715 min (approximately 45 h) per month.

4. Medication-related incident reports

Medication-related incident reports decreased from six before implementation to four after protocol implementation. All incidents involved oral medications. The number of incidents resulting in actual patient harm decreased from three before protocol implementation to two after implementation (Table 3). Before protocol implementation, the reported incidents comprised two cases of contraindicated prescriptions continued from the patients' own medications in patients with renal dysfunction, two cases of dosage or unit entry errors, one case involving omission of a continuation prescription when transitioning from the patient's own medications to regular hospital prescriptions, and

one case involving failure to resume a medication discontinued preoperatively. After protocol implementation, the reported incidents comprised two cases of missing instructions for preoperatively discontinued medications, one case of failure to restart a preoperatively discontinued medication, and one case of an incorrect discontinuation order owing to incorrect operation of the EMR system.

Table 3
Medication-related incident reports before and after implementation of pharmacist-led order-entry support for pre-admission medications.

Classification of incident reports	Before implementation	After implementation
Contraindicated prescriptions continued from patients' brought medications in patients with renal impairment	2 (2[a])	0
Incorrect dose or unit entry	2	0
Omission of continuation orders for regular medications	1 (1[a])	0
Failure to resume preoperatively discontinued medications	1	1
Omission of instructions regarding preoperatively discontinued medications	0	2 (1[a])

[a] The number of accidents causing actual patient harm.

5. Questionnaire survey for physicians

The valid response rate for the questionnaire was 52.5% (31/59) (Fig. 3A). Respondents included 10 orthopedic surgeons, nine neurologists, and 12 neurosurgeons. Regarding clinical experience, nine physicians (29.0%) had 1–5 years of experience, eight (25.8%) had 6–10 years, eight (25.8%) had 11–20 years, and six (19.4%) had over 20 years of experience. Regarding the utility of pharmacist-led order-entry support for patients' own medications at admission (Question 4), 90.3% of physicians rated the intervention as "very useful" (Fig. 3B). Regarding the burden associated with prescription order-entry (Question 5), 80.6% of physicians reported that the burden was "greatly reduced," whereas 16.1% reported that it was "somewhat reduced" (Fig. 3C). In Question 6, the most frequently reported benefit of the intervention was "improved work efficiency" (32.3%), followed by "increased time available for clinical practice" (29.0%) and "reduction in overtime work" (25.8%) (Fig. 3D). Regarding the current operation of the support system (question 7), 77.4% of physicians reported that "the current system is sufficient," whereas 16.1% responded that "there is room for improvement" and 6.5% responded "unsure" (Fig. 3E).

In the free-text responses regarding operational issues, physicians highlighted several issues. These included difficulties in distinguishing provisional orders entered for medication reconciliation from those entered as part of the order-entry support process, uncertainty regarding whether the intervention had been implemented, and requests to expand the eligibility criteria for order-entry support.

Discussion

In the present study, pharmacist-led order-entry support for patients' own medications at admission in a mixed ward, comprising orthopedic surgery, neurology, and neurosurgery departments, effectively reduced the number of prescription queries. Moreover, several physicians reported a reduced burden associated with prescription order entry, suggesting that the present system contributed to prescription optimization and alleviated physician workloads.

The reduction in prescription queries following protocol implementation may be attributable to pharmacists reviewing patients' own medications and provisionally entering optimized prescription orders in advance. Although the reduction in prescription errors was not statistically significant, the number of prescription errors demonstrated a decreasing trend. Conversely, the number of prescription queries related to pharmaceutical interventions decreased significantly (Fig. 2B). This indicates that pharmacist-led order-entry support may have provided benefits beyond administrative support but also facilitated prescription optimization from a perspective on pharmaceutical care. This interpretation is consistent with previous studies demonstrating that pharmacist involvement in medication reconciliation and prescription proposals based on PBPM improves overall prescription quality[10]. Notably, the number of inpatients was significantly higher during the post-implementation period (Table 2), which may partly reflect changes in hospital admission patterns following the reduced impact of the COVID-19 pandemic, including the reclassification of COVID-19 as a Category V infectious disease in Japan in May 2023[12]. Despite this increase in patient volume, the total number of prescription orders remained unchanged, whereas prescription queries decreased significantly (Table 2), suggesting that the reduction in prescription queries cannot be solely explained by changes in patient volume or hospital operational factors.

