



Family physician system in Taiwan

Chyi-Feng Jan^{a,b}, Shinn-Jang Hwang^{c,d,e}, Che-Jui Chang^{a,f}, Cheng-Kuo Huang^{a,c,g,h}, Hsiao-Yu Yang^{f,i,j}, Tai-Yuan Chiu^{a,b,g,*}

^aDepartment of Family Medicine, National Taiwan University Hospital, Taipei, Taiwan, ROC; ^bDepartment of Family Medicine, College of Medicine, National Taiwan University, Taipei, Taiwan, ROC; ^cBoard of Directors, Taiwan Association of Family Medicine, Taipei, Taiwan, ROC; ^dDepartment of Family Medicine, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; ^eSchool of Medicine, National Yang-Ming University, Taipei, Taiwan, ROC; ^fInstitute of Environmental and Occupational Health Sciences, National Taiwan University College of Public Health, Taipei, Taiwan, ROC; ^gBoard of Directors, Taiwan Medical Association, Taipei, Taiwan, ROC; ^hDr. Cheng-Kuo Huang Clinic, Keelung, Taiwan, ROC; ⁱDepartment of Public Health, College of Public Health, National Taiwan University, Taipei, Taiwan, ROC; ^jDepartment of Environmental and Occupational Medicine, National Taiwan University Hospital, Taipei, Taiwan, ROC

Abstract

Following economic development and increasing healthcare demand, Taiwan has not only built a universal healthcare coverage payment system in 1995, but has also developed an accountable family physician system, called the Family Practice Integrated Care Project (FPICP), to deal with the pressures of an ageing society, since 2003. The community healthcare group-based family physician system is not only an important milestone for the development of family medicine in Taiwan but may also even serve as a global example for future family doctor systems. In this review, we aim to review the development of family medicine in Taiwan, the implementation and achievement of the FPICP, as well as the future prospects of system-based healthcare system. We firmly believe that only when the family physician system is well developed and put into practice with person-centered, family as a care unit, and community-oriented holistic care, can the objective of “everyone has their own family doctor” and sustainable operation of National Health Insurance be achieved.

Keywords: Family practice integrated care project; Healthcare policy; Primary care

1. INTRODUCTION

Universal health coverage (UHC) is based on the 1948 World Health Organization (WHO) Constitution, which declares health a fundamental human right and commits to ensuring the highest attainable level of health for all.¹ UHC consists of the full spectrum of essential, quality health services, from health promotion to prevention, treatment, rehabilitation, and palliative or hospice care. Unfortunately, at least half of the world's population still do not have these. All United Nations Member States have agreed to try to achieve UHC by 2030, as part of the Sustainable Development Goals (SDG). Although Taiwan is not a United Nations member at present, its UHC experience could provide an excellent example for others.

Investing in quality primary healthcare, the most efficient and cost-effective way to achieve UHC, should be a cornerstone.² Family physicians, the mainstay of primary care, are trained to manage most common diseases for all. Holistic care in family medicine, usually referred to as primary healthcare, can also

include preventive, adolescent, geriatric, sports, sleep, and palliative medicine, and hospice care. The unifying elements of family medicine are socially accountable responsiveness to local need, adaptation of existing health infrastructure, and ongoing development of the skills required to succeed in a role that is grounded in care.³

Good governance; sound systems of procurement, supply of medicines, and health technologies; and well-functioning health information systems are critical elements for quality primary healthcare. Following economic development and increasing healthcare demand in the 1970s, the healthcare system in Taiwan faced a misdistribution of resources and shortage of primary care providers. Most colleges/schools of medicine and teaching hospitals were competing for “specialist medical training,” which induced fragmented care and increased medical expenditures rapidly. As a result, an insufficient number of medical students received “general medicine training” or “family medicine training.” The Taiwan Association of Family Medicine was thus founded in 1986 to initiate family doctor training at that time and provide whole-person care.

Taiwan has built a UHC system in 1995 to significantly increase accessibility to basic medical care for people with economic obstacles.⁴ However, fee-for-service payments have had a notorious effect on physicians' service pattern. The growing medical expenditures resulted primarily from population ageing and fragmented care. Therefore, many interventions and policies aimed to improve the deteriorating fiscal management of the National Health Insurance (NHI). One major intervention is forming the family doctor system in 2003 to improve healthcare integration and deal with the rapidly growing elderly population. The community healthcare group (CHCG)-based family

*Corresponding author: Dr. Tai-Yuan Chiu, Department of Family Medicine, National Taiwan University Hospital, 17, Xuzhou Road, Taipei 100, Taiwan, ROC. E-mail address: tychiu@ntuh.gov.tw (T.-Y. Chiu).

Conflicts of interest: The authors declare that they have no conflicts of interest related to the subject matter or materials discussed in this article.

Journal of Chinese Medical Association. (2020) 83: 117-124.

Received April 28, 2019; accepted September 2, 2019.

doi: 10.1097/JCMA.0000000000000221.

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physician system is an important milestone for the development of family medicine in Taiwan.

