

for other countries for the cooperation of health insurance, healthcare providers as well as infectious diseases control.

Introduction

Taiwan's universal health insurance is a compulsory insurance of social insurance system and has already covered 99% of population since its inception in 1995 [1]. The single, state-owned insurance system with wide range of medical payments covering Chinese medicine, western medicine and dental services plus low-cost of insurance fees has led to many positive rewards. For example, Nobel winner of Economics, Paul Robin Krugman has ever praised Taiwan has the world's best health insurance system. The US network ABC News even admired that Taiwan's national health insurance system is Health Utopia [2].

A recent study by National Health Research Institute (NHRI) indicated health insurance can enhance the life expectancy for the vulnerable population. Ten years after its implementation, although the life expectancy of economically disadvantaged population is extended, but no evident effect for overall population is shown and the national life expectancy did not show significant improvement[3]. Meanwhile, the financial problems from BNHI, poor quality of health care services and abuse of health resources are becoming issues of concern. As a result, how to enhance quality of medical care has been the focus of government's policy each year. To address these issues, establishing quality care committee, health care network of enhancing medical care quality, hospital accreditation and modification of payment system are instituted.

The quality of medical service involves many aspects, many factors might directly or indirectly influence the measures of health care quality such as the overall health care system, service process, and selection of measures. Furthermore, due to the differences of disease characteristics, comparison might not be able to carry out based on the same reference point if the judgments are based on the results only.

Based on disease characteristics and policy objectives, the current health insurance payment system has different aspects such as fee for service, case payment, global budget, per diem, capitation, and pay for performance, either one might lead to different influential levels on healthcare quality. The purpose of the study is to review and discuss the application of pay for performance system on health care of infectious disease. Specifically, the study attempts to integrate one of the notifiable infectious diseases, TB, the most increased and death cases in Taiwan, with new global health care payment system- pay for performance, to make a further review and discussion.

Global development of pay for performance system

United States Institute of Medicine had proposed two important literatures 10 years ago, *To Err Is Human* and *Crossing the Quality Chasm*. Both mentioned that US medical communities were looking for a way of improving medical service and quality, but lacking a

long term resolution at that time [4-5]. Pay for performance system was then coming out for solving such situation. The definition of Pay-for-Performance is that "healthcare payment systems that offer financial incentives to providers who achieve, improve, or exceed their performance on specified quality, cost, and other benchmarks." [6]. The most common used system in health insurance, "fee for service" means the more health care providers service, the more revenue they generate, which might not be able to cover the health care quality and improvement of health situation. In contrast, pay for performance is a system that combining incentives which promotes health care providers to provide higher quality and better service to patients as well as the use of process and outcome as indicators for final payment, the aim is to produce more effective mechanism.

Bodenheimer and Grumbach have stated that the use of economic and financial incentives to influence behavior is very common in various fields [7]. This is also very common in health care service, for example, the managed care program has been performed in US over 30 years. Robinson has also mentioned the design of financial incentive in health care system [8]. In fact, countries such as USA, Canada, Britain and Australia have used pay for performance system based on different diseases. Many scholars have done detailed evaluation based on such program and its relative outcomes. For example, Rosenthal et al. have analyzed large scale program of pay for performance in US [9], Landon et al. have also analyzed relative program of Health Maintenance Organization (HMO) [10]. In addition, Pink et al. have specific discussion on the health insurance of Canada [11], Doran has detailed discussion with family physicians in England [12], and Australia scholar, Campbell has also discussed the primary care program of pay for performance [13].

When examining the design of insurance concept and payment system, pay for performance system is thought to be totally different from fee for service system. Detsky et al. have made comparisons between these two; the major differences are that health care providers will charge based on every single treatment or medical intervention, the cost will be the prior-set price. The shortcoming is that more medical treatments lead to higher expenses, which might lead health care providers to encourage more medical treatments in order to obtain more benefits. Thus, pay for performance can reconcile such issue, it is designed by combining financial incentives and health care providers, which encourage health care providers to provide essential and higher quality medical service[14].

Application of pay for performance system

Pay for performance is thought to be a positive force in health care system while improving patient care efficacy and safety. Based on these, American Medical Association has purposed five criterions in particular for pay for performance in 2005.

