VALUE IN HEALTH ▮ (2017) ▮▮▮–▮▮▮

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Determination of Cost-Effectiveness Threshold for Health Care Interventions in Malaysia

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ABSTRACT

Background: One major challenge in prioritizing health care using cost-effectiveness (CE) information is when alternatives are more expensive but more effective than existing technology. In such a situation, an external criterion in the form of a CE threshold that reflects the willingness to pay (WTP) per quality-adjusted life-year is necessary. **Objectives:** To determine a CE threshold for health care interventions in Malaysia. **Methods:** A cross-sectional, contingent valuation study was conducted using a stratified multistage cluster random sampling technique in four states in Malaysia. One thousand thirteen respondents were interviewed in person for their socioeconomic background, quality of life, and WTP for a hypothetical scenario. **Results:** The CE thresholds established using the nonparametric Turnbull method ranged from MYR12,810 to MYR22,840 (~US $4,000–US $7,000), whereas those estimated with the parametric interval regression model were between MYR19,929 and MYR28,470 (~US $6,200–US $8,900). Key factors that affected the CE thresholds were education level, estimated monthly household income, and the description of health state scenarios. **Conclusions:** These findings suggest that there is no single WTP value for a quality-adjusted life-year. The CE threshold estimated for Malaysia was found to be lower than the threshold value recommended by the World Health Organization.

Keywords: contingent valuation method, cost-effectiveness threshold, Malaysia, quality-adjusted life-year (QALY), willingness to pay (WTP).

Introduction

For many years, clinical evidence has been the only evidence required in deciding how to fund health care interventions or drug reimbursement. Nevertheless, many countries are now considering the cost of drugs as part of the important criteria in decision making because of the finite resources available in the health care sector [1]. Consequently, economic evaluations have become increasingly important tools to support efficient resource allocation in the health care sector, especially in resource-constrained settings [2].

The results of economic evaluations, especially cost-effectiveness analysis and cost-utility analysis, are usually summarized as an incremental cost-effectiveness ratio (ICER). The ICER represents the incremental cost per incremental gain in outcomes of one intervention compared with another. To draw conclusions on the cost-effectiveness (CE) of health care interventions, the ICER is usually compared with a reference value, the CE threshold, sometimes referred to as the ICER threshold or the ceiling threshold [3,4].

The CE threshold represents the willingness to pay per quality-adjusted life-year (WTP/QALY) gained and is a vital component of decision making involving economic evaluation [5]. In previous arguments on the importance of an explicit threshold value, Johannesson and Meltzer [6] claimed that without a CE threshold, cost-effectiveness analysis cannot be considered a proper decision-making tool because it would lack a systematic and universally recognizable decision criterion.

A number of countries such as the United Kingdom, Ireland, and the Slovak Republic have explicitly stated their own threshold values [1]. For instance, the National Institute for Health and Care Excellence (NICE) in the United Kingdom has set a threshold value of £20,000 to £30,000 per QALY gained [1,7,8]. In Malaysia, however, there is no such explicit threshold value. In current practice, decisions regarding new health care technologies are made without a transparent decision criterion. This situation leaves more room for arbitrariness and ad hoc considerations in the decision-making process. It also prevents the determination of the true opportunity cost of a new medical intervention,

Conflicts of interest: No conflicts of interest have been declared by the authors.

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http://dx.doi.org/10.1016/j.jval.2017.04.002

which, in turn, imposes inefficiencies and inconsistencies in decision making, and threatens the sustainability of the health care funding system [2,9]. Although the World Health Organization (WHO) has made a generic recommendation for CE threshold in developing countries to take the value of 1 to 3 times the gross domestic product (GDP) per capita per disability-adjusted life-years, such an approach does not accurately reflect the specific needs and the economic and disease burden of the general population in each country. Therefore, establishing a Malaysian CE threshold expressed in terms of cost per QALY is vital, because it will provide a solid criterion for decision making. This study was conducted primarily to determine a CE threshold value for health care interventions in Malaysia. A secondary goal was to identify the factors that affect WTP per QALY.