The accountable family physician system includes four valuable concepts: family, doctor, responsibility, and system. So-called family physicians are doctors who are able to undertake the responsibility to implement preventive care and medical care for most families in the community, as well as fully understand patients' disease process, decisive health factors, healthcare resources, and the close relationship with accountable medical professionals. Family physicians receive reward in the form of value-based payment. The service content and items provided by the family physician system should conform to the development direction, as required by international healthcare systems in the twenty first century, person-centered, family as the care unit, and community medicine-oriented healthcare, as the model for prioritizing chronic disease management.⁵ In this review, we aim to delineate the development of family medicine in Taiwan, its implementation, current status, and the achievements of the Family Practice Integrated Care Project (FPICP), as well as the future prospects of system-based healthcare.

2. DEVELOPMENT OF FAMILY MEDICINE IN TAIWAN

In compliance with Article 157 of the Constitution of the Republic of China, the earliest official document to advocate primary care as the primary infrastructure in Taiwan, as promulgated on January 1, 1947, "The State, in order to improve national health, shall establish extensive services for sanitation and health protection, and a system of public medical service."⁶ Accompanied by rapid economic growth in the latter half of the twentieth century, the healthcare system underwent tremendous change, including the development of various medical specialties until the 1970s. In view of the development of highly specialized medical systems, fragmented healthcare was inconducive to the long-term national health of the Taiwanese people. Therefore, the Taiwan government leveraged the experience of the United States and started promoting family medicine.^{7,8} There are several important milestones in the recent four decades.⁹ In short, there are six stages including the emergent, establishment, thriving, transformation, flipping, and stable developing periods with different focuses, as well as important events (Table 1).¹⁰⁻²¹

The fundamental task for development of family medicine is cultivating sufficient competent family physicians for community medical care. In Taiwan, the training of family medicine began with the government funded "General Medicine Physician Development Program" in 1976. The National Taiwan University Hospital implemented the first resident training program for primary care physicians, the prototype for Taiwan's family medicine training system, in 1979. The Taiwan Association of Family Medicine (TAFM), established in 1986, was the first institute entrusted by the government to implement family medicine specialty certification examinations and residency training program accreditation. The two pillars of the Family Medicine Specialist Training Assessment, including "Outline of the Family Medicine Specialist Training Program" and "Family Medicine Specialist Training Hospital Accreditation Standards," were finalized in 1994.²² All Taiwan medical schools have family medicine departments contributing to the undergraduate training curriculum. About 130 graduate students (10%) of all medical graduates choose to enroll in postgraduate training in family medicine annually. Up to May 2019, there were 5377 certified family medicine board certified family physicians. Starting from 2019, the training program of medical students was changed to a 6-year undergraduate program and 2-year postgraduate general medicine training from the previous 7-year undergraduate and 1-year postgraduate training program. The family medicine resident training program was

also extended to 3 years to fulfill the needs for the future aged society. The 3-year training program includes family medicine, internal medicine, surgery, obstetrics and gynecology, pediatrics, psychiatry, emergency medicine, elective courses, and community medicine training courses.²³

3. INITIATION OF THE FAMILY PRACTICE INTEGRATED CARE PROJECT IN TAIWAN

The change in the trend of the top 10 causes of death in Taiwan suggest that future society must deal with ageing, as well as multiple chronic illness; therefore, the main healthcare model needs to shift to provide healthcare for chronic illness, such as cancer, cardiovascular diseases, diabetes, and hypertension. In addition, elderly and end-of-life care should be paid attention, given the society's rapid aging. As a result, providing integrated healthcare in order to improve the quality of life of the elderly and reducing unnecessary medical expenditures are mandatory tasks.

Since March 1995, post NHI implementation, the general public became more prone to seek medical attention in large-scale hospitals as the economic barriers were eliminated, leading to the rapid shrinkage of the primary care system. Under the fee-for-service payment system of NHI, the large-scale development of hospitals and popularization of clinics caused structural transformations in the healthcare system. Moreover, the poor survival of rural local hospitals or clinics was also unfavorable to the balanced development of a regional healthcare network.

In 1992, the College of Medicine, National Taiwan University started promoting medical education reform, and in 1998, general medicine and community medicine education to establish the "NTU Community Medicine Research Group," aiming to improve primary care quality. Professor Bo-sheng Hsieh guided the faculties in the College of Medicine to initiate conversations with community medical institutions, to connect medical education reform with the development of a community-oriented healthcare system. After the 921 earthquake in 1999, Hsieh et al guided faculties and students to take charge of the community medical care system reconstruction in Lugu Township, Nantou County. They visited the disaster area and proposed the CHCG, which consists of community primary care physicians and cooperative community hospitals. They started to propagandize the concept of the "Family Doctor" and encourage the general public to register their primary care physicians as family doctors. In addition, the Primary Healthcare Joint Outpatient Clinic Demonstration Center was established in National Taiwan University Hospital Yunlin Branch, which became the miniature care model of the FPICP. Yunlin, Sanchong City, Taipei County (city-based type), Pingzhen City, Taoyuan County (City-township mixed type), Daya Township, Taichung County (City-township mixed type), and Lugu Township, Nantou County (township-based type) were chosen to establish the prototype CHCGs.^{24,25} These five pilot community programs implemented community-based operations and served the target communities. Because of the initial success of the pilot programs, the Department of Health announced the FPICP in March 2003.

