

Original Research Article

An Initial Study of the Primary Care Services in Hospitals under the Global Budget System: A Case from Taiwan

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Abstract: The government of Taiwan has promoted the hierarchy of medical care in Taiwan in order to facilitate large-scale hospitals returning to the nature of teaching research, emergency and critical care services. Since 2017, the clinical and service growth of mild cases at medical centers and regional hospitals has been limited. This study adopts a retrospective study and uses the clinic application number of the NHI-insured as research subjects. The subject hospital in 2016 applied about 838,088 cases, and after screening about 158,631 people times were included as the research subjects. With the Chi-square test, a significant difference has been identified in age ($p < 0.001$), gender ($p < 0.001$), diagnosis of diabetes, high blood pressure, and hypercholesterolemia ($p < 0.001$), and divisions visited ($p < 0.001$). 2016 Q1's primary care services rate was 15.18% with the annual average of 18.93% lower than national rate at the same period, 21.76%. Patients of primary care can be transferred by hospitals to community clinics to reduce financial losses. Relevant adoptive measures also need to be introduced by the government (such as policy promotion and adjustment of co-payment) to smoothly promote and develop primary care services.

Keywords: Primary Care, Diabetes, Hypertension, Hypercholesterolemia

INTRODUCTION

After a national health insurance (NHI) program was implemented in Taiwan in 1995, due to the high accessibility to medical care and lack of a referral mechanism, the government of Taiwan has promoted the hierarchy of medical care in Taiwan in order to facilitate large-scale hospitals returning to the nature of teaching, research and emergency and critical care services. Since 2017, the clinical and service growth of mild cases at medical centers and regional hospitals has been limited and the number of clinical treatments will not exceed 90% of that in 2016, with excess cases not being covered by the NHI program.

Taiwan's health care system focuses on specialist and hospital care, and there is no referral requirement or gatekeeper in primary care settings [1]. Patients are free to visit physicians at community clinics or hospital outpatient departments for any episode based on their preference. Accordingly, potential doctor shopping and the receiving of fragmented medical services by patients were observed [2]. The essence of the reform of Taiwan's medical system is to search for the

development of balance between hospitals and local clinics, such as the hierarchy of medical care, family physician system, whole person medical care by physicians, and a quality medical insurance policy to ensure the optimal protection of the public health [3]. Proper distribution of medical care and health resources improves the public health, enhances accessibility of medical care, increases medical efficiency, and even boosts health equality between and among groups [4-5].

Primary care is the frontline of the hierarchy of medical care and has often been provided by community institutions (such as clinics, health protection centers, and health stations). The main tasks of primary care physicians are to provide diagnosis information and proper treatment methods for patients to make informed decisions [6]. There are 205 diseases defined to be monitored and controlled by primary care after discussion in several meetings. According to the negotiation meeting for the total budget of hospitals organized on May 24, 2017 in Taiwan, in the first quarter of 2016, 17.78% and 21.76% of primary care services were provided by medical centers and regional

hospitals respectively, while in 2017 the percentages remained at 14.78% and 20.32%. Medical centers and regional hospitals deducted the amounts of 54 million and 172 million respectively (as shown in Table 1). Hence, how to use medical resources more effectively and to reduce the number of primary care services provided by large-scale hospitals has become an important issue for health insurance policies. The purpose of this study is to understand primary care services from a hospital in Taiwan and it is hoped that research results will offer help for hospitals to make the right decision for their management so as to reduce financial losses of hospitals.

METHODS

This study adopts a retrospective study and uses the clinic application number of the NHI-insured as research subjects. The hospital was rated as outstanding and listed as a regional hospital under the NHI.

- A. Condition to collect research subjects: based on the clinical application data of the NHI in 2016.
- B. Condition to exclude research subjects: cases receiving emergency care, the Pay-For-Performance Pilot Project, home care, referrals, major illness/injury in second primary diagnosis, a return visit after hospitalization, pediatric care (under six years old), case payment, clinical surgery, and IDS projects.
- C. Statistical methods include:
 - Age, gender, diagnosis of diabetes, hypertension, and hypercholesterolemia, medical division subjects visited, and frequencies and percentages of visits.
 - In 2016, the monthly number of clinical visits, approved outpatient medical expenses, the number of primary care services, and the medical expenses of primary care services were used to calculate the percentage and medical expenses of primary care services (total number of clinical visit case (per thousand) and each case).
 - Illness code of primary care cases of research subjects and frequency, medical expenses, percentage, and the accumulated value.

