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Contributions of Pharmacists through the Promotion of Proper Drug Use

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The contents of pharmacist interventions, which were carried out by the ward pharmacists in their routine pharmacy service activities, were sorted and analyzed to evaluate the contributions of pharmacists. In the ward where pharmacists were stationed, there were a total of 196 cases of pharmacist intervention. The prescription was changed in 170 cases, giving a rate of prescription change of 86.7%. The breakdown of the pharmacist intervention was as follows: ''efficacy/safety'', 106 cases, followed by ''dosage regimen'' (48 cases) and ''compliance'' (10 cases). Cost savings achieved during the investigation period were calculated to be 440,639 yen, and cost avoidance was valued at 1,941,847–3,883,695 yen using the Diagnosis Procedure Combination (DPC). The results of the present investigation showed that pharmacists contribute to through not only their pharmacy services, but also through the promotion of proper drug use and risk management, thereby contributing to hospital management through cost savings and avoidance.

Key words——pharmacist interventions; cost savings; cost avoidance; diagnosis procedure combination (DPC)

INTRODUCTION

Efforts to quantify pharmaceutical services in terms of health economics are widespread in the United States.[1] The Department of Pharmacy at the Nippon Medical School Hospital (hereafter ''the Hospital'') has reported with respect to the dispensing of injections up to the present time that medical expenses can be reduced when pharmacists are proactively involved in the appropriate use of medicines.[2]

''Medication Management and Guidance'' (MMG) is a comprehensive area of hospital pharmacist activity unique to Japan that has as its goals the appropriate use of medicines, the improvement of patient service, and the bettering of team care. To reach these objectives, pharmacists involved in MMG give medication guidance to inpatients on the basis of medication records, manage medication in hospital wards, and provide information about medication to physicians and other medical staff. So understood, this duty is gaining recognition as one of the most important aspects of the pharmaceutical profession. Currently, concrete outcomes of MMG reported in the literature are the improvement of patient satisfaction levels, the avoidance of adverse drug reaction, the increase of patient awareness and understanding of medication, and the improvement of drug compliance, in addition to the improvement of clinical findings.[3–5] However, there are not yet any detailed investigations of the effect of MMG on medical expenses. The current paper reports on the effect that pharmacists' involvement in MMG for the appropriate use of medicines at the Hospital had on patient outcomes, and evaluates whether or not this type of service is valuable from a pharmacoeconomic perspective.

METHOD

Data An investigation was carried out on 196 Case Reports of Pharmacist Intervention dating from February 2004 to June 2005. These reports were collected by pharmacists, which were engaged in MMG of Nippon Medical School Hospital. The Case Report of Pharmacist Intervention was modified in part from the case report used by Onda et al.[6–8]

Intervention and Outcome Evaluation The

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contents of the interventions were classified into 6 categories and investigated. Next, the outcomes of the interventions were evaluated. The 6 categories were: (1) Incomplete Prescriptions, (2) Dosage and Usage, (3) Period of Dosage, (4) Effectiveness and Safety, (5) Compliance and QOL Improvement, (6) Other. Outcomes were evaluated with respect to the existence or absence of any prescription changes that followed the intervention, and the effect of the intervention on the patient, according to the rubric: (1. Positive, 2. No change, 3. Negative, 4. Unable to evaluate). The importance of this content was further evaluated on a 4-stage scale in response to the question, ''What effects do you think this has had on the patient?'' as judged by the pharmacist: (A: Significant need for change of prescription (Avoided significant disadvantage for patient), B: Significant need for change of prescription (Improved effectiveness of treatment), C: Not as extreme as A or B, but change in prescription was clinically meaningful, D: Not clinically meaningful).

Reduction in Medication Expenses The reduction in medication-related expenses in cases where there was a post-intervention prescription change was calculated by multiplying the number of days of the prescription by the difference between the prescription medication expense after the change and the prescription medication expense before the change (Reduction in medical expenses = (prescription medication expense before change − prescription medication expense after change) × # of days of prescription). The reduction amount was calculated with the database program developed by Kobayashi et al.[9]

Avoidance of Increased Medical Expenses The amount of medical expense avoided due to ward pharmacists' helping patients to avoid medication-related adverse drug reaction was evaluated with the comprehensive payment system (DPC: Diagnosis Procedure Combination).[2] For example, when incompatibilities arose due to the use of medicine when prescriptions had not being changed, or when medicines that were inappropriate for individual patients' age or condition were administered, and resulting side effects were discovered, the case may belong to the category DPC no. 161070 (Other Intoxication). When the side effects are treated, assuming that surgery is not performed and the hospital stay required for treatment is between 2 and 4 days, the medical expenses for that period can be calculated as follows: Medical expenses = 2418 points × # of days × medical institution coefficient (1.1810 for the Hospital). The 2004 edition of the DPC and medical institution coefficients were used.