1. To ensure health care quality: the ultimate goal is to improve patients care, and to apply the evidence-based care measures and professions into the program. Also, physicians can adjust health care program based on individual patient's clinical condition and differences.

2. To promote physician-patient relationship: regardless of patient's health status, race, economic situation, health care workers should treat the relationship fairly and equally and capable to overcome associated barrier.
3. To provide opportunity for physicians to participate: the physicians can decide whether to participate or not without influencing their survival. These programs might help participants to overcome the financial or technical barriers during execution.
4. To use accurate data and fair report: the reports are prepared and assessed by accurate and scientific method, which undergo strict review and evaluation process.
5. To provide a fair and reasonable award scheme: to provide incentives for those active participants such as physicians or clinics that gradually improve service quality and achieve target. [6]

The United States Institute of Medicine has proposed the criterion of implementing pay for performance program in 2007. It has stated to use reliable definition and method to measure the reward indicators, these include reward high quality with efficacy; provide high quality, effectiveness and patient-centered care; provide improvement as well as active coordination of the units and agencies in the patient care process. The scopes of incentives include data collection and reports management, for example, to encourage the use of e-medical reports, prescriptions and case management. In addition, to establish the performance incentives; the promotion of program includes financial incentives provided from the planning stage to each single stage during the overall process. This will allow the health care providers willing to participate [15].

From the literature (Table1), many different results of pay for performance were shown, and most of large-scale programs have offered reasonable incentives.

Improvements and effective results were achieved in several ways, for example, care behavior of physicians on acute and chronic diseases (mainly diabetes, hypertension, and pneumonia), operative procedures (total knee arthroplasty and heart bypass surgery), and disease experience of physician-patient relationship, patients' safety, prescription and application of information technology. Further, overall health care processes, results, overall medical expenses, improvement of chronic disease indicator (diabetes indicators, cholesterol standard) were also included. More importantly, disease primary prevention has included cancer screen and immunization; which help patients to access disease prevention and early diagnosis / treatment. To sum up, although the intervention of pay for performance program has led to the increase of financial burden, however, positive influence was shown for overall health care [16].

Rosenthal has identified that differences were existed for reward program of pay for performance in different countries. Some have set a target value, but those who have already achieved the threshold might just simply maintain the same situation and receive the reward. Thus, they might not invest more resources to achieve higher quality. In contrast, poor medical providers might not be able to achieve the target and cannot receive the reward. As a result, some programs start to focus on quality improvement, not based on the results anymore. Such

program can allow medical providers to show gradual improvements and effectiveness might be enhanced [17].

However, some scholars have proposed that use of financial incentives to improve quality was opposed by some of the medical organizations and consumer groups. They thought that lower quality has more space to make improvement and higher chance to be rewarded, which is totally different for those with high quality. Essentially, this program connives and rewards low quality providers, and punish those health care providers with outstanding performance. Besides, the strategies of reward and punishment applied to some programs were based on relative performances between medical service providers, which might show the shortcomings as mentioned above. Moreover, some quality indicators are difficult to have objective criteria and non-health care providers might not be able to control. As a result, reward and level of improvements need to be carefully designed and should be based on empirical research when executing the program of pay for performance. This will not result in the abuse of cost or progressing without achievements [17-18].

Table1. Comparison of disease scale and pay for performance program

Program	Participants	Insurance providers	Targets	Outcomes
Demonstration program of hospital quality improvement	230 Acute health care hospitals in US	Center for Medicare and Medicaid Services	Heart failure measuring procedure, acute myocardial infarction, pneumonia, hip replacement, coronary bypass surgery	Improvements were shown during the overall process, no significant indicators was shown in the outcomes.
Framework of quality and outcome / contracted Primary care physicians of pay for performance program	42 family physicians institutions in UK	National Health Service	146 items of chronic disease and indicators of patients' experience	Short-term improvements of patients' health care were shown
Integrated health care association/ pay for performance program	225 Internal Medicine Associations in California, US	8 health insurance programs in California	Improvement of clinical pathway, patients' experience and application of information technology	Improvements of health care sectors were shown
Excellence program	Service providers from 13 States in US	To cooperate with large employer groups such as GE and TeleComm	Diabetes, heart disease, spine, and depression	Save costs on diabetes. Quality indicators were achieved for diabetes and heart disease.
HILL Medical Groups	2200 physicians in North Carolina, US	HILL Medical Groups (7 HMOs, 332,000 patients)	Resources utilization, clinical and patient's experience, up to 15% quality payment	42% increase in diabetes health care indicators; 32% increase in cholesterol indicator.
Hawaii Medical Service Association and Hospital quality and service recognition program	Over 2500 physicians, include 17 hospitals	Hawaii Blue Cross Blue Shield Association	Patient safety, guidelines and patient satisfaction	Significant improvements were found in clinical guidelines, include cancer screening, vaccination and heart failure

