

Does the integration of TB medical services in the general hospital improve the quality of TB care? Evidence from a case study in China

Qiang Sun¹, Jia Yin², Xiao Yin³, Guanyang Zou², Mingli Liang⁴, Jieming Zhong⁵, John Walley², Xiaolin Wei^{2,6}

¹Center for Health Management and Policy, Shandong University, Jinan, Shandong 250012, China

²Nuffield Centre for International Health & Development, University of Leeds, Leeds LS2 9LJ, UK

³Jinan Central Hospital, Jinan, Shandong 250013, China

⁴Shandong Provincial TB Control Center, Jinan, Shandong 250013, China

⁵Zhejiang Provincial TB Control Center, Hangzhou, Zhejiang 310051, China

⁶School of Public Health and Primary Care, Chinese University of Hong Kong, Hong Kong, NT, China

Correspondence to Xiaolin Wei, E-mail: xiaolinwei@cuhk.edu.hk

ABSTRACT

Background Moving the clinical services from tuberculosis (TB) dispensary to the integrated county hospital (called integrated approach) has been practiced in China; however, it is unknown the quality of TB care in the integrated approach and in the dispensary approach.

Methods A total of 202 new TB patients were investigated using structured questionnaires in three counties implementing the integrated approach and one county implementing the dispensary approach. The quality of TB care is measured based on success rate of treatment, medical expenditure, health system delay and second-line drug use.

Results The integrated approach showed a high success treatment rate. The medical expenditure in the integrated approach was USD 432, significantly lower than that in the dispensary approach ($Z = -5.771$, $P < 0.001$). The integrated approach had a shorter health system delay (5 days) than the dispensary approach (32 days). Twenty-six percent of patients in integrated hospitals were prescribed with second-line TB drugs, significantly lower than that in the TB dispensary (47%, $\chi^2 = 7.452$, $P = 0.006$). However, the medical expenditure, use of second-line anti-TB drug and liver-protection drugs indeed varied greatly across the three integrated hospitals.

Conclusions The integrated approach showed better quality of TB care, but the performance of the integrated hospitals varied greatly. A method to standardize TB treatment and management of this approach is urgent.

Keywords China, integrated hospital, public–public mix, tuberculosis

Introduction

China has the second largest burden of tuberculosis (TB) globally. There was an estimated 9.4 million new TB cases in China in 2008, accounting for 15% of all new TB cases worldwide.¹ Since 1991, the World Health Organization (WHO)-recommended TB control program, called ‘DOTS’ as a brand name, has been implemented by China’s National TB Program. WHO estimated that China has achieved the global targets for TB case detection by the end of 2005.^{2,3} However, challenges in TB control remain to the China National TB Program, such as how to set up a sustainable

Qiang Sun, Associate Professor and Deputy Dean

Jia Yin, Research Fellow

Xiao Yin, Associate Professor of Medicine

Guanyang Zou, Research Fellow

Mingli Liang, Research Associate

Jieming Zhong, Vice Director

John Walley, Research Fellow

Xiaolin Wei, Assistant Professor, Senior Research Fellow and Director of Comdis China Programme

mechanism with multi-department cooperation and engage everyone in TB control.

Engaging all healthcare providers in TB control is an essential component of WHO's new Stop TB strategy.⁴ Public-private or public-public mix (PPM) is recognized as a robust approach for TB control in some countries.^{5,6} However, PPM strategies are highly context specific and have to be adjusted to local situations when scaling up in different countries. In the current structure of the China National TB Program, the TB dispensaries from provincial to county level take the major responsibilities in TB case detection, diagnosis, treatment and case management. The majority of TB dispensaries are located in the Centers for Disease Control (CDC), while a small of proportion are standing-alone institutions. Public hospitals are required to report and refer TB patients to the TB dispensary. This is called the TB dispensary approach. Only severe TB cases should be referred to general hospitals for further treatment. Because TB symptoms, such as cough and fever, are non-specific, most TB patients visited general health facilities, such as hospitals and village doctors for diagnosis and treatment, instead of the TB dispensary.⁷⁻⁹ Studies found that most patients received in hospitals were not referred to TB dispensaries in a timely manner.^{3,10} In some cases, TB patients may prefer to be treated by the hospitals due to perceived high quality of care in big hospitals, which causes a longer treatment delay and higher medical cost.^{11,12}