Methods

Study Design and Samples

A cross-sectional, contingent valuation survey was conducted between December 1, 2012, and December 31, 2014. A sample size of 608 was required to detect a minimum difference of 0.05 between health states at a 0.05 significance level and with 0.80 statistical power. To account for the 40% of nonresponse expected in population survey, the sample size was increased to 1000. Respondents were interviewed in person for 10 to 20 minutes. All respondents chosen were Malaysian adults aged between 20 and 60 years and able to understand either English or Malay. The questionnaire was available in both languages. Both the English and Malay versions of questionnaire were tested and validated in pilot studies to ensure that there is no translational bias. The questionnaire was first designed in English and translated into Malay using the standardized patient-reported outcomes translation procedure [10]. Forward translation was done by native English speakers who resided in Malaysia and came from a medical background with experience in translating/managing the translation of patient-reported outcome measures. Both languages were used in questionnaire development because most Malaysians younger than 60 years are literate in at least one of the two languages. Malay is the official language of Malaysia, whereas English is offered as a compulsory second language subject as part of the national education syllabus. The country has an adult literacy rate of up to 93.1% [11]. During the interview process, respondents were given the flexibility of choosing their language of preference during the survey. As such, the risk of selection bias because of language was expected to be low.

Stratified multistage cluster sampling was used on the basis of the sampling frame provided by the Population and Housing Census of Malaysia [12]. Three states and a federal territory in Peninsular Malaysia, namely, Penang, Kedah, Selangor, and Kuala Lumpur, were clustered into four regions. The samples were then allocated to each region on the basis of the total population of each region. After this step, 20 enumeration blocks were selected from each region. In the third stage of stratification, 120 and 66 living quarters were selected in each city and each rural area, respectively, in proportion to the 65% urban dwellers nationally. Full-time students were excluded because their financial dependency might bias the valuation of WTP.

Study Instrument

The study questionnaire was developed by a group of practitioners and academics in HTAsiaLink, a network of health technology assessment organizations in Asia. This collaborative study was conducted simultaneously in three other member countries: Korea, Japan, and Thailand.

Each questionnaire was divided into four parts (Appendix 1 in Supplemental Materials). Part 1 consisted of 11 items on respondents' socioeconomic background (sex, age, ethnicity, educational level, occupation, marital status, number of household members, monthly household income, status in the household, presence of health problem, and private health insurance). Part 2 consisted of an assessment of the respondents' current health state using the three-level EuroQol five-dimensional questionnaire (EQ-5D) and valuation of their current and hypothetical health states. During this part of the study, each respondent was asked to imagine being in one of the seven hypothetical health states (Appendix A). The health state descriptions were derived from the EQ-5D definitions. They were chosen to represent "mild," "moderate," or "severe" health conditions as well as "extended life for terminal illness" and "life-saving intervention for immediate death" [13]. Health states with a utility value of more than 0.70 were categorized as mild conditions, whereas those with utility values of 0.35 to 0.70 and less than 0.35 were classified as moderate and severe health conditions, respectively [14,15]. This gave rise to two mild health states (11121 and 11212), two moderate health states (11323 and 22222), and one severe health state (22232) (Fig. 1).

The terminal health state group was represented by two scenarios: one involving extended life for terminal illness and the other involving life-saving intervention for immediate death situations. Both versions shared the same hypothetical severe health state (22232) but the valuation scenarios being described were different. Each respondent valued only one hypothetical health state during the interview. Descriptions of the hypothetical health states were illustrated on a separate color-printed card that was used by the interviewers. Utilities of the current and hypothetical health states were measured using the three-level EQ-5D and the visual analogue scale (VAS) [16,17].

Part 3 consisted of a contingent valuation exercise in which each respondent was asked for the amount he or she was willing to pay for a scenario involving the hypothetical health state selected in part 2 (Fig. 2) with two QALY gained levels, 0.2 QALY and 0.4 QALY. Keeping small QALY gains would enable "health losses" to be considered by the respondents such that WTP values are subjected to "budget constraints" to avoid extreme WTP values [9].

A bidding game technique and a double-bounded dichotomous choice approach were applied in eliciting the maximum WTP value for each respondent. In each version of the questionnaire, respondents were asked to place a value on a hypothetical health state scenario on the basis of a certain starting bidding amount. The starting bidding amounts were calculated in proportion to the Malaysian GDP per capita in 2010. To test and control for anchoring effect commonly associated with contingent valuation, the starting bidding values were varied at 5%, 10%, 20%, 40%, 80%, or 120% of the GDP per capita. This yielded six different starting bidding amounts (MYR1,300, MYR2,600,

11121
I have no problems in walking about
I have no problems with self-care
I have no problems with performing my usual activities (e.g. work, study, housework, family or leisure activities)
I have moderate pain or discomfort
I am not anxious or depressed

Fig. 1 – Example of an information sheet of a given health state described to respondents.