4. ESTABLISHMENT OF THE FAMILY PRACTICE INTEGRATED CARE PROJECT IN TAIWAN

The establishment of the FPICP is briefly described. The basic unit, CHCG, formed of a team of five to ten primary care physicians, practicing in a community in cooperation with their community hospitals. Secondary care, provided by community hospitals in cooperation with at least one CHCG to receive referrals from primary care physician teams. Community hospitals must also cooperate with a medical center, which provides needed tertiary care.

Table 1.**The brief history and development of Family Medicine in Taiwan**

Period	Focus	Important Events
1976–1982; Emergence period	Training programs for residents of general medicine	In 1976, a “General Medicine Physician Development Program” was mandated by the Taiwan Provincial Health Department to the National Taiwan University Hospital. ¹⁰ In 1979, the first resident training program was implemented at National Taiwan University Hospital. The first public community medicine clinic was opened in Audi Community, Gongliao Township, Taipei County (now Gongliao District, New Taipei City). ¹¹
1983–1986; Establishment period	Development of primary care medical educational system. Various major colleges/schools of medicine established the Department of Family Medicine one by one to implement the concept of family medicine and trying to improve the lack of primary healthcare facilities in rural areas.	In 1983, the Department of Health promoted the “Group Medical Practice Center Pilot Program” and established the new form of public healthcare unit. There had been ~170 group medical practice centers established until 1998. ^{12–16} In 1983, the first Department of Family Medicine was established in Kaohsiung Medical University, and then in Taoyuan Provincial Hospital, Chung Shan Medical University Hospital, Taipei Veterans General Hospital, National Taiwan University Hospital, Changhua Christian Hospital, etc. In 1986, the TAFM was established in Kaohsiung.
1986–1994; Thriving period	International exchanges and cross-strait general practice medicine exchanges.	The government started to implement the three-stage National Medical Network Planning Project for 15 years. ¹⁷ In May 1988, TAFM took part in the World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians (WONCA) under the name of Chinese Taipei Association of Family Medicine to become its 35th full member. In November 1988, TAFM attended the “1st International General Practice Medicine Academic Conference” held by WONCA and Beijing Chinese Medical Association General Practice Medicine Branch, which initiated cross-strait academic exchanges. The Family Medicine formally became one of the clinical medicine subspecialties announced by the Department of Health in 1988.
1995–2003; Transformation period	Launch of National Health Insurance	In compliance with Subparagraph 5, Article 10 of the Additional Articles of the Constitution of the Republic of China, as formulated and promulgated on May 1, 1991: “The State shall promote universal health insurance and promote the research and development of both modern and traditional medicines,” which guided the implementation of National Health Insurance on March 1, 1995. ^{18,19} In March 1999, TAFM held the WONCA Asia-Pacific Regional Conference (Taipei), titled: “Health for All by the Year 2000: Family Medicine—Meeting Old Challenges” In 1999, the 921 earthquake highlighted the importance of the primary healthcare system. The College of Medicine, National Taiwan University established the community medicine research group to guide the reconstruction of the community health system in Taiwan.
2003–2011; Flipping period	Initiation of family physician person-centered care system	In 2003, the outbreak of SARS reflected the poor epidemic infectious disease preventive function of communities. Therefore, the Department of Health strengthened the general medical training of medical residents. Bureau of National Health Insurance (now the National Health Insurance Administration, NHIA) announced the FPICP and also implemented the Community Public Health Groups (CPHG) plans. ²⁰ In 2011, the President announced the Second-generation National Health Insurance Act to implement the “Accountable Family Physician System” in Taiwan. ²¹
2012–present; Stable developing period	Further implementation the FPICP to prepare for the accountable family physician system	In 2015, TAFM announced its declaration on its 30th anniversary: Building Taiwan into the world paradigm of “Every Family a Family Doctor” by 2020. To aggressively implement the family physician system of the Second-generation National Health Insurance Act and to develop the system-based healthcare model under the framework of referral medicine and vertical integrating programs.

FPICP = Family Practice Integrated Care Project; TAFM = Taiwan Association of Family Medicine.

There is a mutually cooperative relationship among the various levels of medical units in this primary care community network (PCCN), which helps provide adequate healthcare.

The pilot program implementation found that the critical factors to successfully promote the “family physician system,” proposed according to the meeting minutes of the Forum on “Promotion of Family Physician System,” as held by the NHIA on September 18, 2002, include primary care physicians’ motivation to participate in the reform, and their learning intention; and community hospitals’ cooperation, willingness, and support for the program; as well as policy support, support from NHI payment incentives, and adequate family doctor educational training courses. In this pilot program, the general public could freely choose their family doctor, whereas primary care physicians were encouraged to serve as designated family doctors. The goal was to reconstruct the mutual referral system and exclude hospital “shopping” habits and reduce unnecessary medical waste.

