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# Eliciting preferences for medical devices in South Korea: A discrete choice experiment

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## ABSTRACT

This study aims to identify the attributes that contribute to the value of medical devices and quantify the relative importance of them using a discrete choice experiment. Based on a literature review and expert consultation, seven attributes and their levels were identified—severity of disease (2), availability of substitutes (2), improvement in procedure (3), improvement in clinical outcomes (2), increase in survival (2), improvement in quality of life (3), and cost (4). Among 576 hypothetical profiles, optimal choice sets with 20 choices were developed and experts experienced in health technology assessment and reimbursement decision making in South Korea were surveyed. A total of 102 respondents participated in the survey. The results of the random-effect probit model showed that among the seven attributes, six, except for improvement in procedure, had a significant impact on respondents' choices on medical devices. Respondents were willing to pay the highest amount for devices that provided substantial improvements in quality of life, followed by increased survival, improved clinical outcome, treatment without substitutes, and technology for treating severe diseases. The findings of this experiment will inform decision-makers of the relative importance of the criteria and help them in reimbursement decision making of medical devices.

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## 1. Introduction

Medical devices are articles, apparatus, instruments, or machines used in the diagnosis or treatment of diseases [1]. In modern medicine, medical devices continue to gain importance and become more sophisticated [2]. The National Health Insurance (NHI) of South Korea reimburses medical devices separately from medical procedures. It maintains a list of reimbursable medical devices; only non-durable medical devices and health products are included

in the list. Equipment and medical devices that are used frequently for a number of patients are reimbursed as part of the procedural fee. Therefore, for this study, medical devices are defined as implantable or disposable materials that are used for medical purposes and reimbursed by the NHI. Examples of medical devices include surgical suture threads, drug-eluting stents, pacemakers, and artificial knees but not medical equipment such as magnetic resonance imaging (MRI) machines. As of August 2016, 24,948 medical devices were included in NHI's list, which has expanded at an annual rate of 8.9% [3]. During 2007–2015, the expenditure on medical devices increased with an annual growth rate of 5.9%, and its proportion in the total NHI expenditure was approximately 3.3% on average [4]. The rapid adoption and diffusion of new medical devices has accelerated the growth of health care

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expenditure. However, evidence regarding their clinical and economic value is limited; this is partly due to the unique features of medical devices.

Medical devices have several characteristics that distinguish them from pharmaceuticals. First, the level of clinical evidence on medical devices is relatively low, whereas the clinical efficacy of pharmaceuticals is supported by high-level, randomized controlled trials (RCTs). This is because the mechanisms of action for medical devices are mechanical in nature rather than chemical or biological, resulting in less adverse effects on the human body. Second, medical devices improve gradually based on feedback from end users [5], which leads to short product life cycles and fewer incentives to invest in generating clinical evidence. Third, the outcomes of using the devices are dependent on the users' skills, which are represented on a learning curve. This makes it difficult to distinguish between the performance of the devices and users' excellence in practice.

The lack of quality clinical evidence on medical devices creates obstacles in evaluating them in terms of effectiveness and cost-effectiveness, which may differentiate medical devices from pharmaceuticals based on factors that are considered in reimbursement decision making, and their relative impact on the final decision. However, a few studies have explored the elements that comprise the value of medical devices.

A discrete choice experiment (DCE) is an attribute-based technique to measure the value of a specific benefit; it is based on the assumption that health care interventions or policies can be described by their attributes and that the respondents' valuation depends on the levels of these attributes [6]. DCEs were introduced into health economics in the early 1990s to enhance value assessment with the belief that the goal of health services is not just to improve health [7]. There are many aspects to the benefits of medical technologies. For example, if medical technology improves health outcomes for a limited number of people at a significantly high price, the decision makers would consider the cost and number of people receiving the benefit, as well as the effectiveness of the technology. DCEs are now commonly used to evaluate the benefits of medical technologies and the willingness to pay for them by considering various attributes.

Given the increasing demand for more reasonable and transparent valuations of medical devices, this study aims

to identify the attributes that constitute the value of medical devices and quantify them by conducting a DCE. By observing the respondents' choices between medical devices, which are assigned different combinations of attribute-levels, the effect of each attribute on utility can be verified. These results will inform policy makers on the value of medical devices with different characteristics and improve the current valuation on them.

## 2. Methods

A DCE was conducted to elicit the preferences of health care professionals on medical devices with different characteristics in relation to the reimbursement and pricing of the devices. Health care professionals in this study include decision-makers, experts in health technology assessment, and experienced members of advocacy groups as well as medical doctors. By observing their choices of medical devices comprising different sets of attributes, the relative importance of attributes could be elicited. In order to achieve this, the following processes were determined.

### 2.1. Attributes and levels

Medical devices that show an improvement in health outcomes are rare, and the level of evidence on medical devices is lower than that of biopharmaceuticals. Therefore, decision makers alternatively consider improvements in convenience and ease of use when making decisions on reimbursement and pricing. The severity of diseases for which the devices are used, the availability of substitute devices, and cost are other attributes that are considered. Through a literature review, the attributes that constitute the benefits of medical devices were identified along with their corresponding levels [8–10]. The attributes were finalized after consultation with seven experts with knowledge about health technology, and seven attributes that were expected to affect the choice of medical devices regarding the decisions about their reimbursement and pricing were selected. These attributes and their levels (provided in parentheses) are severity of disease (2), availability of substitutes (2), improvement in procedure (3), improvement in clinical outcomes (2), increase in survival rate (2), improvement in quality of life (QoL; 3), and cost (4) (Table 1).

**Table 1**  
Attributes and levels used for questionnaire on preferences for medical devices.

Attributes	Levels
Severity of disease	Severe (life-threatening)/not severe
Availability of substitutes	Substitutes exist/no substitutes
Improvement in procedure	No improvement/improvement in only procedural convenience/potential improvement in clinical outcome as a result of convenience in procedure
Improvement in clinical outcome	No improvement/significant improvement (improvement in recurrence rate, complications, adverse events, etc.)
Increase in survival	No increase/significant increase
Improvement in QoL	No improvement/intermediate improvement/perfect improvement
Cost (1000 KRW)	500/2,000/5,000/10,000

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