The Impact of Pharmaceutical Home Care on Medical Utilization for Frequent Users of Outpatient Services in Taiwan

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Abstract: Due to the high-accessibility and low-copayment of healthcare system in Taiwan, the clinical visit frequency of people is relatively high, which often leads to an excessively high healthcare expenditure. The aim of this research was to explore the effectiveness of pharmaceutical home care for frequent users of outpatient service and to analyze the impact of pharmaceutical home care on medical utilization. The study was based on the Taiwan National Health Insurance Research Database. Patients with over 100 clinical visits during 2010 to 2012 were selected as subjects. Whether these patients participate the experimental plan of pharmaceutical home care in the following year and the medical utilization of the research subjects were analyzed to compare the difference between participating group and non-participating group in this plan. The generalized estimating equation was employed to examine the difference of medical utilization. A total of 3943 subjects were included in this study, including 591 patients (14.99%) participating in the experimental plan. The average number of physician visits during the following year of the participating group was higher than that of the non-participating group by 0.12 visits, and the outpatient medical expense was lower than the non-participating group by 18,302 points (1 point = 0.03 US dollars). After participating in the plan, the average number of clinical visits of frequent users of outpatient services was significantly reduced by 6.63 visits, and the outpatient expense was significantly decreased by 9871 points. After joining the experimental plan of pharmaceutical home care, the average number of outpatient visits decreased significantly and the medical expense was lower when compared with those who did not participate in the plan.

Keywords: pharmaceutical care; utilization review; ambulatory care; primary healthcare

1. Introduction

In Taiwan, the National Health Insurance (NHI) program was introduced in 1995 [1]. The NHI system provides medical insurance coverage for people, with nearly the whole of Taiwan’s population having been covered with comprehensive insurance [2]. NHI was associated in a reduction in mortality rate and considered to be amenable to health care, particularly among those uninsured people less likely to have medical insurance previously [2]. Literatures have different definitions of patients with high frequency visits. A Canadian study by Demers defined a high use of ambulatory care on patients who received care from more than 20 physicians annually, and received 10 times more medical services
than the overall population [3]. Hauswaldt et al. studied chronically ill and multimorbid patients and defined frequent attenders as 24 or more contacts per year [4]. Another study for the medical utilization of the elderly over 65 years old has established a criteria for frequent attendance with ≥50 contacts with practices, contacts with ≥10 different individual practices, or ≥3 practices of the same discipline per year. Anyone who meets one of the three criteria is defined as a high frequency attendance [5].

The healthcare system in Taiwan is characterized by good accessibility, comprehensive population coverage, and low-copayment, which has contributed to a tendency of people seeking medical service for not feeling well [6]. Patients with multiple chronic conditions (MCCs) tends to be highly frequent users of medical resources. Among all age groups, the percentage of MCC patients are increasing to affect various aspects in healthcare [7] since MCC patients were associated with an excessively high healthcare expenditure [8].

Frequent visits have always been an issue for health insurance. The superiority of the single-payer systems is evidenced by the performance of the Taiwanese health care system [9]. The high accessibility, comprehensive population coverage, and low-copayment condition of the Taiwanese healthcare system have led to a doctor-shopping behavior of people [6,10]. These doctor-shopping patients often spend an excessively high healthcare expenditure [8]. In order to rationalize the use of medical resources, the NHI Administration has implemented the NHI High-visit Medical Behavior Improvement Program—Pharmaceutical Home Care Pilot Program for patients with frequent visits since 2010. Patients with a number of outpatient visits ≥100 were eligible for the Pharmaceutical Home Care Pilot Program. Based on the consideration of the disease severity of patients and manpower of community pharmacies, the priorities of participating in the program were as follows. First, patients had two or more chronic diseases and have received more than 13 chronic disease prescription from two or more hospitals; Second, medicine expenses were in the top 50%, and the number of hospitals was more than 6; Third, Half of the prescriptions and medicines were more than 6; Fourth, physicians or health insurance agency think there was a need for pharmacists.

The aims of this research are to analyze the characteristics of frequent users of outpatient services, to explore the effectiveness of frequent users of outpatient services participating in the experimental plan of pharmaceutical home care, and to analyze the impact of pharmaceutical home care on medical utilization for frequent users of outpatient services.

2. Materials and Methods

2.1. Data Source

This study was a secondary analysis. Data were obtained from the 2010–2013 Longitudinal Health Insurance Database (LHID) provided by the National Health Insurance Administration, Ministry of Health and Welfare Taiwan. The LHID contained one million beneficiaries, which stratified random sampling by gender, age, and township from all insured of National health insurance Taiwan (NHI). The NHI covering over 99% population in Taiwan, avoiding bias from selection, non-response, or poor recall. The LHID has been shown to have good levels of accuracy and completeness in recording prescriptions and clinical diagnoses. Owing to the anonymity of the database, the requirement for informed consent was waived, and this study was approved as an ethical review by the Institutional Review Board of China Medical University Hospital, Taiwan (Approval date: 21 September 2018, No: CMUH106-REC1-134).

