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Cost-Effectiveness of Various Tuberculosis Control Strategies in Thailand

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ABSTRACT

Objective: To evaluate the cost-effectiveness of different tuberculosis control strategies in Thailand. **Methods:** Different tuberculosis control strategies, which included health-worker, community-member, and family-member directly observed treatment (DOT) and a mobile phone “contact-reminder” system, were compared with self-administered treatment (SAT). Cost-effectiveness analysis was undertaken by using a decision tree model. Costs (2005 international dollars [I\$]) were calculated on the basis of treatment periods and treatment outcomes. Health outcomes were estimated over the lifetime of smear-positive pulmonary tuberculosis patients in disability-adjusted life years (DALYs) averted on the basis of Thai evidence on the efficacy of the selected strategies. **Results:** Cost-effectiveness results indicate no preference for any strategy. The uncertainty ranges surrounding the health benefits were wide, including a sizeable probability that SAT could lead to more health gain than DOT strategies. The health gain for family-member DOT was 9400 DALYs (95% uncertainty interval –7200 to 25,000), for community-member DOT was 13,000 DALYs (95% uncer-

tainty interval –21,000 to 37,000), and for health-worker DOT was 7900 DALYs (95% uncertainty interval –50,000 to 43,000). There were cost savings (from less multi-drug resistant tuberculosis treatment) associated with family-member DOT (–I\$9 million [95% uncertainty interval –I\$12 million to –I\$5 million]) because the trial treatment failure rate was significantly lower than that for SAT. The mobile phone reminder system was not cost-effective, because the mortality rate associated with it was much higher than that associated with other treatment strategies. **Conclusions:** Because of the large uncertainty intervals around health gain for DOT strategies, it remains inconclusive whether DOT strategies are more cost-effective than SAT. It is evident, however, that family-member DOT is a cost-saving intervention. **Keywords:** cost-effectiveness, DOT, mobile phone reminder, self-administered treatment, Thailand, tuberculosis.

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Introduction

Tuberculosis (TB) remains one of the global leading public health problems. In 2007, Thailand ranked 18th out of the 22 high-burden countries globally. Thailand has met one of the global targets that have been set by the World Health Assembly and the Stop TB Partnership as well as are within the framework of the Millennium Development Goals, for 70% detection of new smear-positive cases but has not yet achieved successful treatment of 85% [1].

Effective cure of TB requires a patient taking medication without interruption following a strict schedule for at least 6 months, which is difficult for most patients to maintain. Directly observed treatment (DOT), whereby a trained person observes patients taking their medications, is widely used to improve adherence to treatment. It is worth noting that DOT and DOTS (directly observed treatment, short course) are different terms. DOT is one of the five key components of DOTS, which is recommended by the World Health Organization (WHO) [2]. The five key components are 1) government commitment, 2) case detection by sputum smear microscopy, 3) standardized treat-

ment regimen with DOT, 4) a regular drug supply, and 5) a standardized recoding and reporting system. There are three DOT options commonly used: health worker, community member, and family member [3,4].

There have been a few cost-effectiveness studies comparing DOT to self-administered treatment (SAT), but none has been conducted in Thailand [5,6]. A Cochrane review found no evidence that DOT shows better cure rates than does SAT [7]; however, a Thai trial [8] that was included in the review showed that DOT provides modest additional benefits.

Recently, mobile phones have gained attention in health care. As mobile technologies improve health systems and the delivery of health care [9], several researchers have shown evidence that mobile phones have the potential to improve health outcomes in the developing world [10]. There have been a few studies of the use of mobile phone in a TB control program [9,11,12]. To our knowledge, no other studies have evaluated the cost-effectiveness of the mobile phone intervention compared with that of SAT. In this article, we evaluated the cost-effectiveness of five different strategies, including different DOT options, mobile phone intervention, and SAT.

Conflicts of interest: The authors have indicated that they have no conflicts of interest with regard to the content of this article.