A new approach of TB control was initiated in Shanghai, Zhejiang and Jiangsu since 2000. In this approach, the clinical TB care was moved from the TB dispensary to a TB clinic located in a general hospital, known as the TB integrated hospital. The TB dispensary is focused on providing public health care, including TB control planning, case reporting, drug procurement and distribution, defaults tracing and health education.^{6,8,13} It is called as the integrated approach in this paper, because TB patients would receive integrated care in a general hospital without the need of being referred to a TB dispensary. Other general

hospitals, including the township hospitals, are responsible to refer TB suspects and patients to the integrated hospital. It is assumed that the integration of clinical services in the public hospital would reduce patients' medical expenditure and health system delay and improve the quality of clinical care for TB. This paper aims to explore whether these assumptions of integrated approach has been achieved by employing a case study method in Zhejiang Province, China.

Methods

Setting

The study was conducted in Zhejiang, a province located in the eastern China. Zhejiang has a population of 54 million and a GDP per capita of USD 7690, 1.8 times the national average GDP in 2008. Up to 2008, 47% of its 90 counties have implemented the integrated approach, while the rest were with the traditional TB dispensary approach.

Study design and population

Three counties, HN, SZ and CS, were randomly selected among the 42 counties with the integrated approach. The three counties were located in the eastern, middle and western parts of Zhejiang, respectively, representing relatively rich, middle and poor economic development (Table 1). The county DY, located in the middle of Zhejiang and representing a middle level of economic development, was purposively selected as a representative of dispensary approach for a comparison purpose. Because the performance of counties using the dispensary approach was not significantly different regarding drug use, treatment days and success rate of treatment, only one county using the dispensary approach was selected after considering the financial and logistic capacity of the study. Full names of the selected counties were crushed for confidentiality purpose. Free treatment is provided to TB patients treated in TB dispensaries and TB clinics of the TB integrated hospitals in China. The free treatment policy covers the costs of the whole

Table 1 The basic information of the four counties in Zhejiang Province, China

<i>TB control approach</i>	<i>County</i>	<i>Population</i>	<i>GDP per capita (USD)^a</i>	<i>No. of new registered smear-positive TB patients</i>	<i>Geographic location</i>
Integrated approach	HN	1 060 055	7672	170	East
	SZ	817 260	4348	167	Middle
	CS	327 710	3179	108	West
Dispensary approach	DY	1 010 000	3731	259	Middle

^a1 USD = 7.0 RMB in 2007, the data are in 2007.

course of first-line anti-TB drugs, TB sputum smears and cultures, and X-ray examinations for the first and last months. The policy does not cover hospitalization costs, second-line anti-TB drugs and any other drugs or medical examinations during TB treatment.

In each county, 50 new pulmonary TB patients, including both sputum positive and negative, without any serious comorbidities (e.g. diabetes, HIV/AIDS, cardiovascular diseases and mental health problems) were randomly selected from TB patient registers in the TB dispensaries. This represented 85% of the available registered TB patients who met our selection criteria (Table 1).

Data collection and analysis

A structured questionnaire was used to collect the information face-to-face regarding patient demography, patient treatment experiences and medical expenditure. A pilot study was conducted to test the survey instruments. According to the international standards of TB care, all new uncomplicated patients should receive the internationally recommended first-line treatment regimen of isoniazid, rifampicin, pyrazinamide and ethambutol,¹⁴ therefore, any use of second-line anti-TB drugs is regarded not appropriate. The health system delay is defined as the time interval between the first contact of health care for TB-related symptoms and the initiation of anti-TB treatment.¹⁵ The medical expenditure is defined as patients' out-of-pocket expenditure on TB-related care deducting any costs covered by the health insurance or the free treatment policy of TB.

