The Effect of Calendarized Drug Package on Patients Compliance with Antibiotics

Ill Maidatuz Zulfa, Widy Handayani

1Department of Community and Management Pharmacy, Pharmacy Diploma, Akademi Farmasi Surabaya, Surabaya, East Java, Indonesia; 2Department of Clinical Pharmacy, Akademi Farmasi Surabaya, Surabaya, East Java, Indonesia

Abstract

BACKGROUND: Patients’ compliance with antibiotics has been one of the global challenges in combating antibiotics resistance. Patients will tend to forget their antibiotics, especially when they feel better. Related to this phenomenon, the development of medication reminder media is essential.

AIM: This experimental study was aimed to develop and apply calendarized package as a medication reminder media in patients with short-course antibiotics to improve their compliance.

METHODS: Calendarized package was prepared from the labeling of the original package of antibiotics with stickers. Patients were then contacted for compliance evaluation on the latest antibiotics course day.

RESULTS: A total of 150 patients who met the inclusion criteria were recruited in this study. Seventy-six patients were grouped into the intervention group, while the remaining 74 patients were the control group. The results showed that the number of compliant patients in the intervention group was higher (72.37%) than those in the control group (45.95%), respectively (p < 0.000).

CONCLUSION: The application of the calendar on the package indicates the positive impact on the patients’ compliance with antibiotics. However, in this study, the compliance measurement was conducted indirectly because of the coronavirus disease 2019 pandemic. However, several limitations should be considered. Future research using a bigger sample size and stricter compliance measurement method is needed to confirm this finding.
Materials and Methods

Materials

Calendarized package

Calendarized package was prepared from the labeling of the original package of antibiotics with stickers. The stickers were designed for 7 days (written in Bahasa Indonesia) and five different times printed in different colors (Table 1). The stickers were applied to the original antibiotics package manually based on patients’ prescriptions. Time stickers for antibiotics prescribed 3 times a day were set at 05.00, 13.00, and 21.00, while for antibiotics prescribed 2 times a day, the stickers were set at 06.00 and 18.00. For example, if patients are prescribed amoxicillin 3 times a day on Wednesday, subsequently, stickers will start on Wednesday and end on Saturday (Figure 1).

Table 1: Stickers design

| Days (in Indonesian) | Days (in English) | Sticker Design | Times  |
|---------------------|------------------|---------------|--------|
| Senin               | Monday           | Senin         | 05.00  |
| Selasa              | Tuesday          | Selasa        | 06.00  |
| Rabu                | Wednesday        | Rabu          | 13.00  |
| Kamis               | Thursday         | Kamis         | 18.00  |
| Jum’at              | Friday           | Jum’at        | 21.00  |
| Sabtu               | Saturday         | Sabtu         |        |
| Minggu              | Sunday           | Minggu        |        |

Methods

Study design

This was an experimental study conducted at four community health center in Surabaya (Puskesmas Wonokromo, Puskesmas Kalirungkut, Puskesmas Gayungan, and Puskesmas Kedurus) from January to April 2021. The ethical approval was obtained from the Ethics Committee of Universitas Surabaya. Patients above 18 years old who were prescribed short-course oral antibiotics (not more than 7 days) during the study period were asked to participate in this study. Patients who agreed to participate would be asked to sign the informed consent and then classified into two groups using systematic random sampling. Patients who came first, third, fifth (odd number) were grouped into the control group, while those who arrived at second, fourth, and sixth (even number) were grouped into the intervention group. We did not interfere with the antibiotics prescription both in the intervention and control group. We calendarized the antibiotics package in the intervention group with the stickers while the control group received medication as a standard operational procedure at the community health center. Patients’ demographical data, medications prescribed, and the last antibiotics course day was recorded. Patients were then contacted for compliance evaluation on the latest antibiotics course day.

Compliance measurements

Compliance measurements were conducted using the pill count method. Patients would be considered compliant if the remaining tablets counted not more than 15% of the total tablet prescribed [12]. However, because of the coronavirus disease 2019 (COVID-19) pandemic, the counting process could not be conducted directly. Therefore, we contacted patients on the last antibiotics course day and asked them to fill the online form and upload their remaining tablet pictures.

Data analysis

Baseline characteristic data such as the age, gender, educational background, and the average of drugs consumed were compared between two groups to confirm that there were no differences in
the factors that affected compliance. The number of compliant and non-compliant patients in both groups was analyzed using the Chi-square test. p < 0.05 was considered statistically significant in the effect of the calendarized package on the patients’ compliance with oral antibiotics.