Sources:[16]

Application of pay for performance in Taiwan

Since 2001, BNHI has implemented trial programs of improving medical payment for cervical cancer, breast cancer, tuberculosis, diabetes, as well as asthma. The original purpose was to develop proper medical payment system and to improve effectiveness and efficiency of health care via integration of health care and design of payment system. The ultimate goal was to provide high quality of service by following the cost-effectiveness principles. The above diseases were chosen for reasons, for example, “early diagnosis, and early treatment” is the spirit of cervical cancer, BNHI expects the public understand the importance of early screening. For TB and breast cancer, “proper treatment and quality improvement” is the main focus. As for diabetes and asthma, the aim is to provide “complete and continuous health care management” [19].

In the health care facilities, the implementation of global budget payment system has led to some issues, for example, the control of hospitals’ revenue resides in the total growth, and challenges the improving of health care service and quality. The improvement of health care quality and service under limited resources and enhancement of public health are ultimate goals for both medical society and BNHI. This promotes the program of improving health care service for five major diseases. This program is the first time that transforms to “pay for performance” from “fee for service”, and emphasis on both overall quality and case follow-up management.

BNHI assumes that partial medical cost might be increased during the initial stage. The implementation of higher medical cost at initial stage has several attempts, for example, health care providers can spend more time on treatment and giving medical advises to patients to understand and control of disease through self-explanation or health education. This can also prevent “hospital shopping” from patients, and improve the consistent and continuous treatment and care. For long term perspective, it can save overall health care cost, promote public health with positive effect. Besides the diseases mentioned above, hypertension, schizophrenia, hepatitis B, hepatitis C and kidney disease are included in this program in 2010 and 2011, respectively.

Current TB status in Taiwan

TB is a chronic infectious disease caused by *Mycobacterium tuberculosis* which affects any parts of body organs. However, TB usually attacks lungs due to the requirement of oxygen during its multiplication, especially upper part of lobe. Thus lung attack accounts up to 90% among TB. The common symptoms include weight loss, no appetite, fatigue, fever, sweating at night, cough up blood or sputum. With the advanced medical technology and development of anti-TB drugs, the disease now can be effectively controlled with well treatment. Patients can be cured by having a complete course of treatment of 6-9 months with regular medication and medical visit. However, if patients do not take medication, self-withdrawal of medication

when symptoms improved, or selective medication, then drug resistance might occur, which lead the treatment more difficult [20].

According to Taiwan Tuberculosis Control Report, TB remains the leading and increased number of infectious disease annually in Taiwan. Up to 2010, there are around 13,000 new cases in each year. Regardless of actual informed cases or evaluation of disease burden, Taiwan is defined as median burden region according to WHO definition. And there is still a large gap existed when compared to other developed countries such as USA, UK and Japan. With regard to the geographic distribution, the highest incidence rates are in Hualien and Taitung counties, near 100 per 100,000 population, followed by Kao-ping, South, Taipei and North regions. However, due to dense population, Taipei and North regions have most cases. In relation to age distribution, the incidence rate appeared to be increased as age increases, ages with 65 years old and higher account over 50%. In terms of gender, incidence rate of male is 2-3 times greater than female, and the incidence rate appeared to be increased as age increase regardless of gender. The annual TB deaths are 600-700 (approximately 3 per 100,000 population); which is on top death toll among infectious cases. Thus, factors such as incidence, follow-up treatment, prognosis evaluation and death cannot be ignored when dealing with TB. Moreover, the effect of TB might lead to depletion of social production, decreasing in country competition and negative global image toward Taiwan.

Due to dense population with higher mobility, popularity of medical resources, patients may choose their healthcare providers and which might cause difficulty of diagnosis and disease management. In recent years, aging population and comorbidity conditions such as chronic diseases and cancers also lead the challenges of diagnosis, treatment and disease control. Follow-up of cohort TB treatment, 2,000 patients died each year, of which the underlying cause of death due to TB accounts only 4% [21]. Furthermore, multidrug resistance TB and co-infections of HIV/AIDS also cause more difficulty on TB control.

