COST-EFFECTIVENESS OF α–THALASSEMIA 1 SCREENING IN PREGNANT WOMEN BY αTHAL IMMUNOCHROMATOGRAPHIC STRIP TEST UNDER THAI CONTEXT

Yupin Jopang[1*], Watchareeporn Rodthong, Sanong Suksaweang[3]

[1]*Regional Health Promotion Center 9, Nakhon Ratchasima,* [2]*Dankhuntod Hospital,* [3]*Department of Pathology and Laboratory Medicine, Institute of Medicine, Suranaree University of Technology*

Presenter: Dr. Yupin Jopang, E-mail: jopang08@gmail.com

Abstract

Introduction and objective

The most severe form of α thalassemia disease is Hemoglobin (Hb) Bart's hydrops fetalis. Most fetuses could die either in utero in late gestation or shortly after birth. There are few studies revealed that αTHAL IC strip, i+Med Laboratories Company Limited was attractive for identifying α-thalassemia 1 carriers due to its simplicity, no requirement of sophisticated instrument, high sensitivity and specificity. However, there is no consensus cost-effectiveness if include αTHAL IC strip into the current Thai screening guideline in pregnancy. The study aimed to evaluate the cost-effectiveness of the proposed α-thalassemia 1 screening protocol in pregnancy in which the αTHAL IC strip was added into the conventional protocol under the Thai context.

Methods: Analyze the cost-effectiveness by using the decision analysis model. Direct health care cost of the proposed protocol was calculated and compared with the conventional protocol. Effectiveness of the proposed protocol was evaluated in terms of the number of prevented Hb Bart's hydrops fetalis newborns. Data sets and variables in model come from the previous study in 2014 based on 898 pregnant women. The key factors affecting variation in effectiveness and cost of screening were used sensitivity analysis.

Results: The cost-effectiveness of the proposed protocol for thalassemia screening could decrease 19 cases of Hb Bart's hydrops fetalis newborn per 10,000 couples with the healthcare cost about 5.67 million baht whereas the conventional protocol cost is about 6.02 million baht. Therefore, the cost of prevented one case with Hb Bart's hydrops fetalis would be 0.018 million baht. We found that the price, prevalence and specificity of αTHAL IC strip are the significant factors affecting the uncertainty.

Conclusion and suggestion: The results showed that the proposed thalassemia screening protocol gave a higher cost-effectiveness. Decision makers should draw the attention to the price of the αTHAL IC strip, prevalence of α-thalassemia 1 carriers and specificity of αTHAL IC strip.

Keywords: αTHAL immunochromatographic (IC) strip test, cost-effectiveness, α-thalassemia 1, decision analysis model

Introduction

The most severe form of α thalassemia disease is Hemoglobin (Hb) Bart's hydrops fetalis. The fetuses could die either in utero in late gestation or shortly after birth. Moreover, their affected mothers could suffer from complications such as pre-eclampsia and postpartum hemorrhage. α-thalassemia 1 carriers are frequently found in people of Southeast Asia and China. In Thailand, the prevalence varies from 2.5-14.0% and each year there will be about 833 babies born with Hb Bart's hydrops fetalis. The Ministry of Public Health (MOPH) has launched the national policy for prevention and control the disease by screening, identifying risk couples, prenatal diagnosis, counseling and termination of affected fetus. There are few studies unveiled that αTHAL IC strip, i+Med Laboratories Company Limited was attractive for identifying α-thalassemia 1 carriers due to its simplicity, no need sophisticated instrument, high sensitivity and specificity. Nonetheless, there is no consensus regarding cost-effectiveness evaluation.

Methods

This study analyzed the cost-effectiveness under the healthcare providers' perspective by using the decision analysis model (Figure 1) in terms of direct healthcare cost. We applied two protocols of the program for thalassemia screening in pregnant women in order to prevent Hb Bart's hydrops fetalis in risk couple; a proposed and a conventional protocol. The purposed protocol is a thalassemia screening protocol in pregnant women in which αTHAL IC strip is added into the conventional protocol and the conventional protocol is a current thalassemia screening protocol used in pregnant women under the Thai context. We compared the direct healthcare cost of the proposed protocol with the conventional protocol. Then, we evaluated the effectiveness of the protocol on the number of prevented Hb Bart's hydrops fetalis newborns.