2.2. Study Subjects

All study subjects were patients with a high frequency of visits between 2010 and 2012, with a number of outpatient visits ≥100 in the current year, whereas not all patients with a high frequency of visits were mandatory to enroll in the program in the following year. Therefore, the study further divided into groups of participating or non-participating the Pharmaceutical Home Care Pilot Program in the following year based on the health insurance declaration record. The status of participating in the program is defined as the
prescription and dispensing details file in NHIRD and the declared case is classified as the Pharmaceutical Home Care Pilot Program.

2.3. Study Design

This research is a cross-sectional study by controlling related variables to explore the impact of Pharmaceutical Home Care Pilot Program on the medical utilization. Every patient was only included once to avoid duplicate observation. Whether these patients participate in the pharmaceutical home care in the following year, and the medical utilization of the research subjects, aided in analyzing the impact of participation on medical utilization.

Controlled variables include patient characteristics (age, gender, degree of urbanization, and Charlson Comorbidity Index (CCI), comorbid conditions (hypertension, diabetes, allergic rhinitis, musculoskeletal system and connective tissue diseases, digestive system diseases, sleep disturbances, and dizziness). The dependent variables are the number of outpatient visits and outpatient medical expenses in the current year. The unit of medical expense claim in the LHID was the “point”. One point was approximately equal to 0.03 US dollars.

2.4. Statistical Analysis

SAS 9.4 software was used for data sorting and statistical analysis with a \( p \) value < 0.05 as statistical significance. First of all, we used descriptive statistics to understand the basic characteristics of subjects, and then t-test and ANOVA were conducted for double-variable analysis of participation in the pharmaceutical home care pilot program and medical utilization. Because the distribution of the healthcare expenditure was markedly skewed, we used the generalized estimating equation (GEE) to analyze the impact of the pharmaceutical home care pilot program on the medical utilization after being adjusted for the variables, as otherwise the estimation results would have been biased.

3. Results

3.1. The Baseline Characteristics of Patients

The basic characteristics of subjects are shown in Table 1. A total of 3943 frequent users of outpatient services were eligible to be included in the pharmaceutical home care pilot program. Eventually, there were 591 (14.99%) patients participating. The participation rate is higher for female subjects (15.15%) compared to that of male subjects (14.84%).

| Variable                                | Join Pharmaceutical Home Care Plan | \( p \) Value |
|-----------------------------------------|------------------------------------|---------------|
|                                          | Total | No    | Yes |                     |               |
|                                          | N     | %     | N   | %     | N   | %     |               |
| Total                                    | 3943  | 100.00| 3352| 85.01| 591 | 14.99|               |
| Gender                                   |       |       |     |       |     |       | <0.001         |
| Female                                   | 1921  | 48.72 | 1630| 84.85| 291 | 15.15|               |
| Male                                     | 2022  | 51.28 | 1722| 85.16| 300 | 14.84|               |
| Age (year)                               |       |       |     |       |     |       | <0.001         |
| <44                                      | 314   | 7.96  | 282 | 89.81| 32  | 10.19|               |
| 45-55                                    | 432   | 10.96 | 379 | 87.73| 53  | 12.27|               |
| 55-65                                    | 721   | 18.29 | 600 | 83.22| 121 | 16.78|               |
| 65-75                                    | 1108  | 28.10 | 919 | 82.94| 189 | 17.06|               |
| 75-85                                    | 1127  | 28.58 | 951 | 84.38| 176 | 15.62|               |
| >85                                      | 241   | 6.11  | 221 | 91.70| 20  | 8.30 | <0.001         |
| Degree of urbanization                   |       |       |     |       |     |       |               |
| High                                     | 2742  | 69.54 | 2381| 86.83| 361 | 13.17|               |
| Middle                                   | 745   | 18.89 | 610 | 81.88| 135 | 18.12|               |
| Low                                      | 456   | 11.56 | 361 | 79.17| 95  | 20.83|               |
Table 1. Cont.