The quality of TB care was measured by the success rate of TB treatment, health system delay, medical expenditure and second-line drug use. Descriptive statistical analysis was used to analyse the quality of TB care. The cut-off point for statistical significance was set at the 5% level. Statistical

analyses were performed using STATA 9.0 statistical software (Stata-Corp, College Station, TX, USA).

Ethical approval

Ethical approval was issued by the Ethics Committee of School of Public Health, Shandong University. Consent forms were obtained from all participants. Names of selected counties were used as acronyms to prevent the identification of the places.

Results

Official reported cure rate of smear-positive TB patients in the four counties

According to the routine TB reporting data, all the four counties increased the cure rate of new smear-positive steadily between 2004 and 08. In DY county, the cure rate increased from 82% in 2004 to 94% in 2008. The cure rates of the other three integrated approach counties also showed a steady increase in trend from 73% in SZ in 2004 to over 90% in HN and CS in 2008 (Fig. 1).

Basic characters of TB patients

Among the 202 surveyed TB patients, the range of age was from 48 to 60 years, and over 60% of them are male. The annual income per capita was between USD 554 and 1190 in the four counties, with a significant difference among four sites ($F = 9.970$, $P < 0.001$). HN and SZ had a significantly higher income than CS (Table 2).

Health system delay and second-line drug use

The health system delay in DY was 32 days, which was significantly higher than that in the counties using integrated approach (5 days, $Z = -5.450$, $P < 0.001$). However, this varied

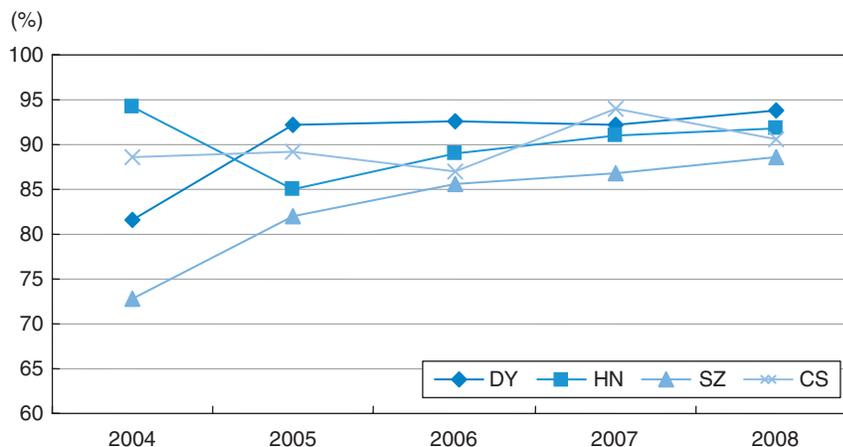


Fig. 1. The cure rate of new smear-positive TB patients from 2004 to 08.

Table 2 The basic characteristics of TB patients

Indicators	Dispensary approach DY	Integrated approach		
		HN	SZ	CS
No. of patients	51	50	51	50
Age	58 (47–69)	48 (35–62)	52 (32–59)	60 (44–69)
Male patients, <i>n</i> (%)	33 (65%)	33 (66%)	34 (67%)	41 (82%)
Annual income per capita (USD)	714 (439–1429)	1167 (857–1500)	1190 (714–1786)	554 (286–857)

Note: Age and annual income per capital are measured by the median value, and the range was showed by P25 and P75 in the parentheses. 1 USD = 7.0 RMB in 2007.