Taiwan’s NHIA announced the “FPICP” on March 10, 2003 during the SARS outbreak of that time.²⁶ The objectives of the

FPICP are: (1) to establish the family doctor system providing the general public with comprehensive, coordinated, and continuous medical care, and to provide family and community health services, to fulfill the integrated care needs of the whole person, family, and community; (2) to establish public general health-oriented and patient-centered medical concepts to improve healthcare quality; and (3) to lay a foundation for the implementation of a family physician system in compliance with the National Health Insurance Act.

The working contents of an FPICP include: (1) organizing a CHCG; (2) archiving family health profiles; (3) establishing a community medical information system; (4) developing a bi-directional and mutual referral model; and (5) cultivating a healthy community. All the doctors in a CHCG support one another in the PCCN, advocate the family physician system and concept, archive family and personal health profiles, and provide “patient-centered, family as the care unit, and community-oriented comprehensive care.” Periodic CHCG meetings can be held to coordinate and discuss the operations, and community

Table 2.
The distribution of family practice integrated care project (2003–2017)

Year	Number of CHCGs	Number of member clinics	Percentage of total clinics (%)	Number of member physician	Percentage of total physicians (%)	Number of participating beneficiaries	Percentage of total NHI beneficiaries (%)
2003	24	144	1.68	154	1.39	60,331	2.73
2004	269	1,576	18.41	1,811	16.36	620,294	2.81
2005	258	1,533	17.05	1,766	14.74	1,186,997	5.11
2006	303	1,801	19.68	2,050	16.80	1,535,740	5.28
2007	305	1,736	18.76	1,981	16.00	1,371,362	6.84
2008	324	1,871	19.85	2,269	17.72	1,569,133	6.61
2009	318	1,789	18.74	2,026	15.48	1,610,276	6.99
2010	356	2,183	21.46	2,478	18.59	1,311,460	5.77
2011	373	2,257	22.86	2,499	17.92	1,444,835	6.23
2012	367	2,361	23.79	2,749	19.65	2,110,866	9.11
2013	374	2,785	27.73	3,343	23.29	2,053,499	8.75
2014	389	2,890	28.54	3,527	24.09	2,235,088	9.55
2015	426	3,035	29.69	3,709	24.87	2,484,646	10.54
2016	414	3,057	29.9	3,789	25.0	2,603,800	11.10
2017	526	4,063	36.61	5,182	37.7	4,134,200	17.56

CHCG = Community Healthcare Group; NHI = National Health Insurance (Taiwan).

Table 3.
Demographics of FPICP participants and non-participants (2010–2012)

Year of recruitment	2010		2011		2012	
	Participants	Non-participants	Participants	Non-participants	Participants	Non-participants
Population	1,604,980	3,230,559	1,622,107	3,277,716	2,249,841	3,930,740
Sex						
Female	862,836 (53.8%)	1,726,790 (53.5%)	875,216 (54.0%)	1,739,806 (53.1%)	1,218,234 (54.2%)	2,098,374 (53.4%)
Male	740,759 (46.2%)	1,501,607 (46.5%)	746,891 (46.0%)	1,537,910 (46.9%)	1,031,607 (45.9%)	1,832,366 (46.6%)
Age (years) ^a						
0–5	104,194 (6.5%)	186,305 (5.8%)	153,463 (9.5%)	258,376 (7.9%)	155,961 (6.9%)	245,431 (6.2%)
5–10	111,413 (6.9%)	202,181 (6.3%)	162,260 (10.0%)	306,759 (9.4%)	224,547 (10.0%)	382,108 (9.7%)
10–20	86,919 (5.4%)	152,175 (4.7%)	129,933 (8.0%)	260,610 (8.0%)	232,201 (10.3%)	352,798 (9.0%)
20–30	75,578 (4.7%)	153,244 (4.7%)	90,271 (5.6%)	182,572 (5.6%)	144,478 (6.4%)	218,747 (5.6%)
30–40	133,421 (8.3%)	251,184 (7.8%)	155,402 (9.6%)	294,235 (9.0%)	235,590 (10.5%)	350,968 (8.9%)
40–50	195,441 (12.2%)	362,966 (11.2%)	196,977 (12.1%)	368,059 (11.2%)	280,299 (12.5%)	423,252 (10.8%)
50–60	266,560 (16.6%)	527,545 (16.3%)	242,432 (15.0%)	488,800 (14.9%)	339,432 (15.1%)	580,923 (14.8%)
60–70	219,724 (13.7%)	470,094 (14.6%)	186,175 (11.5%)	409,560 (12.5%)	261,149 (11.6%)	514,114 (13.1%)
70–80	235,623 (14.7%)	526,287 (16.3%)	174,511 (10.8%)	399,803 (12.2%)	219,367 (9.8%)	486,715 (12.4%)
80–90	152,512 (9.5%)	346,367 (10.7%)	111,576 (6.9%)	263,816 (8.1%)	133,604 (5.9%)	320,806 (8.2%)
90	23,595 (1.5%)	52,211 (1.6%)	19,107 (1.2%)	45,126 (1.4%)	23,213 (1.0%)	54,878 (1.4%)
Monthly income ^b						
High	523,106 (32.6%)	1,018,328 (31.5%)	548,849 (33.8%)	1,096,195 (33.4%)	774,701 (34.4%)	1,329,907 (33.8%)
Medium	615,787 (38.4%)	1,277,485 (39.5%)	596,492 (36.8%)	1,242,291 (37.9%)	811,020 (36.1%)	1,475,346 (37.5%)
Low	466,087 (29.0%)	934,746 (28.9%)	476,766 (29.4%)	939,230 (28.7%)	664,120 (29.5%)	1,125,487 (28.6%)
Urbanization ^c						
Level 1 (high)	337,408 (21.4%)	758,807 (23.9%)	353,055 (22.1%)	839,078 (26.0%)	509,375 (23.0%)	980,241 (25.3%)
Level 2 (medium)	738,139 (46.8%)	1,324,761 (41.7%)	758,438 (47.5%)	1,360,105 (42.2%)	1,051,563 (47.4%)	1,673,496 (43.2%)
Level 3 (low)	502,930 (31.9%)	1,093,117 (34.4%)	486,368 (30.4%)	1,027,864 (31.9%)	656,602 (29.6%)	1,218,187 (31.5%)
Participation in other P4P program						
Asthma pay-for-performance project	37,393 (2.33%)	37,290 (1.15%)	13,926 (0.86%)	18,144 (0.55%)	29,792 (1.32%)	43,834 (1.12%)
Diabetes pay-for-performance project	64,817 (4.04%)	83,956 (2.60%)	19,495 (1.20%)	31,248 (0.95%)	60,431 (2.69%)	108,018 (2.75%)