Although order-entry support required approximately 45 h per month in total, this corresponded to approximately 22.5 h per month per pharmacist, assuming an equal workload distribution between the two pharmacists. Assuming a standard 40-h workweek, this would account for approximately 13% of the working time per pharmacist. Although this protocol required a measurable time investment from pharmacists, this workload should be considered in the context of the overall allocation of pharmacists' working hours and the potential benefits for patient care. Nagase et al[13] reported that delegating medication-related tasks from pharmacists to non-pharmacist staff increased the provision of medication management and counseling services [13], and such initiatives have been reported to enhance the quality of pharmaceutical care in wards[14]. Accordingly, similar efforts to shift dispensing-related tasks from pharmacists to non-pharmacist staff have been implemented at Mie University Hospital to optimize the allocation of pharmacy personnel[15]. Consequently, pharmacist-led order-entry support should not necessarily be viewed merely as increasing pharmacists' workload; rather, when implemented alongside appropriate task shifting/sharing, it may facilitate more efficient allocation of pharmacy personnel and maximize the time available for pharmaceutical care in wards. However, because this study did not evaluate changes in pharmacists' overall workload or the time spent on patient care, the

cost-effectiveness of pharmacist-led order entry support remains unclear and warrants further investigation.

In the questionnaire survey, respondents were relatively evenly distributed across the three departments and represented a broad range of clinical experience, suggesting minimal bias in respondent characteristics. Generally, physicians perceived the pharmacist-led order-entry support for patients' own medications at admission as beneficial, particularly in reducing the burden of prescription order-entry (Figs. 3B-D). Because reducing physician overtime is a primary objective of physician workstyle reforms in Japan[3)], this intervention may serve as an effective task-sharing strategy to alleviate physicians' workload. Although previous research similarly reported that pharmacist-led order-entry reduced physician workload[11)], these studies involved only a small number of neurosurgeons (n = 11)[11)]. Conversely, this present study included 31 physicians from the neurosurgery, neurology, and orthopedic surgery departments, demonstrating similar benefits across multiple clinical specialties within a mixed ward. Taken together, these findings suggest that pharmacist-led order-entry support for patients' own medications at admission may help reduce physician workload in mixed wards comprising multiple clinical departments. Although most physicians were satisfied with the current system, with 77.4% responding that "the current system is sufficient" (Fig. 3E), some respondents indicated that there were areas for improvement in its operational aspects. Additionally, physicians requested that the eligibility criteria for order-entry support be expanded. Therefore, revising and optimizing the operational protocol may further alleviate physicians' workload.

Although the overall number of medication-related incidents did not differ markedly before and after protocol implementation, contraindicated prescriptions in patients with renal dysfunction and dosage/unit entry errors reported before protocol implementation were not observed after protocol implementation (Table 3). These incidents were likely associated with prescriptions entered shortly after admission and may have occurred before pharmacist intervention. Moreover, no incidents involving the omission of continuation prescriptions were reported during the post-implementation period. Although this finding may have occurred by chance owing to the small number of incident reports, pharmacist-led order-entry support may have contributed to a reduced likelihood of continuation prescription omissions. These findings align with previous studies that have demonstrated that pharmacist involvement in pharmacotherapy contributes to improved patient safety[16)]. Nevertheless, medication-related incidents related to perioperative medication discontinuation continued to occur after protocol implementation. This suggests that such incidents cannot be completely prevented by this intervention alone; therefore, additional strategies to strengthen perioperative medication management may be necessary.

This study has several limitations that should be acknowledged. First, this was a single-institution before-and-after study, which limits the generalizability of the findings. Second, medication-related incident reports were based on voluntary reporting and may therefore be subject to reporting bias. Third, the questionnaire survey relied on subjective evaluations, and the response rate was relatively low (52.5%). Physicians who had more favorable perceptions of pharmacist-led order-entry support were more likely to respond to the survey, potentially introducing response bias and an overestimation of the

perceived benefits of the intervention and its impact on alleviating physicians' workload. Accordingly, the questionnaire results should be interpreted with caution. Finally, because no direct preintervention comparator was established for the time required for order-entry support, the extent to which the intervention reduced physician workload could not be quantitatively assessed. Despite these limitations, the present study clearly demonstrated the utility of pharmacist-led order-entry support in a mixed-ward setting and may provide fundamental evidence to support future efforts aimed at enhancing ward management efficiency and promoting task shifting/sharing in clinical practice.

Conclusions

Implementing pharmacist-led support for the continuation of patients' own medications upon hospital admission may facilitate prescription optimization and alleviate physicians' workloads in mixed wards. This study is particularly significant because it comprehensively evaluated pharmacist-led interventions that directly support prescription order-entry and highlights their benefits on prescription optimization, medical safety, and reducing physician workloads.