Application of TB pay for performance program in Taiwan.

BNHI stated that the concept of Taiwan pay for performance program as “buying health for people, which stand for that spend the medical resources on early stage of disease, constant health care and active follow-up”, as well as providing higher care quality and complete treatment for TB as expected. This is matched with the concept of original direction such as case detection, follow-up and evaluation of treatment outcomes for TB management [19].

Prior to the implementation of revised Communicable Disease Control Act in 1999, TB was a reportable communicable disease rather than a mandatory notifiable communicable disease. To encourage notification and TB care, Department of Health, BNHI, and Bureau of Chronic Disease Control implemented the policy of “no report, no health insurance payment”, and BNHI added payment items of case notification fee (A1001C: 250 points) and treatment success fee (A1002C: 1000 points) for financial incentives.

BNHI has implemented the payment system since 2001, and improved program of TB medical care payment was included at the initial stage. However, the program was restricted due to the log-in and management process was handled bilaterally by BNHI and TCDC. Since 2004, the BNHI has collaborated with TCDC horizontally, and adopted financial incentives for patient care and management. Improved TB program of health insurance system, simplified login process, claims and effective management were also established.

Through the collaboration of BNHI and TCDC, healthcare providers have shown more willingness to adopt the pay for performance program. Among all TB cases, nearly 60% of cases (9000+) enrolled in the program in 2004, and expanded to 80% of cases enrolled in 2007 [22]. Moreover, the establishment of case management staff (part-time or full-time based on case numbers) was designed for many reasons. For example, each TB case was handled by specific management staff or physician. These professionals can supervise each case to follow the prescription with regular clinical visit as well as provide health education to patients. They also serve as a communication bridge between public health and medical institutions. The objects are to enhance the rate of treatment completion as well as to reduce the loss and the occurrence of drug-resistance TB. Finally, the ultimate goal is to interrupt the transmission and reduce of TB cases [19].

In 2008, BNHI executed the healthcare quality payment (Part 10) program as stated in "National Health Insurance Payment Standards" (Table 2). The case confirmatory fee (P1310C: 500 points) combined with primary discovery fee (250 points) to discovery confirmation fee (new A1001C: 750 points). The original complete treatment/examination fee (P1320C: 1000 points) to combine with complete treatment fee (1000 points) to treatment success fee (new A1002C: 2000 points). As for case management fee (P1316C: 1500 points) will pay for care provider each quarter.

And if not continuous care, half fee will be paid to encourage consistent care. In addition, to simplify bureaucratic workload and avoid tedious procedures, the reimbursement could be requested with regular healthcare fee claim every month.

The main executive plan is to divide payment into different sections. For example, quarterly payment is made based on treatment regime, the payments include disease treatment and health care cost. Moreover, disease diagnosis fees, treatment fees, health care fees, special case management fees after a complete treatment, special reward fees for complete treatment of multi-drug resistant cases as well as special care fees for physicians are included. In short, the current case management model with appropriate financial incentives is applicable to healthcare providers and hoping to encourage physicians, medical institutions and TB case management staff to continuously track patients' health situation and provide complete medical care (Table2).

In order to protect cases privacy when executing the program, the log-in process has to be done via IC card or identification such as Citizen Digital ID or Medical Personnel ID card under the regulation of TCDC (Fig 1). After accessing the system, case management,

review of cross-treatment, diagnosis results can be done. The system also provides transfer and connection function of cases; batches retrieve review. And the warning functions of continuous health care can help case management staff to remind patients to revisit with regular treatment and serve as health educational tool.

The overall concept of the program is that BNHI plays the role of insurer; the improved medical payment serves as pivotal to enhance the overall health care quality. This approach is also consistent with the PPM concept which is highly promoted by WHO, International Union against Tuberculosis and Lung Disease and other global associations in recent years. PPM is the abbreviation of Public-Private-Mix, which is to utilize the cooperation model with private medical institutions, fusions of public and private, to control TB [23].