Missing data:

Year 2010: 3,547 missing values in sex and 80,377 missing values in level of urbanization.

Year 2011: 74,915 missing values in level of urbanization.

Year 2012: 91,117 missing values in level of urbanization.

FPICP = Family Practice Integrated Care Project;

^a Age at recruitment.

^b Counted in New Taiwan Dollar (NT\$); grouped by tercile.

^c Region codes of the residential region were transformed into three levels of urbanization according to Taiwan National Health Research Institutes (NHRI) publications, with level 1 referring to the "most urbanized" and level 3 referring to the "least urbanized" communities.^{28,29}

hospitals with a cooperative relationship can also provide replies to clinics regarding treatments and examinations of the referred patients in a timely manner. After the patients' condition is stabilized, they can be referred back to the primary care team or clinic. Primary care physician can also utilize the libraries and various teaching resources of community hospitals in a cooperative relationship to engage in lifelong medical learning and advanced research. In addition to cooperating with CHCGs to form a community care network, community hospitals can also cooperate with nearby medical centers to create a vertical integration system to jointly provide the general public in the community with an accessible, continuous, coordinated, and comprehensive PCCN to achieve the ultimate objective of building "healthy communities."

The FPICP has been included as one of the NHIA quality-based payment programs, and its implementation overcomes the boundaries of competition between medical centers, district hospitals, and primary care clinics, developing a cooperative model of healthcare systems at different levels and vertically integrating all medical resources to offer great benefits to patients and healthcare providers. The people participating in the FPICP are entitled to the medical services offered by a family doctor, and CHCGs can provide services, such as 24-hour telephone consultation, preventive healthcare, and continuous medical care from the primary

care clinic to hospitalization. In addition, medical care will be expanded from individuals to household members. After 2010, Taiwan's NHIA transformed and changed the program recruitment method. The list of detailed primary healthcare clinic data on western medicine within the past year of the NHI beneficiaries are extracted according to the medical expenditure data for the NHIA insurance declaration, and the beneficiaries are divided into cases with chronic illness and cases with non-chronic illness. Moreover, the list of beneficiaries needing more care is delivered to the CHCG participating in the program to provide health management. Three kinds of patients were enrolled into CHCGs: firstly and majorly, the most highly utilized chronic illness patients (type A) assigned by the NHIA according to their medical resource utilization in the previous year; secondly and with a limited amount per year, those who are not type A patients but have a good relationships with primary care physicians (type B); and thirdly, the patients recruited by the pay-for-performance program and assigned to primary care physicians (type C).

5. ACHIEVEMENTS OF THE FAMILY PRACTICE INTEGRATED CARE PROJECT

Approximately 20 groups participated in FPICP in the first year (2003). In the second year, there were 269 groups, rapidly

Table 4.
Demographics of FPICP participants and non-participants (2013–2015)