RESULTS

The subject hospital in 2016 applied about 838,088 cases, and after screening about 158,631 people times were included as the research subjects. In terms of age, in 2016, most outpatients were between 45-64 years old (8.5%, 11.5%, 11.8%, 13.9%) in each quarter followed by those >65 years old (6.6%, 8.8%, 8.75, 10.9%). For gender, in each quarter, there were more male outpatients (10.6%, 13.4%, 14.1%, 16.2%). There were quarterly differences of diagnosis of diabetes, high blood pressure, and hypercholesterolemia. They visited the Division of Internal Medicine more frequently (9.8%, 13.2%, 13.6%, 16.4%) followed by visits to the Division of

Family Medicine (4.8%, 6.0%, 6.3%, 8.1%). Information of research subjects according to the applications of the insured of the NHI program, the duration was classified into Quarter 1, 2, 3, and 4. With the Chi-square test, a significant difference has been identified in age ($p < 0.001$), gender ($p < 0.001$), diagnosis of diabetes, high blood pressure, and hypercholesterolemia ($p < 0.001$), and divisions visited ($p < 0.001$). (see Table 2)

According to the clinical application information of the hospital, from the statistical analyses of the number of primary care services and outpatients, the highest number of primary care services was 17,549 in September, 2016 (Medical expenses and percentage of primary care services are respectively, 13,993,754 and 23.14%) followed by 15,358 (Medical expenses and percentage of primary care services are respectively, 16,711,646 and 21.73%) in December, 2016, while the lowest number was 7,371 (Medical expenses and percentage of primary care services are respectively, 9,176,081 and 11.25%) in January, 2016. 2016 Q1's primary care services rate was 15.18% with the annual average of 18.93% lower than national rate at the same period, 21.76%. Please see Table 3.

In order to understand the outpatients visiting the subject hospital and frequency of primary care services they received, we find that based on the statistical results of ICD-10, the highest number was 46,025 of I10 Essential (primary) hypertension (with primary care medical expenses and percentages of 53,660,012 and 29.01%) followed by the remaining top ten, the number was 31,961 of E119. Type 2 diabetes mellitus without complications (with primary care medical expenses and percentages of 42,437,903 and 20.15%); the number was 9,381 of K279 Peptic ulcer, site unspecified, unspecified as acute or chronic, without hemorrhage or perforation (with primary care medical expenses and percentages of 11,614,369 and 5.91%); the number was 5,872 of Z23 Encounter for immunization (with primary care medical expenses and percentages of 723,196 and 3.7%); the number was 4,139 of F419 Anxiety disorder, unspecified (with primary care medical expenses and percentages of 3,532,337 and 2.61%); the number was 3,665 of N951 Menopausal and female climacteric states (with primary care medical expenses and percentages of 2,329,756 and 2.31%); the number was 3,488 of J069 Acute upper respiratory infection, unspecified (with primary care medical expenses and percentages of 1,505,423 and 2.2%); the number was 3,328 of M179Osteoarthritis of knee, unspecified (with primary care medical expenses and percentages of 3,540,590 and 2.1%); the number was 2,920 of K739 Chronic hepatitis, unspecified (with primary care medical expenses and percentages of 2,955,786 and 1.84%) (Table 4).

Table-1: Monitored and controlled by primary care

Item		Medical centers	Regional hospitals	District hospitals
First Quarter, 2016	Medical expenses	5,989,000	8,723,000	5,982,000
	Medical expenses of primary care services	1,065,000	1,898,000	2,039,000
	Number of primary care percentage	17.78%	21.76%	34.09%
	Medical expenses of primary care services /each case	1,852	1,407	941
First Quarter, 2017	Medical expenses	6,001,000	8,534,000	5,962,000
	Medical expenses of primary care services	887,000	1,734,000	1,894,000
	Number of primary care percentage	14.78%	20.32%	31.76%
	Medical expenses of primary care services /each case	2,570	1,859	1,180
Deducted the amounts		54 million	172 million	0