| Variable                                      | Join Pharmaceutical Home Care Plan | p Value |
|-----------------------------------------------|------------------------------------|---------|
|                                               | Total | No | % | N | % | Yes | % | N | % |
| CCI score                                     |       |    |   |   |    |     |   |   |    |   |
| 0                                            | 422   | 373 | 88.39 | 49 | 11.61 |       | 0.004 |
| 1–2                                          | 1294  | 1067 | 82.46 | 227 | 17.54 |       |
| 3–4                                          | 1086  | 921 | 84.81 | 165 | 15.19 |       |
| >5                                           | 1141  | 991 | 86.85 | 150 | 13.15 |       |
| Hypertension                                 |       |    |   |   |    |     |   |   |    |   |
| No                                           | 1419  | 1243 | 87.60 | 176 | 12.40 | <0.001 |
| Yes                                          | 2524  | 2109 | 83.56 | 415 | 16.44 |       |
| Diabetes                                     |       |    |   |   |    |     |   |   |    |   |
| No                                           | 2415  | 2049 | 84.84 | 366 | 15.16 | <0.001 |
| Yes                                          | 1528  | 1303 | 85.27 | 225 | 14.73 |       |
| Allergic rhinitis                            |       |    |   |   |    |     |   |   |    |   |
| No                                           | 3338  | 2835 | 84.93 | 503 | 15.07 | 0.661 |
| Yes                                          | 605   | 517 | 85.45 | 88  | 14.55 |       |
| Musculoskeletal system and connective tissue diseases |       |    |   |   |    |     |   |   |    |   |
| No                                           | 650   | 573 | 88.15 | 77  | 11.85 | <0.001 |
| Yes                                          | 3293  | 2779 | 84.39 | 514 | 15.61 |       |
| Digestive system diseases                    |       |    |   |   |    |     |   |   |    |   |
| No                                           | 625   | 548 | 87.68 | 77  | 12.32 | <0.001 |
| Yes                                          | 3318  | 2804 | 84.51 | 514 | 15.49 |       |
| Sleep disturbance                            |       |    |   |   |    |     |   |   |    |   |
| No                                           | 2790  | 2385 | 85.48 | 405 | 14.52 | <0.001 |
| Yes                                          | 1153  | 967 | 83.87 | 186 | 16.13 |       |
| Dizziness                                    |       |    |   |   |    |     |   |   |    |   |
| No                                           | 2268  | 1970 | 86.86 | 298 | 13.14 | <0.001 |
| Yes                                          | 1675  | 1382 | 82.51 | 293 | 17.49 |       |

Regarding to basic characteristics of subjects, male, aged between 75 and 85, high degree urbanization and a CCI score of 1 to 2 were accounted for a higher percentage of subjects. Regarding comorbidities, there were 3318 (84.15%) patients seeking medical care for digestive diseases, 3293 (83.52%) patients for musculoskeletal system and connective tissue diseases, and 2524 (64.01%) patients for hypertensive diseases.

3.2. Influencing Factors for the Willingness of Patients with Frequent Visits to Participate the Plan

Table 2 indicated the factors relevant to the participation of patients with frequent visits into the plan. Based on the GEE model analysis with female subjects as the reference group, the odds ratio of men joining the project is 1.06 times (95% CI = 0.86–1.30), without reaching a statistical significance. In the aspect of age, with subjects under 44 years old as the reference, the age groups of 55–64 years (OR = 1.45, 95% CI = 0.90–2.31) and 65–74 years old (OR = 1.41, 95% CI = 0.89–2.23) have higher participate rates, while the age group of over 85 years old (OR = 0.69, 95% CI = 0.36–1.31) has the lowest rate, however, the difference is not statistically significant. Regarding the degree of urbanization with the high urbanization as the reference group, the odds ratio of participation is 1.41 for patients in the middle urbanization (95% CI = 1.11–1.80) and 1.66 for patients in low-urbanization areas are (95% CI = 1.26–2.19). In the aspect of CCI scores with a CCI score of 0 as the reference group, the odds ratio of participation for patients with the CCI score of 1 to 2 was 1.42 times (95% CI = 0.95–2.11) without statistical significance. As for comorbidities, the odds ratio of participation is 1.30 for hypertension (95% CI = 1.04–1.62, p = 0.022), and 1.26 for vertigo (95% CI = 1.04–1.54, p = 0.021), and both reached a statistically significant difference.
Table 2. Factors related to the willingness of high frequent users of outpatient services to participate in the plan of pharmaceutical home care.