Results

Baseline characteristics

A total of 150 patients who met the inclusion criteria were recruited in this study. Seventy-six patients were grouped into the intervention group, while the remaining 74 patients were the control group. All of the patients who joined in this study were received single short course antibiotics. The baseline characteristics of all patients were presented in Table 2, and the profile of antibiotics prescribed was illustrated in Figure 1.

Table 2: Baseline Characteristics

| Characteristics      | Intervention Group | Control Group | p-value |
|----------------------|--------------------|---------------|---------|
| Age**                | n = 76             | n = 74        |         |
| <40                  | 61 (53.20)         | 44 (51.80)    | 0.005*  |
| >40                  | 15 (22.80)         | 30 (22.20)    |         |
| Gender**             |                    |               |         |
| Female               | 50 (65.79)         | 42 (56.76)    |         |
| Male                 | 26 (34.21)         | 32 (43.24)    | 0.937*  |
| Education**          |                    |               |         |
| Higher Education     | 28 (36.84)         | 21 (28.38)    | 0.866*  |
| Non-Higher Education | 48 (63.16)         | 53 (71.62)    |         |
| Number of drug consumed* | 3.70 ± 1.03 | 3.60 ± 1.00 | 0.269*  |

Table 2 shows that there was no difference between the average number of drugs consumed and the distribution of gender and educational background (p > 0.05). However, in the distribution of age, there was a significant difference between the two groups (p < 0.05).

Figure 2 shows that both in the control and intervention groups, the most frequently prescribed antibiotic was amoxicillin with a dosage of 500 mg 3 times a day. The other antibiotics prescribed were metronidazole 500 mg 3 times a day, ciprofloxacin 500 mg 2 to 3 times a day, and cotrimoxazole 960 mg 2 times a day.

Patients compliance

Patients’ compliance was measured by counting the remaining antibiotics in the last day course. The distribution of compliance patients in both groups was presented in Table 3 below. The Analysis results demonstrated that the p < 0.005. Consequently, the number of compliance patients between the two groups compared was statistically significant.

Table 3: Patients Compliance with Antibiotics

| Groups             | Compliance | Non-compliance | p-value |
|--------------------|------------|----------------|---------|
| Intervention Group | n = 76     | 55 (72.37)     | 21 (27.63)| 0.002* |
| Control Group      | n = 74     | 34 (45.95)     | 40 (54.05)|         |

Table 3 shows that there was no difference between the average number of drugs consumed and the distribution of gender and educational background (p > 0.05). However, in the distribution of age, there was a significant difference between the two groups (p < 0.05).

As far as our observation, the concept of reminder packaging has not been applied to improving antibiotics compliance before. However, reminder or calendarized packaging has been confirmed on the improving of hypertensive patients’ compliance. A previous study by Dupclay et al. stated that the use of reminder packaging had a positive role in consistent improvement in adherence and persistence of patients on an antihypertensive regimen [7]. Reminder or calendarized packaging might be a helpful tool for patients who likely to forget their therapeutics dosage. A study by Schneider et al. showed that daily dose blister packaging (pill-calendar) helped elderly patients remember their medication. It was proved by their higher medication possession ratios (p = 0.04) and lower diastolic blood pressure (p = 0.01) than patients who used traditional bottles [14]. The same reason might underlie the results of this study. Patients receiving antibiotics often miss their dosage because of simply forgetting [15].
The findings in this study indicate a potential role of the calendarized package in improving patients' compliance. However, this study has several limitations that should be considered. The first limitation is in the distribution of patients' age recruited between two groups. The analysis results in Table 2 showed a significant difference in patients' age which can intervene in patients' compliance. Age was confirmed as the independent factor related to nonadherence. Poor compliance in older age, especially the elderly, is associated with the decline in memory, forgetfulness, which was influenced by advertisements and the preference for secret recipes or food therapy [4], [13], [16]. Bigger sample size in further study is needed to minimize the bias caused by the different age profiles between the two groups. In addition, because of the pandemic COVID-19, the compliance measurement was conducted indirectly. Therefore, future research using stricter compliance measurement methods is needed to confirm this finding.

Conclusion

The application of the calendar on the package indicates the positive impact on the patients' compliance with antibiotics. However, several limitations should be considered. Future research using a bigger sample size and stricter compliance measurement method is needed to confirm this finding.

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