Direct healthcare cost is an accumulation of initial cost and other downstream costs, which is depended on event probabilities including the cost of laboratory screening and

confirmation. The unit cost of all tests is obtained from standard cost lists for health technology assessment 2011 except the unit cost of αTHAL IC strip. It was collected from a current price of the test and a labor cost in which drawn from estimation of similar test like immunochromatographic assay. The actual unit cost will be adjusted with 6.4% incremental cost of consumer cost index of Ministry of Finance for 2016-annual unit cost.

The data set and variables in our model come from our previous study in 2014 based on 898 pregnant women and being calculated the expected cost and effectiveness for both protocols. In this aspect, we forecast the uncertainty by using one-way sensitivity analysis with the extreme values of $\pm$25% and 95% confidence intervals (CIs) in which depended on a base case analysis and a secondary data (prevalence) from literature review.

Results

This study showed that the cost-effectiveness of the proposed protocol for thalassemia screening in pregnant women could decrease 19 cases of Hb Bart's hydrops fetalis babies per 10,000 couples with the healthcare cost about 5.67 million baht whereas the conventional protocol cost is about 6.02 million baht. That means the proposed protocol could save cost about 0.35 million baht. Therefore, the cost of prevented one case with Hb Bart's hydrops fetalis would be 0.018 million baht.

For our sensitivity analysis, we choose the range at least 10% in which important and relevant factors that could affect the uncertainty in ICER. For the cost of αTHAL IC strip; if the price reduce from 120 baht to 90 baht (minimum 25% extreme value), unit cost will decrease from 0.0182 million baht to 0.0111 million baht. For the prevalence; the higher prevalence seems to be the better benefit when using proposed protocol. In terms of specificity of the α-thalassemia 1 screening with αTHAL IC strip; if increase the specificity from 81.4% to 83.9%, the unit cost will decrease from 0.0182 million baht to 0.0167 million baht.

Discussion

It is really a beneficial strategy regarding cost-effectiveness if we add α-thalassemia 1 screening with αTHAL IC strip into a conventional protocol right after MCV and DCIP tests, which can save about 19 cases of Hb Bart's hydrops fetalis plus cheaper unit cost. According to our large scale of sample size and multicenter-study, we, therefore, use our data for base case analysis to forecast the uncertainty. We found the significant relevant factors that affect the cost-effectiveness of α-thalassemia 1 screening include cost, prevalence and specificity parameters. Our results showed that if the company reduce the price of the strip at least 25% and increase its specificity beyond 85%, the cost-effectiveness would be very attractive.
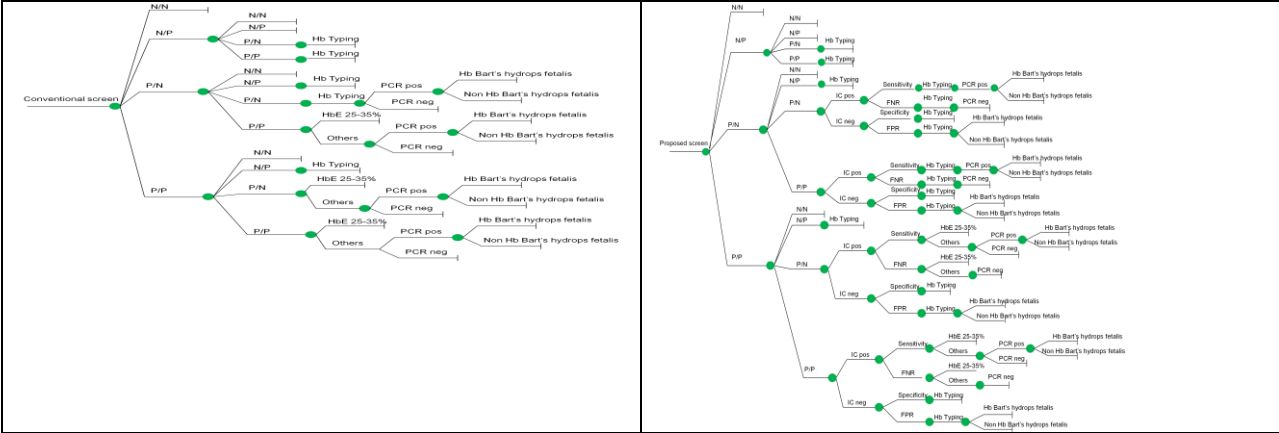
Figure 1: Compared between flow of conventional (left) and proposed (right) thalassemia screening diagrams in pregnant women