| Variable                                    | Adjusted Odds Ratio | 95% CI      | p Value |
|---------------------------------------------|---------------------|-------------|---------|
| Gender                                      |                     |             |         |
| Female (ref.)                               |                     |             |         |
| Male                                        | 1.06                | 0.86–1.30   | 0.593   |
| Age (year)                                  |                     |             |         |
| <44 (ref.)                                  |                     |             |         |
| 45–55                                       | 1.06                | 0.64–1.78   | 0.815   |
| 55–65                                       | 1.45                | 0.90–2.31   | 0.125   |
| 65–75                                       | 1.41                | 0.89–2.23   | 0.142   |
| 75–85                                       | 1.20                | 0.75–1.92   | 0.437   |
| >85                                         | 0.69                | 0.36–1.31   | 0.259   |
| Degree of urbanization                      |                     |             |         |
| High (ref.)                                 |                     |             |         |
| Middle                                     | 1.41                | 1.11–1.80   | 0.005   |
| Low                                         | 1.66                | 1.26–2.19   | <0.001  |
| CCI score                                   |                     |             |         |
| 0 (ref.)                                    |                     |             |         |
| 1–2                                        | 1.42                | 0.95–2.11   | 0.087   |
| 3–4                                        | 1.26                | 0.84–1.90   | 0.269   |
| >5                                         | 1.14                | 0.75–1.74   | 0.532   |
| Hypertension                                |                     |             |         |
| No (ref.)                                   |                     |             |         |
| Yes                                         | 1.30                | 1.04–1.62   | 0.022   |
| Diabetes                                    |                     |             |         |
| No (ref.)                                   |                     |             |         |
| Yes                                         | 0.90                | 0.73–1.11   | 0.313   |
| Allergic rhinitis                           |                     |             |         |
| No (ref.)                                   |                     |             |         |
| Yes                                         | 1.04                | 0.79–1.38   | 0.761   |
| Musculoskeletal system and connective tissue diseases | | | |
| No (ref.)                                   |                     |             |         |
| Yes                                         | 1.19                | 0.89–1.58   | 0.243   |
| Digestive system diseases                   |                     |             |         |
| No (ref.)                                   |                     |             |         |
| Yes                                         | 1.30                | 0.97–1.73   | 0.077   |
| Sleep disturbance                           |                     |             |         |
| No (ref.)                                   |                     |             |         |
| Yes                                         | 1.12                | 0.91–1.38   | 0.288   |
| Dizziness                                   |                     |             |         |
| No (ref.)                                   |                     |             |         |
| Yes                                         | 1.26                | 1.04–1.54   | 0.021   |

3.3. The Impact of Participation on the Frequency of Outpatient Medical Utilization

GEE model was used to analyze the difference between two subject groups in the number of outpatient visit. Results shown in Table 3 revealed that the average number of outpatient visits was 105.35 and 92.78 for patients participating and non-participating in the plan, respectively. After controlling related variables, the average number of outpatient visits for those who joined the plan was 0.117 higher than those who did not join the plan (95% CI = 0.08–0.15, p < 0.001). With the group under 44 years old as reference, the participation rate of patients over 85 years was the lowest, with 0.118 visits lower than the reference group (95% CI = −0.20 to −0.03, p = 0.007). Using the high degree of urbanization as the reference group, the average number of outpatient visits for the middle is 0.048 visits lower (95% CI = −0.09 to −0.01, p = 0.018). As for comorbidities, the average number of outpatient visits for patients with musculoskeletal system diseases and connective tissue diseases was 0.121 visits higher than those of without such comorbidities (95% CI = 0.08–0.17, p < 0.001), and for patients with digestive system diseases, it was 0.042 visits higher than those without such comorbidities (95% CI = 0.00–0.08, p = 0.038). The average number of visits for patients with dizziness was 0.032 visits higher than that of patients without such comorbidities (95% CI = 0.00–0.06, p = 0.048).
Table 3. The impact of participation in the program on the number of outpatient visits.