Note. From National Health Insurance Administration, Ministry of Health and Welfare (2017)

Table-2: Baseline Characteristics of study subjects (n=158,631)

Characteristics	Q1		Q2		Q3		Q4		X ² test p value
	n	%	n	%	n	%	n	%	
Age(years)									<0.001
<14	526	0.3	328	0.2	341	0.2	475	0.3	
15-29	2001	1.3	1920	1.2	1827	1.2	2329	1.5	
30-44	4497	2.8	4978	3.1	5418	3.4	6028	3.8	
45-64	13493	8.5	18286	11.5	18789	11.8	22050	13.9	
>65	10395	6.6	13898	8.8	13780	8.7	17272	10.9	
Gender									<0.001
Female	14047	8.9	18089	11.4	17852	11.3	22469	14.2	
Male	16865	10.6	21321	13.4	22303	14.1	25685	16.2	
Diabetes, Dyslipidemia, Hypertension,									<0.001
Yes	14315	9.0	21307	13.4	21452	13.5	23464	14.8	
No	16597	10.5	18103	11.4	18703	11.8	24690	15.6	
Division									<0.001
Family Medicine	7600	4.8	9531	6.0	9930	6.3	12870	8.1	
General Medicine	15544	9.8	20918	13.2	21633	13.6	26081	16.4	
General Surgery	17.3	0.4	843	0.5	742	0.5	995	0.6	
Pediatrics	361	0.2	184	0.1	135	0.1	308	0.2	
Obstetrics & Gynecology	1013	0.6	1320	0.8	1267	0.8	1372	0.9	
Orthopedics	1309	0.8	1423	0.9	1295	0.8	1394	0.9	
Neurosurgery	201	0.1	267	0.2	288	0.2	349	0.2	
Urology	161	0.1	224	0.1	239	0.2	234	0.1	
Otolaryngology	857	0.5	717	0.5	637	0.4	622	0.4	
Ophthalmology	1183	0.7	1335	0.8	1392	0.9	1395	0.9	
Dermatology	679	0.4	972	0.6	895	0.6	897	0.6	
Psychiatry	816	0.5	855	0.5	857	0.5	890	0.6	
Rehabilitation Medicine	416	0.3	751	0.5	762	0.5	619	0.4	
Plastic Surgery	59	0.0	70	0.0	83	0.1	129	0.1	

Table-3: Descriptive statistics (n=158,631)

Months	Number of clinical visits	Medical expenses	Number of primary care services	Medical expenses of primary care services	Number of primary care percentage	Medical expenses of primary care percentage
Jan.2016	65,494	109,709,511	7,371	9,176,081	11.25%	8.36%
Feb.2016	61,791	103,905,784	9,642	10,635,972	15.60%	10.24%
Mar.2016	76,349	122,399,617	13,899	15,468,769	18.20%	12.64%
Apr.2016	68,762	116,127,859	12,934	14,332,931	18.81%	12.34%
May.2016	70,363	116,541,504	13,309	14,648,864	18.91%	12.57%
Jun.2016	68,640	116,353,956	13,167	14,555,010	19.18%	12.51%
Jul.2016	68,798	117,047,336	13,421	14,741,644	19.51%	12.59%
Aug.2016	73,166	123,768,614	13,964	14,986,548	19.09%	12.11%
Sep.2016	66,127	112,426,002	12,770	13,993,754	19.31%	12.45%
Oct.2016	75,835	122,276,836	17,549	15,886,553	23.14%	12.99%
Nov.2016	72,100	120,343,662	15,247	15,397,329	21.15%	12.79%
Dec.2016	70,663	119,170,967	15,358	16,711,646	21.73%	14.02%
Mean	69,804	116,672,637	13,219	14,211,258	18.93%	12.18%

Table-4: Outpatients visiting the subject hospital and frequency of primary care services they received