RESULTS

Content of Intervention and Outcomes Of the 196 interventions studied, 170 resulted in prescription change, a rate of 86.7%. Among the medicines addressed in the interventions, 166 were oral/external, a figure amounting to 84.7% of the total; 30, or 15.3%, were injections. A breakdown of intervention content appears in Table 1. The 106 cases regarding ''Effectiveness and Safety'' were most numerous. Following this, there were 48 cases relating to ''Usage and Dosage'' and 10 relating to ''Compliance''.

Further classification and analysis of the results presented in Table 1 appear in Table 2. In the ''Effectiveness and Safety'' category, ''Duplicated prescriptions with drugs of similar type or effect,'' ''Appearance of side effects while taking medication,'' ''Recommended change in prescription on basis of drug effectiveness evaluation,''and ''Contraindication'' were the most commonly indicated items.

The outcomes of the various interventions are shown in Table 3. In 120 cases, or more than half of all interventions, the ''Effect of intervention on the patient'' was judged as positive. With respect to the question of the ''Importance of intervention,'' 34 cases were rated ''A'', 71 were rated ''B'', and 72 were rated ''C''.

Reduction in Medication Expenses Among the cases involving prescription change following intervention, 136 resulted in a difference in medication expense. These amounted to an overall cost reduction of ¥440,639 (¥457,322 in decreases and ¥16,683 in increases) (Table 4).

Table 1. Global Classification of Pharmacist Intervention

Global classification	# of cases	rate (%)
1. Dosage and usage (excluding omission of printed information)	48	24.0
2. Period of dosage	2	1.0
3. Effectiveness and safety	106	53.0
4. Compliance and QOL improvement	10	5.0
5. Other	34	17.0
Total (including multiple-choice)	200	100.0

Table 2. Individual Classification of Pharmacist Intervention

1. Dosage and usage (excluding omission of printed information)	# of cases	rate (%)
1. Time of dosage	6	12.5
2. Interval between dosages	2	4.2
3. Usage	14	29.2
4. Route of administration	0	0.0
5. Interval between injections	1	2.1
6. Dosage	21	43.8
7. Standards	1	2.1
8. Region/area of use	0	0.0
9. Other	3	6.3
Total (including multiple-choice)	48	100.0

2. Period of dosage	# of cases	rate (%)
1. Adjustment in # of days for remaining medicine	0	0.0
2. Adjustment in # of days for insurance reasons	1	50.0
3. Other adjustments in # of days	1	50.0
Total (including multiple-choice)	2	100.0

3. Effectiveness and safety	# of cases	rate (%)
1. Error in printed information on medicine	0	0.0
2. Contraindications with prescribed medication	15	14.2
3. Possibility of interaction	3	2.8
4. Injection medicine interactions	0	0.0
5. Duplicated prescriptions with drugs of similar type or effect	29	27.4
6. Appearance of side effects while taking medication	18	17.0
7. History of allergy/side effects	8	7.5
8. Recommended change in prescription on basis of drug effectiveness evaluation	17	16.0
9. Omission in prescription	0	0.0
10. Influence on pregnancy/nursing	2	1.9
11. TDM	6	5.7
12. Other	8	7.5
Total (including multiple-choice)	106	100.0

4. Compliance and QOL improvement	# of cases	rate (%)
1. Advisability of one-dose packaging	2	20
2. Advisability of crushing tablets	0	0
3. Change in dosage forms	5	50
4. Changes in usage, etc. due to lifestyle	2	20
5. Other	1	10
Total (including multiple-choice)	10	100

5. Other	# of cases	rate (%)
1. Proposed substitute prescription	7	20.6
2. Patient desired drug supplement (reduction)	27	79.4
Total (including multiple-choice)	34	100.0

Table 3. Evaluation of Clinical Outcome of Pharmacist Intervention

Effect of intervention on patient	# of cases	rate (%)
1. Positive	120	61.2
2. No change	66	33.7
3. Negative	0	0.0
4. Unable to evaluate	10	5.1
Total	196	100.0

Importance of intervention	# of cases	rate (%)
A. Significant need for change of prescription (Avoided significant disadvantage for patient)	34	17.3
B. Significant need for change of prescription (Improved effectiveness of treatment)	71	36.2
C. Not as extreme as A or B, but change in prescription was clinically meaningful	72	36.7
D. Not clinically meaningful	19	9.7
Total	196	100.0

Table 4. Cost Savings through Proper Drug Use Intervention

Number of potential cost savings cases	Cost savings value (yen)
136/196	440,639 (457,322 (decrease)—16,683 (increase))

Table 5. Cost Avoidance through Proper Drug Use Intervention

# of cost avoidance cases	Cost avoidance value (yen)
34	1,941,847—3,883,695

Avoidance of Increased Medical Expenses The number of cases in which outcome evaluations indicated an avoidance of increased medical expenses was 34—the number of cases marked with a significance level of ''A'' among the post-intervention prescription changes. When adverse drug reaction appeared, requiring a requisite hospital stay of between 2 and 4 days in cases of interventions with outcome evaluations of significance level ''A'', a possible future increase of ¥1,941,847 to ¥3,883,695 in medical expenses was regarded as preventable through early intervention regarding the appropriate use of medicines (Table 5).