Abbreviations

PBPM: protocol-based pharmacotherapy management

EMR: electronic medical record

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects in Japan and the principles of the Declaration of Helsinki. This study was approved by the Medical Research Ethics Committee of Mie University Hospital (No. H2024-227). Because the analyses of prescription queries and incident reports were conducted using retrospectively collected data, consent was obtained through an opt-out approach. Written informed consent for participation in the assessment of time required for order-entry support was obtained from the two pharmacists involved. For the physician questionnaire survey, consent was considered to have been obtained upon submission of the completed questionnaire.

Consent for publication

Not applicable.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that there are no competing interests.

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Authors' contributions

Conceived and designed the study: YS, YA, HK, and TI

Performed research: YS

Collected data: YS

Analyzed and interpreted data: YS and YA

Wrote the paper: YS, YA, NS, YM, RO, HK, RM, MH, AS, HS, and TI

Supervised the study: TI

All authors read and approved the final manuscript.

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Figures

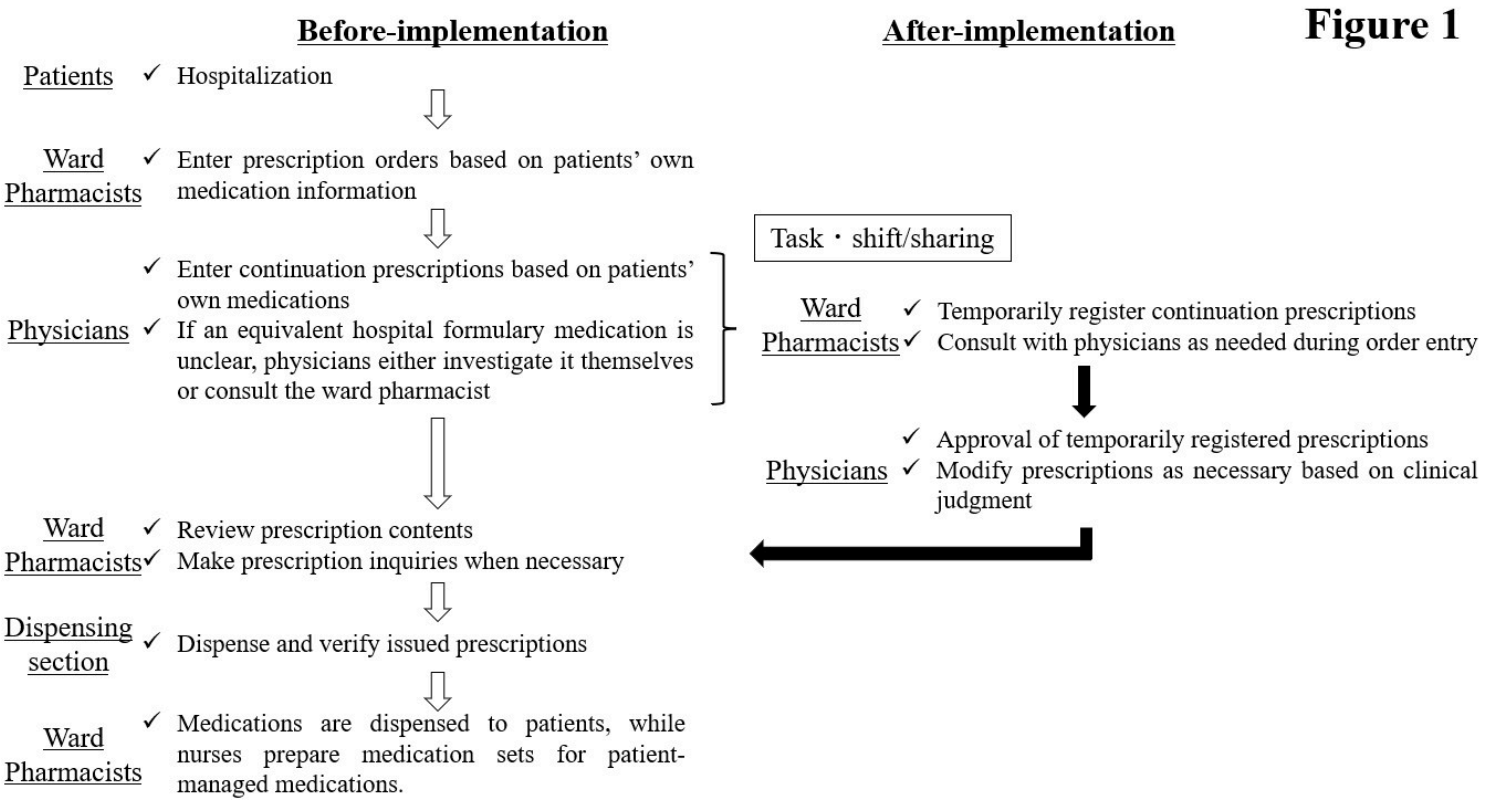


Figure 1

Workflow of pharmacist-led order-entry support for patients' own medications before and after protocol implementation.