ICD-10	Disease	Patients	Medical expenses	Percentage	Cumulative values
I10	Essential (primary) hypertension	46,025	53,660,012	29.01%	29.01%
E119	Type 2 diabetes mellitus without complications	31,961	42,437,903	20.15%	49.16%
K279	Peptic ulcer, site unspecified, without hemorrhage or perforation	9,381	11,614,369	5.91%	55.08%
Z23	Encounter for immunization	5,872	723,196	3.70%	58.78%
F419	Anxiety disorder, unspecified	4,139	3,532,337	2.61%	61.39%
N951	Menopausal and female climacteric states	3,665	2,329,756	2.31%	63.70%
J069	Acute upper respiratory infection, unspecified	3,488	1,505,423	2.20%	65.90%
M179	Osteoarthritis of knee, unspecified	3,328	3,540,590	2.10%	67.99%
K739	Chronic hepatitis, unspecified	2,920	2,955,786	1.84%	69.83%
R42	Dizziness and giddiness	2,818	3,875,960	1.78%	71.61%
E785	Hyperlipidemia, unspecified	2,552	2,539,421	1.61%	73.22%
H259	Unspecified age-related cataract	2,440	9,802,210	1.54%	74.76%
J00	Acute nasopharyngitis	2,039	921,751	1.29%	76.04%
L309	Dermatitis, unspecified	1,718	859,675	1.08%	77.13%
L282	Other prurigo	1,705	860,129	1.07%	78.20%
J309	Allergic rhinitis, unspecified	1,332	1,242,526	0.84%	79.04%
M109	Gout, unspecified	1,291	908,909	0.81%	79.85%
M545	Low back pain	1,281	1,372,917	0.81%	80.66%
R51	Headache	1,253	1,324,926	0.79%	81.45%
R109	Unspecified abdominal pain	1,231	1,680,331	0.78%	82.23%
R509	Fever, unspecified	1,178	1,086,913	0.74%	82.97%
S300XXA	Contusion of lower back and pelvis, initial encounter	1,163	1,022,220	0.73%	83.70%
M1990	Unspecified osteoarthritis	1,047	1,218,560	0.66%	84.36%
G4700	Insomnia, unspecified	1,007	769,947	0.63%	85.00%

DISCUSSION

This study discovers the top two age groups of the main receivers of primary care services, the middle-aged (45-64 years old) and the elderly with an age of 65 and up. Among them, about 50% were diagnosed with

diabetes, high blood pressure, and hypercholesterolemia. This study also finds that the essential (primary) hypertension, type 2 diabetes mellitus without complications, and peptic ulcer illnesses are top three illnesses in primary care services

possibly because these patients have multiple chronic conditions and they need to visit their doctors periodically. Second, in Taiwan, patients can freely choose their preferred medical institutions, there has been no waiting period for medical treatment, the public bear relatively low fees, and Taiwan has medical services which are in compliance with international standards. Therefore, medical resources have not been properly distributed.

For common illnesses (such as diabetes, high blood pressure, and depression), the National Health Administration has launched the Pay for Performance policy (P4P) for many years and the concept behind this is to link up financial incentives and medical service quality. When high quality medical services are provided by medical service providers, the insured need to pay relatively more so as to improve overall medical service quality, health behavior of patients, and medication adherence [7]. In Taiwan, due to the high accessibility of medical care, patients of primary care can be transferred by hospitals to community clinics to reduce financial losses. Relevant adoptive measures also need to be introduced by the government (such as policy promotion and adjustment of co-payment) to smoothly promote and develop primary care services.

CONCLUSIONS

Although primary care services in Taiwan has excluded cases such as emergency care services, the policy has only been implemented since the beginning of this year. It is suggested that after one year, issues and the effectiveness of execution shall be reviewed. For a country, the hierarchy of medical care shall include the basic concept of home care, care of local medical doctors, secondary regional hospitals or tertiary regional hospitals or medical centers through transfer [8]. The hierarchy of medical care in Taiwan consists of three to five levels, but the boundary between basic care and secondary care is still not clear. Overlapped roles of physicians at basic medical care units and specialist physicians in hospitals are often observed. For example, physicians in basic medical units provide specialized care services or specialist physicians offer general care, the so called hidden basic medical care [9]. Hence, in fact, we are not able to clearly determine and distinguish which medical services shall be provided at basic medical units. In addition to the difficulty to determine the seriousness of illness of patients, physicians who offer medical services are very likely to play overlapped roles [10]. In order to reduce the number of primary care services in big hospitals, the government needs to carry out the hierarchy policy of medical care.

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