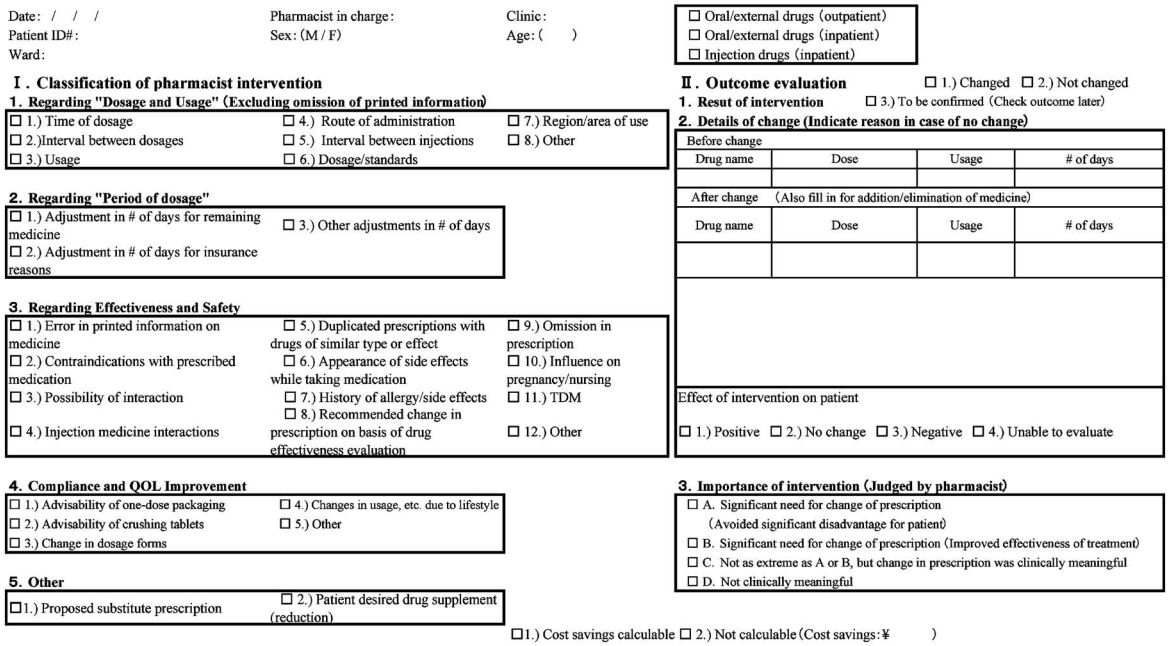

Fig. 1. Case Report of Pharmacist Intervention

DISCUSSION

The breakdown of pharmacist interventions reveals that the number of cases responding to ''Effectiveness and Safety'' concerns was most numerous, followed by ''Usage and Dosage'' and then ''Compliance''. These data are illustrative of the fact that, in contrast to dispensing in the pharmacy, the consultations with patients and communication with ward staff required in MMG are relatively easy to perform. As a result, significant contributions would seem to be possible with respect to the appropriate use of medicines and the promotion of risk management in a manner that is responsive to individual patient conditions and compliance. Furthermore, the results of this investigation suggest that pharmacist intervention has a large influence on medication: over 60% of the prescription changes following pharmacist intervention were judged as having a positive effect on the patient, and clinically meaningful prescription changes (A+B+C) amounted to over 90% of the total. For these reasons, Pharmacist interventions with physicians may contribute to risk avoidance and the appropriate use of medicines through MMG.

The findings also clearly indicate that the cost benefits of MMG are not just realized in terms of consultation fees, but also significantly in the reduction of medication costs and avoidance of increases in medical expenses. In turn, these results suggest that pharmacists are making contributions to hospital administration through the appropriate use of medicines. In particular, research such as the present study, through investigation and substantiation of the cost benefits that accrue to the avoidance of medical expenses, will likely play an important part in realizing a broader social appreciation of hospital pharmacists' professional abilities.

As pharmacists, we are significantly contributing to patients' safety management through the appropriate use of medicines. However, evaluation of this service from the perspective of health economics, and the corresponding level of contribution to hospital administration, have not yet been actively discussed. The group that most centrally engaged in investigating placement standards for hospital pharmacists is medical management organizations. For this reason, one of the most important factors influencing future evaluations of pharmacists' service will be showing clearly to managers, in numerical form, to what degree we are contributing to hospital administration through our role in the appropriate use of medicines. Thus, by understanding pharmacoeconomics and implementing its analytical methods in decision-making processes and the medication evaluations that inform them, pharmacists will be able to expand the scope of their influence with respect to both the quality of medication and hospital management.

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