Table2. Summary of pay for performance program of TB and financial incentives

Structure (requirements of participating the program)	Process (requirements of implemented health care level & extra health care fees from insurer)	Outcome (outcomes of health care & extra financial incentives from insurer)
(1) Medical institutions have to be contracted with BNHI	(1) First stage of disease management(continuous care for 3 months); 1500 points of health care fees will be paid. Other extra costs such as examinations, medical expenses and inspections can still be verified and claimed.	(1) 750 points of TB case examination fees are paid after confirmed by TCDC.
(2) Minimum one physician specializing either in chest, infection and TB, or certificate of TB training from health authorities.	(2) Second stage of disease management (continuous care for 4-6 months); 1500 points of health care fees will be paid. The maximum claims are up to four stages, i.e. , continuous care of 12 months.	(2) 2000 points of TB treatment fees after confirmed by TCDC.
(3) Establishment of 1 case management personnel if the TB reported cases exceeding 100. Additional case management staff depends on case number. Part-time staff is applicable for cases less than 100.		

Special requirements :

If medical institutions wish to declare the process of health care indicators, complete and continuous care of TB cases are required; and detailed case records, visiting records, treatment, medication records, and biochemical examination records are required as well.

Case management fees (1500 points) are paid every three months per case by insurer. If not conform to the related provisions, only half of disease management fees will be paid.

Expected efficiency :

- (1) To improve payment system, to encourage health care providers to take responsibility of case management and health education, and to complete the TB treatment in order to enhance health care quality.
- (2) To complete the diagnosis and treatment of TB and to ensure the enhancement of health care quality.
- (3) Hospitals have established case management staff, platform of public health and medical networks in order to reduce the loss the TB patients and to enhance the cure rate.
- (4) To strengthen the disease-specific case management model and served as the communication tool for public health, medical as well as the case management. To lower the incidence of interrupted medication, drug-induced side effects and drug-resistance cases.

Note: The contents are from the “Standard of National Health Insurance Payment”, part 10, “Quality Payment Service”.

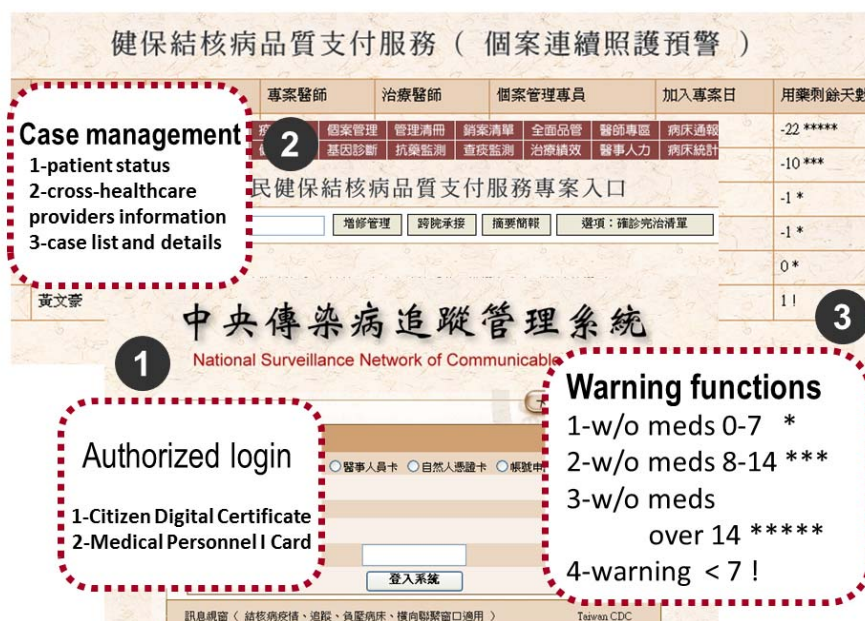


Figure 1. TB pay for performance interface for healthcare providers.

Figure English description:

1. The log-in process has to be done via IC card or Identification such as Citizen Digital ID or Medical personnel ID card under the regulation of TCDC.
2. After accessing the system, case management, review of cross-healthcare facilities treatment, diagnosis results can be reviewed online.
3. The warning functions of continuous health care can help case management staff to remind patients to revisit with regular treatment. 1- warning of revisit required (over 0-7 days) ; 2- warning of revisit required (8-14 days); 3- warning of revisit required (over 14 days); 4- warning of revisit required (less than 7 days).