| Variable                                  | Average Number of Outpatient Visits |
|-------------------------------------------|------------------------------------|
|                                           | Mean  | Std   | β     | S.E. | 95% CI  | p Value |
| Total                                     | 94.64 | 40.31 |       |      |         |         |
| Pharmaceutical home care plan             |       |       |       |      |         |         |
| No (ref.)                                 | 92.78 | 40.22 | 0.117 | 0.02 | 0.08    | 0.15    |
| Yes                                       | 105.35| 38.84 |       |      |         | <0.001  |
| Gender                                    |       |       |       |      |         |         |
| Female (ref.)                             | 95.15 | 37.12 |       |      |         |         |
| Male                                      | 94.14 | 43.05 | 0.011 | 0.02 | −0.02   | 0.04    |
| Age (year)                                |       |       |       |      |         |         |
| <44 (ref.)                                | 93.51 | 44.94 |       |      |         |         |
| 45–55                                     | 100.85| 52.27 | 0.059 | 0.04 | −0.01   | 0.13    |
| 55–65                                     | 96.43 | 41.49 | −0.006| 0.04 | −0.08   | 0.06    |
| 65–75                                     | 95.52 | 36.07 | −0.019| 0.03 | −0.08   | 0.05    |
| 75–85                                     | 92.50 | 36.24 | −0.052| 0.03 | −0.12   | 0.01    |
| >85                                       | 85.68 | 36.45 | −0.118| 0.04 | −0.20   | −0.03   |
| Degree of urbanization                    |       |       |       |      |         |         |
| High (ref.)                               | 95.12 | 41.19 |       |      |         |         |
| Middle                                    | 92.36 | 38.22 | −0.048| 0.02 | −0.09   | −0.01   |
| Low                                       | 95.82 | 38.13 | −0.016| 0.02 | −0.06   | 0.03    |
| CCI score                                 |       |       |       |      |         |         |
| 0 (ref.)                                  | 92.47 | 39.33 |       |      |         |         |
| 1–2                                       | 95.85 | 36.50 | 0.022 | 0.02 | −0.02   | 0.07    |
| 3–4                                       | 96.72 | 41.01 | 0.038 | 0.03 | −0.02   | 0.09    |
| >5                                        | 92.17 | 43.47 | −0.002| 0.03 | −0.06   | 0.05    |
| Hypertension                              |       |       |       |      |         |         |
| No (ref.)                                 | 94.61 | 44.04 |       |      |         |         |
| Yes                                       | 94.65 | 38.02 | −0.002| 0.02 | −0.04   | 0.03    |
| Diabetes                                  |       |       |       |      |         |         |
| No (ref.)                                 | 94.77 | 39.99 |       |      |         |         |
| Yes                                       | 94.44 | 40.76 | 0.001 | 0.02 | −0.03   | 0.03    |
| Allergic rhinitis                         |       |       |       |      |         |         |
| No (ref.)                                 | 94.43 | 40.86 |       |      |         |         |
| Yes                                       | 95.69 | 36.85 | 0.008 | 0.02 | −0.03   | 0.05    |
| Musculoskeletal system and connective tissue diseases |       |       |       |      |         |         |
| No (ref.)                                 | 85.24 | 38.79 |       |      |         |         |
| Yes                                       | 96.50 | 40.35 | 0.121 | 0.02 | 0.08    | 0.17    |
| Digestive system diseases                 |       |       |       |      |         |         |
| No (ref.)                                 | 90.23 | 38.19 |       |      |         |         |
| Yes                                       | 95.47 | 40.64 | 0.042 | 0.02 | 0.00    | 0.08    |
| Sleep disturbance                         |       |       |       |      |         |         |
| No (ref.)                                 | 93.51 | 39.18 |       |      |         |         |
| Yes                                       | 97.34 | 42.40 | 0.024 | 0.02 | −0.01   | 0.06    |
| Dizziness                                 |       |       |       |      |         |         |
| No (ref.)                                 | 93.03 | 40.61 |       |      |         |         |
| Yes                                       | 96.81 | 39.81 | 0.032 | 0.02 | 0.00    | 0.06    |

Abbreviations: Std, standard deviation; S.E., standard error.

3.4. The Impact of Pharmaceutical Home Care Plan on Outpatient Medical Expenses

Results shown in Table 4 were the difference in outpatient medical expenses between participating and non-participating groups.

The results indicated that the average outpatient medical expense points of patients in the participating group was 81,269 points less than that of non-participating group (95% CI = −26,301 to −10,303; p < 0.001). As for gender, the average outpatient medical cost of male subjects was 6738 points more, but not significantly, than that of female subjects (95% CI = −10,749 to 14,945; p = 0.749). As compared with subjects of the high degree of urbanization, the average outpatient medical expenses of subjects with middle (89,278 points) and low degrees (83,720 points) of urbanization had a statistically significant decrease. Regarding the effect of CCI, a higher CCI score was significantly related to a higher average of outpatient medical expenses. For the impact of comorbidities, the average outpatient medical expenses of patients with dizziness is 87,866 points less than
those without such comorbidities (95% CI = −27,862 to −8228; p < 0.001), while there was no statistically significant difference for other comorbidities.

Table 4. The impact of participation in the pharmaceutical home care plan on outpatient medical expenses.