Year of recruitment	2013		2014		2015	
	Participants	Non-participants	Participants	Non-participants	Participants	Non-participants
Population	2,033,302	3,486,168	2,193,583	3,568,252	2,498,382	3,192,787
Sex						
Female	1,086,902 (53.5%)	1,828,222 (52.4%)	1,176,833 (53.7%)	1,882,465 (52.8%)	1,339,604 (53.6%)	1,703,967 (53.4%)
Male	946,400 (46.5%)	1,657,946 (47.6%)	1,016,750 (46.4%)	1,685,787 (47.2%)	1,158,778 (46.4%)	1,488,820 (46.6%)
Age (year) ^a						
0–5	101,597 (5.0%)	126,465 (3.6%)	130,365 (5.9%)	142,600 (4.0%)	161,651 (6.5%)	136,931 (4.3%)
5–10	185,505 (9.1%)	290,683 (8.3%)	204,128 (9.3%)	282,809 (7.9%)	223,969 (9.0%)	242,749 (7.6%)
10–20	213,489 (10.5%)	349,519 (10.0%)	235,822 (10.8%)	325,695 (9.1%)	255,603 (10.2%)	307,437 (9.6%)
20–30	117,014 (5.8%)	170,934 (4.9%)	144,611 (6.6%)	174,386 (4.9%)	157,192 (6.3%)	162,778 (5.1%)
30–40	198,636 (9.8%)	294,626 (8.5%)	236,336 (10.8%)	312,615 (8.8%)	262,320 (10.5%)	289,263 (9.1%)
40–50	246,216 (12.1%)	376,300 (10.8%)	267,745 (12.2%)	385,837 (10.8%)	294,268 (11.8%)	348,120 (10.9%)
50–60	320,738 (15.8%)	530,192 (15.2%)	344,145 (15.7%)	555,603 (15.6%)	383,825 (15.4%)	490,610 (15.4%)
60–70	257,009 (12.6%)	471,186 (13.5%)	285,776 (13.0%)	560,222 (15.7%)	354,871 (14.2%)	529,679 (16.6%)
70–80	219,118 (10.8%)	461,589 (13.2%)	212,532 (9.7%)	499,870 (14.0%)	252,016 (10.1%)	427,721 (13.4%)
80–90	147,627 (7.3%)	352,477 (10.1%)	113,362 (5.2%)	281,688 (7.9%)	131,635 (5.3%)	221,638 (6.9%)
90	26,353 (1.3%)	62,197 (1.8%)	18,761 (0.9%)	46,927 (1.3%)	21,032 (0.8%)	35,861 (1.1%)
Monthly income ^b						
High	699,350 (34.4%)	1,191,150 (34.2%)	774,720 (35.3%)	1,249,431 (35.0%)	891,185 (35.7%)	1,140,862 (35.7%)
Medium	740,238 (36.4%)	1,316,272 (37.8%)	774,586 (35.3%)	1,318,515 (37.0%)	881,964 (35.3%)	1,164,284 (36.5%)
Low	593,714 (29.2%)	978,746 (28.1%)	644,277 (29.4%)	1,000,306 (28.0%)	725,233 (29.0%)	887,641 (27.8%)
Urbanization ^c						
Level 1 (high)	462,681 (23.1%)	871,779 (25.3%)	506,286 (23.4%)	908,332 (25.8%)	562,393 (22.8%)	827,931 (26.4%)
Level 2 (medium)	943,280 (47.0%)	1,480,757 (43.0%)	1,030,488 (47.6%)	1,534,507 (43.6%)	1,172,034 (47.5%)	1,377,087 (43.9%)
Level 3 (low)	599,791 (29.9%)	1,091,833 (31.7%)	629,241 (29.1%)	1,078,774 (30.6%)	731,640 (29.7%)	932,506 (29.7%)
Participation in other P4P program						
Asthma pay-for-performance project	29,247 (1.44%)	41,793 (1.20%)	20,873 (0.95%)	50,857 (1.43%)	32,532 (1.30%)	26,494 (0.83%)
Diabetes pay-for-performance project	75,616 (3.72%)	137,162 (3.93%)	59,173 (2.70%)	180,282 (5.05%)	91,788 (3.67%)	132,501 (4.15%)

Missing data:

Year 2013: 69,349 missing values in level of urbanization.

Year 2014: 74,207 missing values in level of urbanization

Year 2015: 87,578 missing values in level of urbanization.

FPICP = Family Practice Integrated Care Project.

^a Age at recruitment.

^b Counted in New Taiwan Dollar (NT\$); grouped by tercile.

^c Region codes of the residential region were transformed into three levels of urbanization according to Taiwan National Health Research Institutes (NHRI) publications, with level 1 referring to the "most urbanized" and level 3 referring to the "least urbanized" communities.^{28,29}

reaching the national target of 300 groups for the trial period. In the second stage of the execution (2005–2009), ~300 groups participated, and bonus feedback payments were introduced to incentivize improving the quality care of patients.

In brief, the overall implementation effectiveness and future prospects of Taiwan FPICP between 2003 and 2010 found:

1. Reduction in the visits to outpatients' clinic and hospitals, lessening people's medical expenses and healthcare costs;
2. Improving people's satisfaction with adequate treatment;
3. Strengthening the necessary referral service for the public;
4. Improving health promotion, disease prevention, and control benefits;
5. Enhancing medical services through the service requirements of the mixed quality assessment principle;
6. Introducing a healthy feedback-based business model to facilitate healthy lifestyle development.²⁷

In the reform period after 2010, the group number has steadily grown, reaching 526 groups in 2017 (Table 2). At the end of 2017, 4,063 primary care institutions (~36.6% of the total number of primary care institutions) and 5,182 doctors (~37.7% of the number of doctors in primary healthcare institutions) participated in the program. In addition, the people receiving care from this program reached 4.13 million (17.6% of the total number of people insured by the NHIA). Due to the achievements in recent years and the policy promoting the accountable family physician system, the NHIA has expanded the FPICP. In 2017, NT\$ 1.58 billion (USD 53 million) was budgeted to expand clinic participation. In 2018, funding for the implementation reached NT\$ 2.43 billion (USD 81 million) to continue strengthening the efficiency and quality of the FPICP and implement the collaborative care between CHCGs and hospitals cooperating with them, including two-way referrals and the chronic illness joint care model, in order to build a medical care environment of "Good Family Doctors in the Neighborhood and Good Hospitals in the Community."