The public-private fusion is critical because TB treatment is mainly in the public hospitals or designated ones in most of countries. But these types of hospitals are unlikely to spread widely over the countries, which might lead to the blind zone of disease prevention. In turn, the patients care and accessibility are unlikely to upgrade, which are challenges for TB prevention. WHO also appeal to all countries that inviting private health care system into the model of TB control is essential [24]. The private health care system may include private practice physicians, hospitals, clinics and pharmacies, profit and non-profit institutions, formal/western/traditional health care providers. Whereas, public care systems, in regarding to the national TB program, all public institutions include public medical institutions, academic institutions and local governments are all involved in the PPM model. Therefore, by using financial incentives, the private, public and insurer systems are all incorporated into this unique three-in-one prevention system in Taiwan, which becomes the executive strategy of resolving the difficulties in management and facilitating the international connection.

According to the data from BNHI and TCDC, the treatment success rate for those participants with 18 months follow-up is 74.6% in 2001, and 63.0% for those who did not participate. In 2004, the treatment success rate for those participants with 18 months follow-up is 83.5% and 61.1% for those who did not participate in the program [25-26]. The comparison shows that those who join the program have better clinical outcomes. However, more scientific analysis and research are required for better support for the effectiveness of the plan.

So far, it shows over 80% of cases join the program and receives the health care annually. For those who do not join the program might due to the otherwise complicated MDR-TB cases who were enrolled in the MDR-TB health care program in 2007, or the “counter-elimination phenomenon” - that is some medical institutions show no inspirations to manage the cases and leading to the loss of cases. Public health system should strengthen the supervision, monitor case referral arrangement and provide resources to assist these patients.

Until the end of 2010, the number of healthcare providers joined the reporting or TB pay for performance program are 468 (Table 3), which include 351 district level facilities, all

Table 3. The executive situation of pay for performance program of TB in Taiwan, 2010

Classification	Number of participated medical institutions	Annual new enrolled cases	Number of full-time and part-time case managers
Taipei Branch	112	4156	76
Medical centers	10	1981	26
Regional Hospitals	24	1666	34
District Hospitals	53	351	9
Clinics	25	158	7
North Branch	63	1724	44
Medical centers	1	516	2
Regional Hospitals	12	882	16
District Hospitals	40	317	26
Clinics	10	9	0
Central Branch	112	2745	61
Medical centers	4	1051	7
Regional Hospitals	18	1251	27
District Hospitals	51	416	27
Clinics	39	27	0
East Branch	37	550	15
Medical centers	1	163	1
Regional Hospitals	4	187	3
District Hospitals	10	160	10
Clinics	22	40	1
South Branch	58	2203	45
Medical centers	3	415	4
Regional Hospitals	15	1296	22
District Hospitals	29	472	17
Clinics	11	20	2
Kao-Ping Branch	86	2997	53
Medical centers	3	1129	11
Regional Hospitals	15-	1451	16
District Hospitals	58	388	21
Clinics	10	29	5
Total	468	14375	294

Note 1 : Data source is from National TB database. The annual new enrolled cases include the cases reported in current and previous year and been confirmed in 2010 and joined the program.

Note 2 : Classifications are based on the branch location of BNHI. Taipei (Taipei City and Taipei County, Keelung City, Ilan County, Kinmen County and Lienchiang County), North (Taoyuan County, Hsinchu County, Miaoli County), Central (Taichung County and Changhua County, Nantou County), South District (Yunlin County, Chiayi County, Tainan County), Eastern (Hualien County, Taitung County), the Kao-Ping (Kaohsiung City and County, Pingtung County, Penghu County)

medical centers have joined already, and 117 clinics have joined as well. From geographical analysis, the most number of medical institutions joined are located in Taipei and Taichung areas, which also include most cases. In terms of workload of case management, an average of 37 cases per case manager in Eastern region is needed. There are 112 healthcare facilities (4,156 cases) in Taipei region, 86 healthcare facilities (2,997 cases) in Kao-ping region, and each case manager's workload is 56 cases, the workload is higher than other areas.