| Variable                                               | Mean  | Std   | β     | S.E.  | 95% CI          | p Value |
|--------------------------------------------------------|-------|-------|-------|-------|-----------------|---------|
| Total                                                  | 101,915 | 153,685 |       |       |                 |         |
| Pharmaceutical home care plan                          |       |       |       |       |                 |         |
| No (ref.)                                              | 105,725 | 163,814 |       |       |                 |         |
| Yes                                                    | 81,269  | 66,629 | −18,302 | 4081  | −26,301 to −10,303 | <0.001  |
| Gender                                                 |       |       |       |       |                 |         |
| Female (ref.)                                          | 98,469  | 133,680 |       |       |                 |         |
| Male                                                   | 105,207 | 170,215 | 2098  | 6555  | −10,749 to 14,945 | 0.749   |
| Age (year)                                             |       |       |       |       |                 |         |
| <44 (ref.)                                             | 101,903 | 289,451 |       |       |                 |         |
| 55–65                                                  | 91,466  | 118,995 | −14,952 | 25,547 | −65,024 to 35,120 | 0.558   |
| 65–75                                                  | 120,412 | 177,452 | −348  | 24,762 | −48,881 to 48,184 | 0.989   |
| 75–85                                                  | 104,636 | 139,895 | −18,714 | 23,565 | −64,900 to 27,472 | 0.427   |
| >85                                                    | 93,281  | 105,416 | −35,486 | 23,958 | −82,443 to 11,471 | 0.139   |
| Degree of urbanization                                 |       |       |       |       |                 |         |
| High (ref.)                                            | 108,377 | 168,909 |       |       |                 |         |
| Middle                                                 | 89,278  | 115,301 | −13,914 | 5956  | −25,588 to −2240 | 0.020   |
| Low                                                    | 83,720  | 100,588 | −21,087 | 6843  | −34,498 to −7676 | 0.002   |
| CCI score                                              |       |       |       |       |                 |         |
| 0 (ref.)                                               | 63,450  | 164,988 |       |       |                 |         |
| 1–2                                                    | 70,602  | 92,185  | 19,785 | 5911  | 8199 to 31,372  | 0.001   |
| 3–4                                                    | 92,014  | 111,174 | 44,913 | 8416  | 28,417 to 61,409 | <0.001  |
| >5                                                     | 161,201 | 200,767 | 113,835 | 11,248 | 91,790 to 135,881 | <0.001  |
| Hypertension                                           |       |       |       |       |                 |         |
| No (ref.)                                              | 101,304 | 188,322 |       |       |                 |         |
| Yes                                                    | 102,173 | 129,999 | 804   | 6122  | −11,195 to 12,803 | 0.896   |
| Diabetes                                               |       |       |       |       |                 |         |
| No (ref.)                                              | 92,567  | 155,144 |       |       |                 |         |
| Yes                                                    | 116,742 | 150,310 | −2039 | 5861  | −13,525 to 9448  | 0.728   |
| Allergic rhinitis                                      |       |       |       |       |                 |         |
| No (ref.)                                              | 102,659 | 153,907 |       |       |                 |         |
| Yes                                                    | 97,567  | 140,140 | −7555 | 6333  | −19,967 to 4858  | 0.233   |
| Musculoskeletal system and connective tissue diseases  |       |       |       |       |                 |         |
| No (ref.)                                              | 113,522 | 238,417 |       |       |                 |         |
| Yes                                                    | 99,809  | 130,617 | −11,347 | 10,847 | −32,606 to 9912  | 0.296   |
| Digestive system diseases                              |       |       |       |       |                 |         |
| No (ref.)                                              | 101,368 | 195,784 |       |       |                 |         |
| Yes                                                    | 102,028 | 143,689 | −4490 | 7319  | −18,834 to 9854  | 0.540   |
| Sleep disturbance                                      |       |       |       |       |                 |         |
| No (ref.)                                              | 103,632 | 158,937 |       |       |                 |         |
| Yes                                                    | 97,825  | 140,354 | −3640 | 6395  | −16,173 to 8894  | 0.569   |
| Dizziness                                              |       |       |       |       |                 |         |
| No (ref.)                                              | 112,287 | 178,967 |       |       |                 |         |
| Yes                                                    | 87,866  | 109,098 | −18,045 | 5009  | −27,862 to −8228 | <0.001  |

1 The unit of medical expense claim was the “point”. One point was approximately equal to 0.03 US dollars. Abbreviations: Std, standard deviation; S.E., standard error.

3.5. Differences in Medical Utilization before and after the Participation in the Plan

The paired t-test was used to analyze the average number of outpatient visits and the average medical expenses before and after the participation of subjects among the patients joining the pharmaceutical home care plan, as shown in Table 5. Results showed that after participating in the plan, the average number of outpatient visits decreased for 6.63 visits and the average outpatient cost significantly decreased by 9871 points.
Table 5. The differences in medical utilization among patients participating in the Pharmaceutical Home Care Pilot Program (N = 591).

| Variables                      | Before Join | After Join | Differences | p Value |
|--------------------------------|-------------|------------|-------------|---------|
| Average outpatient visits      | 111.98      | 105.35     | 6.63        | <0.001  |
| Average outpatient expenses 1  | 91,140      | 81,269     | 9871        | <0.001  |

The unit of medical expense claim was the “point”. One point was approximately equal to 0.03 US dollars.

4. Discussion

Pharmaceutical care has evolved from passively waiting for patients in the past and has now developed into an active provision of services, and community pharmaceutical care has also become a trend [11]. Several positive outcomes obtained with different pharmaceutical care programs are making a beneficial change based on the pharmacist’s professional judgment by applying continuous quality improvement [12]. This plan is the first time that a community pharmacist provides pharmaceutical care for patients with frequent visits. This study tried to evaluate the influencing factors of patients with frequent visits in the pharmaceutical home care program, and the impact of the plan on the medical utilization of frequent users.