Here, we report the characteristics of the FPICP utilizing the NHIA population databank from 2010 to 2015. Between January 2010 and December 2015, there were 5,277,020 participants of all 11,386,248 NHI-assigned patients to FPICP (Tables 3 and 4).^{28,29} The participation rate of the project was 49.7% of 3,230,559 patients in 2010 and increased to 78.3% of 3,192,787 in 2015. Among FPICP participants and non-participants, there were 53.8% vs 53.5% females, 25.7% vs 28.6% >70 years of age, in 2010 and 2015, respectively. With regard to the board specialty of attending physicians, family medicine accounted for 32.8%, followed by internal medicine (19.0%), pediatrics (14.1%), and then otolaryngology (11.3%).

The prevalence of chronic diseases and comorbidities among the patients in the FPICP participant and non-participant groups from 2010 to 2015 were 35.2% vs 35.5% with hypertensive diseases, 21.5% vs 21.2% with diabetes, 16.3% vs 15.2% with hyperlipidemia, 12.4% vs 11.7% with chronic obstructive pulmonary disease or asthma, 6.7% vs 7.1% with coronary artery disease, and 6.4% vs 7.1% with cancer of any site, respectively (Table 5 shows a detailed comparison in 2015). Comparing the utilization of medical resources, the FPICP participants and non-participants had 11.5 vs 12.7 visits per year for ambulatory care, 1.69 vs 1.74 visits per year to the emergency department, and 1.71 vs 1.74 visits per year to an inpatient department, respectively. The yearly quality assessment of primary care by the NHIA (Table 6) included the rate of emergency department visits (26.1%), hospitalization (11.5%), adult health examination (47.6%), and annual elderly influenza vaccination (41.0%).

The 10-year effectiveness of the FPICP was published in the journal "Family Practice."³⁰ According to a literature review,

Table 5.

Chronic diseases, comorbidities, and resource utilization among the Family Practice Integrated Care Project Population in 2015

Variable	Participants (N = 2,498,382)	Non-participants (N = 3,192,787)
Chronic disease		
Hypertension	762,097 (30.5%)	1,089,630 (34.1%)
Diabetes	452,280 (18.1%)	663,435 (20.8%)
Hyperlipidemia	456,583 (18.3%)	624,452 (19.6%)
Cerebral vascular disease	93,792 (3.8%)	148,165 (4.6%)
Peripheral vascular disease	13,553 (0.5%)	20,936 (0.7%)
Heart failure	30,507 (1.2%)	49,435 (1.5%)
Coronary artery disease	111,356 (4.5%)	175,781 (5.5%)
COPD/asthma	211,178 (8.5%)	257,506 (8.1%)
Chronic liver disease	97,028 (3.9%)	128,852 (4.0%)
Chronic kidney disease	64,456 (2.6%)	90,267 (2.8%)
Osteoporosis	45,460 (1.8%)	70,323 (2.2%)
Depression	88,638 (3.5%)	135,721 (4.3%)
Dementia	31,291 (1.3%)	53,221 (1.7%)
Cancer	97,614 (3.9%)	159,403 (5.0%)
CCI		
High (>2)	159,866 (6.4%)	244,390 (7.7%)
Low (0–2)	2,338,516 (94.6%)	2,253,992 (93.7%)
Clinic/outpatient care		
Number of visits/year	11.48 (10.85)	12.71 (11.66)
Medical cost/year (point) ^a	8,241 (45,643)	9,422 (42,248)
Emergency care		
Number of visits/year	1.69 (1.99)	1.74 (2.14)
Medical cost/year (point)	5,137 (9,629)	5,631 (10,618)
Inpatient care		
Number of visits/year	1.66 (1.54)	1.71 (1.59)
Length of stay (day)	14.3 (39.8)	14.6 (31.7)
Medical cost/year (point)	94,508 (175,976)	103,438 (185,205)

Percentage or SD is shown in parentheses.

CCI = Charlson comorbidity index; COPD = Chronic obstructive pulmonary disease.

^a Floating point value (1 point ~ NT\$0.9) under global budget scheme since 2001.

the most effective part was increasing the utilization rate of preventive healthcare services of family doctors. In the foreseeable future, the implementation of case health management can increase the general public's attention to health promotion and their willingness to attend disease-specific screening to further improve health status and reduce medical seeking behaviors.