Table 3 The health system delay and second-line drug use

	Dispensary approach (DY)	Integrated approach			
		HN	SZ	CS	Sub-total
No. of patients	51	50	51	50	151
The health system delay	32 (15–61)	6 (0–20)	13 (0–41)	1 (0–15)	5 (0–30)
Patients given second-line TB drugs, <i>N</i> (%)	24 (47)	4 (8.0)	4 (7.8)	32 (64)	40 (26)

Note: The days of health system delay are measured by the median, and the range was showed by P25 and P75 in the parentheses.

greatly among the three integrated approach counties, from 1 day in CS to 13 days in SZ. Nearly 50% of the patients treated by the TB dispensary in DY were prescribed with second-line TB drugs. The proportion was significantly higher than that in the three integrated hospitals ($\chi^2 = 7.452$, $P = 0.006$). In CS, 64% of the patients were prescribed with second-line TB drugs, significantly higher than that in HN (8%, $\chi^2 = 34.028$, $P < 0.001$) and SZ (7.8%, $\chi^2 = 34.710$, $P < 0.001$). The most frequently used second-line TB drugs were acetylsalicylic acid and Levofloxacin in DY county, and levofloxacin and gatifloxacin in CS county (Table 3).

Medical expenditure in the four counties

Medical expenditure refers to direct medical expenses that TB patients spent from the first contact of health care to completion of TB treatment, which includes the medical expenses of both outpatient and inpatient care during this period, and excludes any expenses covered by health insurance and the free TB treatment policy. In DY county, the average medical expenditure in the dispensary approach was USD 947, which was significantly higher than that in other three integrated hospitals (USD 432, $Z = -5.771$, $P < 0.001$) (Fig. 2). Seventy-nine percent of TB patients' medical

expenditure in DY county occurred before TB dispensary, which was significantly higher compared with the proportions in the three integrated approach counties (7–35%, $Z = -5.708$, $P < 0.001$).

Medical expenditures in the integrated hospitals varied across the three sites. Medical expenditure occurred in the integrated hospital of SZ was the highest compared with that in the integrated hospitals of HN and CS ($F = 13.769$, $P < 0.001$). The main cost contributor in SZ' integrated hospital was the liver-protection drug with an average of USD 129, compared with the average costs of USD 100 in HN and USD 40 in CS.

Discussion

Main finding of this study

Compared with the county using the dispensary approach, the counties using the integrated approach maintained a high treatment success rate, a lower medical expenditure of TB patients and shorter health system delay. The prescription of second-line anti-TB drug and liver-protecting drug varied greatly among the four counties and no single pattern could be found in either of the approaches.

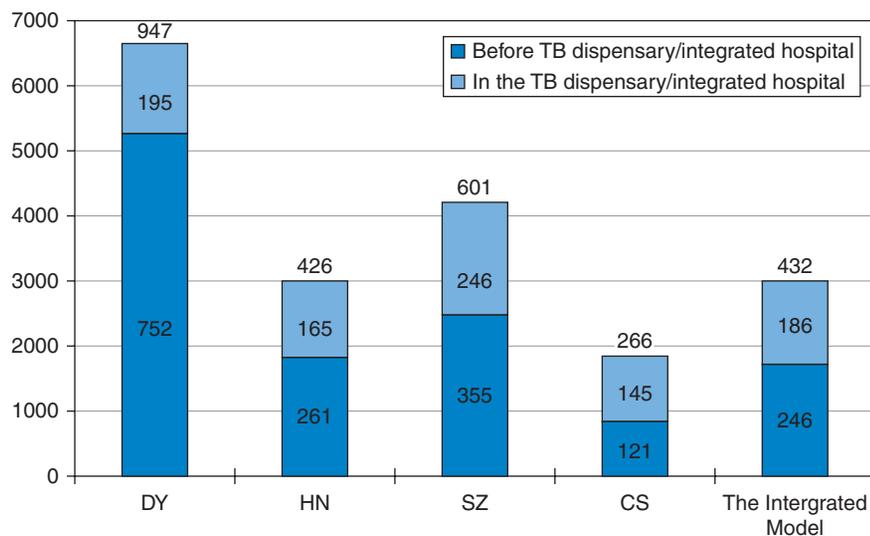


Fig. 2. The medical expenditure and its components (USD).

What is already known on this topic?