According to Lo et al., the new TB cases are 16,784, with incidence rate of 74 per 100,000 population in 2004 (the initial year implementing pay for performance program). In 2006, the new TB cases are 15,378, with incidence rate of 67 per 100,000 population, which has decreased by 8.4%. Since April 2006, DOTS program was implemented nationally with cooperation of pay for performance program and active prevention measures. In 2008, the cases decreased to 14,265 with 15.0% of decrease rate compared to 2004 [27]. Although the influence of pay for performance and DOTS program requires more evaluation, however, it connects to health care system and public health system practically. For example, it allows health care providers to search for the past medical history and examination data when dealing with transfer cases. In addition, TB case management staff can provide examinations for TB contacts, and to provide treatment for risk cases. Together, this has led to a greater efficiency.

Discussion and Conclusion

The BNHI has started to implement the pay for performance for TB since 2001. The willingness of medical institutes to participate was very low, only 54 institutions participated and the number of people received health care were around 1,000 during the initial period [25]. Since 2004, the cooperation between BNHI and TCDC has substantially increased the willingness of participation for medical institutions; nearly 60% have joined this program at that time. Until 2007, the joined cases have reached to more than 80%. Since January 1 2008, the BNHI has decided to include this program into the Standard of National Health Insurance Payment, part 10, "Quality payment service" [22]. So far, TB is the only disease which has been included into the official standard payment from the trial program. In 2010, around ten thousands cases have joined the TB program; and more than 400 medical institutions have joined as well. This shows that financial incentive could improve the willingness to participate in the program and thus could improve the public health control network.

In fact, the implementation of pay for performance with appropriate financial incentives really can increase the health care coverage rate for patients and higher quality of medical service. However, more scientific evidence should be accumulated during implementation and evaluation, and some issues are required to be clarified after such intervention. For example, the association between medical utilization and quality, expected success rate of treatment, lower deaths, and qualitative change of interactions between case management staff, hospital infection control and public health institutions.

The experience of promoting pay for performance with integration of TB in Taiwan might serve a reference for other countries, however, disease characteristics, insurance system, and the differences between health care systems in different countries should be considered as well. At the time of improving financial incentives, insurance and supporting mechanisms should be fully integrated to prevent the failure of service upgrading or even lead to the public concerns. In addition, the internal evaluation has shown that cherry picking effect might be an issue, that is medical institutions only select cases who are easier to care, and issues such as transfer case treatment, cost of human resources, degree of patients' coordination and follow-up. Thus, the above issues should be well considered during the design period of system. Also, it is more important for public health system to rapidly handle the transfer and management for those cases who are not included into the program. The difficulties during the health care process, such as uncooperative, disadvantaged groups are depending on the future establishment of the Department of Health and Welfare. Thus the solutions can be provided through the integration of social assistance and health system.

We have found that cases that joined the pay for performance program have better outcomes, however, more scientific evidence can support the efficacy of the program, for example, advanced research on the factors affecting the outcomes is required, and comparisons between participants and non-participants in terms of structure, process and outcomes should be made with rigorous study design and analysis. For the cherry picking effect, prior research should be done to understand the behavior and factors of non-participants, as well as the active intervention of public health.

In summary, if the integration of pay for performance and TB control can be continuously monitored with fine tuning, the system will be effective for TB control in Taiwan. Moreover, this might be a successful example of collaboration between national health payment system and infectious disease control.

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Outbreak Investigation Express

An Outbreak of Shigellosis Infection within Three Tourism Groups during Traveling in Boracay, the Philippines, 2012

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Abstract

Transmission of infectious diseases internationally has become an important global public health issue because of frequent international business and travel activities. At the airport fever screening station, the Second Branch of Taiwan CDC detected three persons, one each from three tourism groups returning from Boracay, the Philippines, with symptoms of fever and diarrhea during June 22 to 24. The three members were diagnosed as Shigellosis after anal swab test on June 28 by the Research and Diagnostics Center. Then Taiwan CDC instantly directed the local health units to implement the outbreak investigation, health education on related diseases, and guidance of environmental disinfection. In the meantime, the list of the positive cases' family and tourist groups was transferred to the local health units for contact tracing and health investigation. The tracing results from 86 contacts showed twenty contacts

were with suspect symptoms, and specimen testing from contacts detected one positive Shigellosis case. The risk of transmitting infectious disease is high in Taiwan due to the high population density. However, the effective control measures, rapid obtaining information of imported infectious disease, continuous surveillance, and implementation of relevant prevention strategy, may decrease the risk of domestic dissemination.

Keywords: Shigellosis, tourism groups, Boracay, imported infectious disease

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