In this study, a total of 3943 people were identified as having visited physicians for over 100 times. The percentage of these patients participating in the experimental plan of pharmaceutical home care was 14.99%. The influencing factors for these subjects participating in the plan include urbanization level, hypertension, and dizziness. The average physician visits during the following year for participating group was higher than non-participating group for 0.117 visits, and the outpatient medical expenses was lower than the non-participating group by 18,302 points. After participating in the plan, the physician visits of studied subjects significantly reduced by 6.63 visits, and the outpatient expense was significantly decreased for 9871 points. The influencing factors for the number of physician visits were age, degree of urbanization level, and other comorbidities, including musculoskeletal system diseases, connective tissue diseases, digestive system disease, and vertigo. The influencing factors for outpatient medical expenses in the following year include degree of urbanization level, CCI index, and comorbidity dizziness. There were no significant differences in the influence of pharmacist characteristics on the medical utilization for outpatients who joined the experimental plan.

High utilizers are associated with a higher proportion of medical services and therefore produce relative health care services expenditures [13,14]. Several studies showed that chronic diseases and multi-morbidity are associated with substantially higher health care utilization [4,15]. The frequent visitors has some common characteristics. A study found that most over-users are elderly, female, less-educated, self-perceived patients with poor health and multiple clinical treatments [16]. A German study showed that patients with frequent visits are mainly elderly, suffering from severe or multiple diseases, and relying on long-term care [5]. A study from US Medicare files expressed that patients with medical expenses in the top 10% are distributed among older male, more often black, and more co-morbidity [17]. In addition, a Danish study found that patients with hypertension, diabetes mellitus, and mental illness have twice the odds of becoming a patient with high frequency visits [18].

In this study, we found that the characteristics of outpatients who visited more than 100 times were mainly male, aged from 65 to 85 years old, and high urbanization. The influencing factors of becoming a patient with frequent visits include female, aged over 85 years old and higher total number of medications [19]. Research in South Korea found that most of the overuse of medical resources was from those who were elderly and female [16]. These factors were similar to that identified from other literature research, while the gender distribution is slightly different. It is speculated that it may be different due to different national conditions. Taiwan’s medical utility is mainly concentrated in areas with high urbanization. The scholars use the degree of urbanization developed by Liu et al. to explore the differences in medical use between different degrees of urbanization.
in Taiwan and find that the degree of urbanization is grade sixth agricultural towns have a significantly lower medical utilization than grade 1 highly urbanized towns [1].

In this study, most of the patients had CCI scores of 1–2. Canadian scholars found that the average CCI index of the high-visiting group with an age of over 65 was 5.5 points, which is significantly higher than the average for the general group of 4.1 points [19]. The distribution of the CCI score was slightly different in other studies. A literature pointed out that patients with significant psychiatric and social comorbidities was prone to high frequency visits [20]. Several studies indicated that there is an association between high utilization and psychiatric syndromes, and medically unexplained symptoms [21,22]. The medical home care pilot program excluded the number of consultations in the psychiatric department. Therefore, this may be one explanation for different CCI score in this study. The influencing comorbidities for frequent users of outpatient services who participated the plan were hypertension and dizziness. Our results indicated that the odds ratio is 1.30 for hypertension and 1.26 for Dizziness than those without such comorbidities. Higher prevalence of hypertension may be one reason. A Taiwanese research showed that higher crude prevalence of hypertension was found in the elderly population [23].

Pharmaceutical care services are an important part of medication safety. According to the results of the GEE model analysis, the average number of outpatient visits during the following year for subjects participating in the plan significantly increased for 0.117 visits. It may be due to that Pharmaceutical Home Care Plan has a priority order for the counseling cases. In medical expenses, pharmacist intervention may improve the medication behavior of patients with frequent visits, showing the effect of counseling. The intervention of community pharmaceutical care could enhance compliance with medications of the elderly, prevent the occurrence of serious diseases, and could save medical costs [24,25]. A systematic literature review indicated that the clinical benefits of hospital pharmaceutical services include the improvement of patients’ health status, reduction of the use of undesirable drugs, and meeting the cost of Quality-Adjusted Life Years (QALYs), or cost savings [26]. It was found that the average outpatient medical expenses for patients with frequent visits in the plan were significantly lower than that of non-participants for 18,302 points. It may be that the intervention of pharmacist’s consultation resulted in an improvement in medication for patients with frequent visits, thereby reducing medical expenses. In this study, the average number of outpatient visits and medical expenses was significantly reduced among patients joining the pharmaceutical home care plan. Although compared with patients without joining the pharmaceutical home care plan, the average number of physician visits was still higher on statistical significant meaning, the difference is very limited. In terms of outpatient medical expenses, it was dramatically decreased after participating in the pharmaceutical home care. It showed the pharmaceutical home care helped reduce medical service utilization. The outpatient visits were not decreased as it may be related to the aging society, due to the complex health conditions of high-need patients suffering from chronic diseases, as well as the number of medications prescribed that are polypharmacy. It may require long-term intervention and counseling by a pharmacist service to improve high-frequency behaviors.