The experience from India showed that collaboration between hospitals and public health institutions has improved the TB control in increasing the case detection, keeping high treatment success rates and reducing the cost of TB care for the patients.^{16–19} However, experience from Indonesia found the opposite, i.e. despite the successful scale-up of PPM, a large proportion of patients were not treated with standardized diagnosis and treatment in the hospitals.²⁰ The great variations regarding TB treatment among the three counties of integrated model echoed the results from the Indonesian study. The current PPM practices in China showed that moving the clinical services from the TB dispensary to the county hospital increases the case detection and referral rate.^{21,22} Gradually scaling up the integrated hospital approach should get more government support as China's experience on TB control has shown that investment in both control programmers and health systems was needed and indeed to contribute the TB control.^{23,24}

What this study adds

This study found that the three counties with integrated approach show high success treatment rate of new patients, which was similar to the county using the dispensary approach. Medical expenditure in the integrated approach was significantly lower than that in the dispensary approach. One possible explanation is that the integrated hospitals normally are the popular public hospitals within the counties. The hospitals are usually the first choice of most TB patients, which would result in the reduction of the health system delay, subsequently, as well as the medical expenditure occurred before TB diagnosis. However, it should be noted

that the expenditures varied greatly across the three integrated hospitals. Patients in SZ had the highest medical expenditure before visiting the integrated hospital, suggesting that strengthening the TB suspects referral and promoting public awareness to this approach are still needed.

This study found that the average medical expenditure in the integrated hospitals was around USD 186, which was slightly lower than that in the DY TB dispensary, and also similar with the USD 177–371 of medical expenditure in the most TB dispensaries in China.²⁵ Our study found a large variation in medical expenditures in the three integrated hospitals, with the highest medical expenditure occurred in SZ. Liver-protection drugs were found widely used in the study sites, although their necessity is actually not well established. The use of liver-protection drugs also varied greatly in the three counties using the integrated approach. The less use of liver-protection drugs in CS and HN may be due to the fact that a working contract was signed between hospital and CDC, with an effect on regulating the prescription behavior of physicians.

In the TB control system, prescription of the second-line drugs for the new TB patients commonly existed in the TB control institution, which could cause the development of multi-drug resistant (MDR) TB cases and bring heavy financial burden on these patients.^{26–28} This study found that in general the integrated approach had lower use of second-line TB drugs than the dispensary approach. As public health services cannot be fully financed by government budget, the TB dispensary may have stronger economic incentives to prescribe non-free drugs. On the contrary, TB services contributed only to a small proportion of the public hospital revenues. The use of second-line drugs also varied greatly in

the three integrated hospitals. This suggests that training and monitoring of clinical TB services are important in the integrated hospitals.

According to WHO guidance on implementing PPM approaches, national situation assessment and operational guideline are essential and important.²⁹ However, the implementation of PPM approaches in China did not accompany with sound design in operating and evaluation mechanism in the beginning, and most of PPM practices were spontaneously implemented by local health authorities without careful consideration on policy regulation. As the Chinese government plans to expand this integrated approach on TB control, it is important that the government must address the impacts of warped incentives on TB treatment in public hospitals and produce a standardized guideline of TB treatment and management in integrated hospitals.

Limitations of this study

This study may suffer from bias as only one dispensary approach county was selected, risking non-representativeness. The main reason was the past studies suggested that the performance of the counties with dispensary approaches did not vary significantly in terms of drug use, treatment days and success rate of treatment in Zhejiang Province.³⁰ Considering the limitation of study time and budget, we included one county using the dispensary approach. Nevertheless, this study provided useful information on the quality of TB care of the integrated public hospitals. Future study is needed to better understand the factors contributing to the different results between sites implementing different PPM approaches in China.

Authors' contributions

Q.S., X.W. and J.W. were involved in conception and design of this project, whereas Q.S., X.Y., X.W., G.Z., J.Y., J.Z. and L.M. were involved with the implementation of the project and analysis and interpretation of the data. Q.S. and X.W. have drafted the manuscripts, while G.Z., J.W., J.Z. and J.Y. have provided critical comments.

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