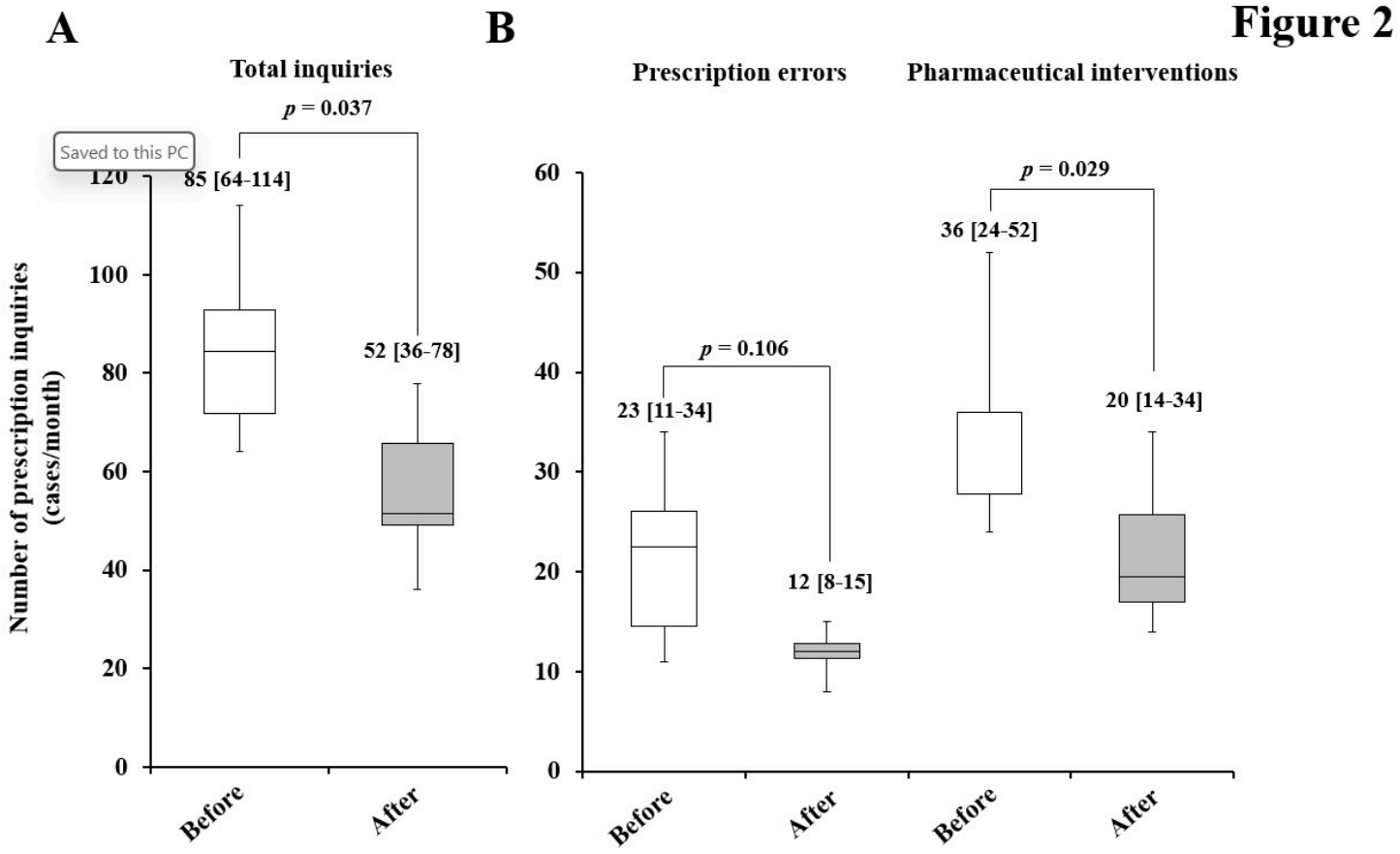


Figure 2

Comparison of monthly numbers and categories of prescription queries before and after protocol implementation.

(A) Total number of prescription queries. (B) Categories of prescription queries, including prescription errors and pharmaceutical interventions. Data are presented as the median (minimum–maximum) monthly values over the 6-month study period.