6. BUILDING COMMUNITY COMPREHENSIVE CARE MODEL IN TAIWAN

On January 26, 2011, Article 44 of the Second-generation National Health Insurance Act, as promulgated by the President, mentioned that "in order to promote preventive medicine, implement a referral system, and improve medical quality and the doctor-patient relationship, the insurer shall establish a family physician system." Therefore, the NTUMC community medicine research group has proposed the "community comprehensive care" model (3 "C" Model) to develop the future community healthcare network. All primary care physicians should receive the training required to be an accountable family doctor, take charge of the health of the family members of the patients, and provide care with comprehensiveness, continuity, coordination, accessibility, and accountability (3C2A). In addition to hospital and primary care clinics, community health support networks should be concurrently integrated to include community resources and volunteers. Moreover, government units also have to support the coordination of the allocation of various resources. Lastly, the health education of the general

Table 6.**Characteristics of CHCGs composed of FPICP members**

Variable	Budget year 2013 (N = 374)	Budget year 2014 (N = 389)	Budget year 2015 (N = 425)
Number of clinics per group			
Mean ± SD	9.6 ± 4.1	9.8 ± 4.6	9.8 ± 4.8
Median (quartile)	9 (6)	9 (6)	9 (6)
Number of groups			
Taipei division	63 (17.0%)	67 (17.2%)	72 (16.9%)
Northern division	30 (8.0%)	33 (8.6%)	43 (10.1%)
Central division	152 (40.6%)	158 (40.6%)	167 (39.3%)
Southern division	62 (16.6%)	62 (15.9%)	73 (17.1%)
Kaoping division	63 (16.8%)	65 (16.6%)	67 (15.9%)
Eastern division	4 (1.2%)	4 (1.1%)	3 (0.8%)
Indicators in quality assessment (% of achievement) ^a			
Rate of emergency department visits	25.1% (24.9%–25.4%)	25.4% (25.1%–25.6%)	26.1% (25.9%–26.3%)
Rate of hospitalization	12.0% (11.8%–12.1%)	11.8% (11.7%–11.9%)	11.5% (11.4%–11.6%)
Rate of providing adult health examination	48.8% (48.4%–49.2%)	49.1% (48.7%–49.5%)	47.6% (47.2%–48.0%)
Rate of providing adult influenza vaccination	42.4% (42.1%–42.7%)	41.1% (40.9%–41.4%)	41.0% (40.7%–41.2%)

CHCG = community healthcare group; FPICP = Family Practice Integrated Care Project; SD = standard deviation;

^a The quality assessment data were built since 2013.

public should not be underemphasized, in order to strengthen their responsibility for their own health.

The success of the FPICP depends on facilitating good interactions among community residents, family physicians, and hospitals of all levels. According to a systematic literature review, the 10 key principles for a successful integrated medical care system include: (1) institutions' provision of continuous and integrated care; (2) patients' participation and patient-centered concept; (3) joint participation of institutions in the same geographical area that increases medical accessibility and reduces the waste caused by repeated medical seeking behaviors; (4) interdisciplinary team's provision of care that conforms to clinical empirical medicine guidelines; (5) performance management implemented according to the health outcomes; (6) efficient integration of health information system management platform; (7) high-quality leadership and organizational culture; (8) functional coordination of various specialists; (9) organizational framework that improves integration and coordination; and (10) effective financial resource allocation.³¹ These are exactly that required for the development of a comprehensive community care model system in Taiwan. Moreover, the coordination of care should be particularly emphasized to provide payment incentives after reassuring quality care, as well as to reforming the design of the healthcare system.

After 10 years of FPICP implementation, Professor Hsieh planned to establish the system-based family physician model in Taiwan. At the end of 2014, the National Taiwan University Hospital and Taipei City Hospital established a cooperation network, and a referral mechanism was established for the department of Emergency Medicine, the National Taiwan University Hospital, wards of Taipei City Hospital, wards of Division of Integrated Division of National Taiwan University Hospital, and Taipei City Hospital Home Care System. The organizational framework was equipped with three departments, educational training, coordination of care, and administrative management, to assist in the integration of the community medical care system. Therefore, the concept of dual attending physician-based combined care for referral medicine, as provided by "CHCG doctors" and "hospitalists taking charge of hospitalization care" was put into practice in 2016.

The eighth period of Taiwan Medical Network had been implemented since 2017 with the main objective to redefine the healthcare system.³² The Department of Medical Affairs, and the Ministry of Health and Welfare subsidized the establishment of the community healthcare networks of six city government

Departments of Health, and implemented the Medical Vertical Integration Transfer Care Pilot Program, to emphasize referrals and division of labor between community medicine and hospital medicine.³³ At the end of 2017, a total of 14 hospitalist wards of hospitals participated in this pilot program to gradually refer suitable inpatients to CHCGs. The vertical integration programs emphasize cooperation between community primary care institutions and hospitals or medical centers through patient-centered care system referral, as implemented by case managers.

7. FUTURE PERSPECTIVES

We hope to encourage cooperation between family physicians and the patients to cherish the National Health Insurance. In Taiwan, healthcare for the elderly population has become important. Preventive and precision medicine, long-term and telehealth care, and the provision of patient-centered referrals and shared care, and the implementation of system-based care for referral medicine are key issues requiring further endeavor of CHCG family doctors.

We firmly believe that only when the family physician system is comprehensively developed and put into practice in the holistic care of whole families and whole communities, the objective "everyone has their own family doctor" and the sustainable operation of NHI can be achieved.

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