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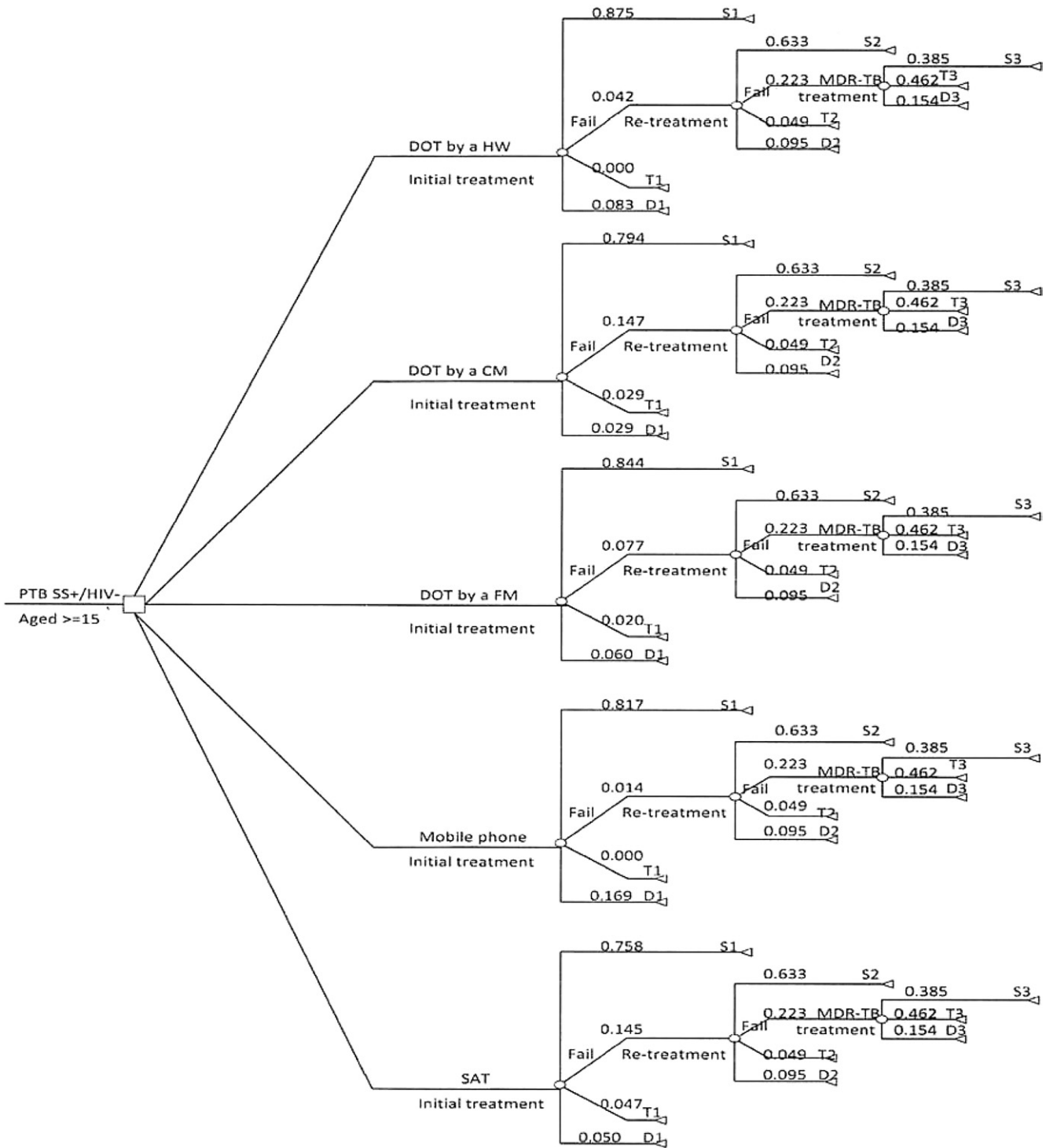


Fig. 1 – Decision tree of different TB control strategies. CM, community member; D, died; DOT, directly observed treatment; FM, family member; HIV-, HIV negative; HW, health worker; MDR-TB, multi-drug resistant tuberculosis; PTB, pulmonary tuberculosis; S, successful treatment; SAT, self-administered treatment; SS+, sputum smear-positive; T, transferred out.

Methods

Interventions and comparator

We reviewed the TB control strategy literature to identify interventions that would be suitable to implement in Thailand and had evidence of efficacy to support the analyses. The three DOT options are recommended methods of supervision by the WHO, depending on

the distance between a patient’s place and a health facility [4], while mobile phone intervention has become an interesting alternative as it has become ubiquitous. Five interventions were included in the cost-effectiveness analysis: health-worker DOT, community-member DOT, family-member DOT, mobile phone “contact-reminder” system, and SAT. We used SAT as the comparator for each DOT strategy and the mobile phone intervention. A description of each intervention is as follows:

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