After joining the experimental plan of pharmaceutical home care, the average number of outpatient visits was similar and the medical expense was lower when compared with those who did not participate in the plan. The primary reason for the effectiveness of the Pharmaceutical Home Care Pilot Program is the virtuous cycle given by the policy. For reducing the waste of medical resources, the National Health Insurance Administration appoints community pharmacists to perform the home medication care, and pay for the pharmacy care fees. The community pharmacists would have face-to-face communication with high frequent users. While most high frequent users are the elderly or patients with multiple chronic diseases, the direct consultation and continuous instruction provided by community pharmacists to them, to establish a guideline for medication to reduce duplicate waste of medications, indirectly reduces the number of physician visits and achieves reasonable utilization of the medical resource. The government, community pharmacists,
and patients are all beneficiaries of the policy. The virtuous cycle is an important factor contributing to a win-win policy. The pharmaceutical home care program continues to this day. It indicated that most patients agreed pharmaceutical service is helpful, they are highly satisfied, and wished to continue. Pharmacists can resolve drug therapy problems with a specifically trained skill in this plan. In terms of economic outcomes, the outpatient drug expenditure decreased. The effectiveness of counseling can be sustained after the completion of the plan, which is worth having a further follow-up study to provide more information for planning policies of medical and health-related units. Moreover, the Ministry of Health and Welfare Taiwan (MOHW) integrated the pharmaceutical home care program and other pharmaceutical programs into the “Special Population Pharmaceutical Care Program” in 2019 for patients with high-frequent visits, new residents, migrant workers, people with disabilities, and the aboriginal in Taiwan.

Compared with the previous studies, the study not only evaluated the impact of participation on medical utilization but also investigated the influence factors related to the willingness of high frequent users of outpatient services to participate in the plan of pharmaceutical home care. Based on the results of this study, the effectiveness of the program has been shown and verified. The major assignment of the next stage is how to increase the participation rate of the program. The research findings would provide a reference for participation improvement of the present Pharmaceutical Care Program.

There may be some possible limitations in this study. This study uses the secondary data analysis of the NHI Database. The database does not contain information on the quality of life, education, attitudes, and living habits. Therefore, we cannot understand the difference in the quality of life and the improvement of knowledge and attitudes in home-based medical care. Only the analysis of health insurance medical utilization may underestimate the impact and effectiveness of the pharmacist’s intervention and counseling on patients with frequent visits. In addition, the patients who participated in the Pharmaceutical Home Care Pilot Program were voluntary and the dates of joining and leaving the programs of each patient were different. It may have selection bias in the study. The study reduced the selection bias by using the nationwide database and selecting the patients without any exclusion, whereas the highly frequent users of medical resources are in the minority. As the number of study subjects was rare, our study was unable to use matching methods to further reduce the bias. Future research can use the matching methods to obtain study subjects to further assess the benefits of pharmaceutical home care. Due to the LHID limitation, the study used the 2010–2013 database to assess the impact of pharmaceutical home care on medical utilization. This study was based on a nationwide database. Thus, the study subjects and results still had accuracy and representativeness.

The research subjects cannot exclude the high-visit insurance subjects of the other integrated care plan. It is possible that patients with frequent visit in the control group joined the integrated care plan, and maybe not truly measure the high-visit illnesses of the pharmaceutical home care program and the difference between the frequent patients who have not joined any plan. The literature points out that patients with mental disorders are more likely to become patients with frequent visits, but the design of this medical home care pilot plan excludes the number of visits to the psychiatric department. Therefore, mental illness is not included as a comorbidity in this study, which may cause differences in the results of this study and other high-visit studies.

5. Conclusions

Based on the results of this study, the effectiveness of the program has been shown and verified. After joining the Pharmaceutical Home Care Pilot Program, the average number of outpatient visits decreased significantly and the medical expense was lower when compared with those who did not participate in the plan.
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Institutional Review Board Statement: Data were obtained from the National Health Insurance Administration, Ministry of Health and Welfare Taiwan provides scrambled random identification numbers for insured patients to protect the privacy of beneficiaries. This study protocol was approved from a completely ethical review by the Institutional Review Board of China Medical University Hospital, Taiwan (Approval date: 21 September 2018, No: CMUH106-REC1-134).

Informed Consent Statement: The database was anonymous, therefore, the requirement for informed consent was waived.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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