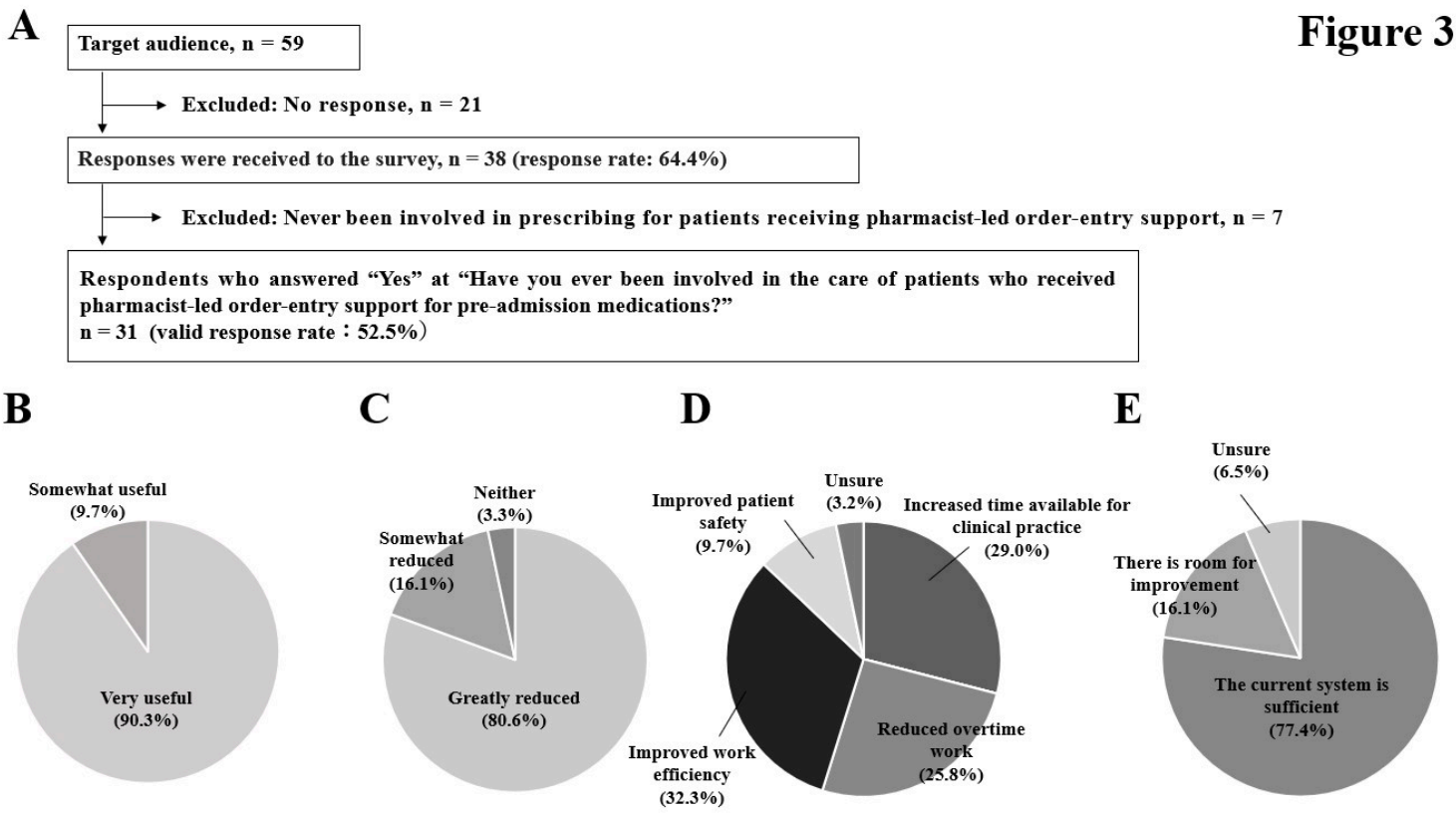


Figure 3

Physician survey regarding the impact of pharmacist-led order-entry support for patients' own medications at admission.

(A) Flow diagram showing physician selection for the questionnaire survey. (B) Responses to the question: "Do you find pharmacist-led order-entry support for patients' own medications at admission useful?" (C) Responses to the question: "Did pharmacist-led support for continuation prescription order entry of patients' own medications reduce the burden of prescription order entry?" (D) Responses to the question: "What do you think is the most significant effect of pharmacist-led order-entry support for patients'own medications at admission?" (E) Responses to the question: "Do you think there is room for improvement in the current pharmacist-led order-entry support for patients' own medications at admission?"

Supplementary Files

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- Supprementaldata20260923.docx