

SHORT COMMUNICATION

HOW GREAT IS WILLINGNESS TO PAY FOR RECOVERY FROM SEQUELAE AFTER SEVERE TRAUMATIC BRAIN INJURY IN JAPAN?

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Objective: To evaluate the burden on families with a family member suffering traumatic brain injury sequelae in Japan.

Design: Cross-sectional study.

Methods: Family members' burden from the sequelae of traumatic brain injury was estimated by use of willingness-to-pay models and the contingent valuation method. A national survey among 1707 members of the Japan Traumatic Brain Injury Association was conducted by postal questionnaire with open-ended questions. A total of 509 (29.8%) of the family members responded (405 men and 104 women). Mean age of patients with traumatic brain injury was 33.4 (SD 14.3) years and of responding family members 53.3 (SD 14.5) years.

Results: Willingness-to-pay for the family member's recovery from sequelae of traumatic brain injury (8,694,502 Japanese yen; 79,134 US dollars/year) was similar to that reported for a family member's survival from incurable terminal disease (8,342,953 Japanese yen; 75,934 US dollars/year).

Conclusion: The data indicate that family members perceive the burden of a family member with traumatic brain injury sequelae as similar to what would have been caused by an incurable terminal disease.

Key words: traumatic brain injury, family, contingent valuation method, willingness-to-pay, rehabilitation.

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INTRODUCTION

Traumatic brain injury (TBI) has become a hot topic in rehabilitation medicine (1). However, rehabilitation programs focusing on the various sequelae caused by TBI are not provided in many districts, and it is difficult to evaluate the burden on families due to patients with TBI. In this study, we focused on family members' burden due to the sequelae of TBI

and estimated willingness-to-pay (WTP) models using the contingent valuation method (CVM) (2) among 509 family members of patients with TBI in Japan.

METHODS

In June 2004, we conducted a nationwide postal questionnaire survey among members of the Japan Traumatic Brain Injury Association. Responses were received from 509 families (29.8% of the survey size of 1707) of patients with TBI (405 men and 104 women). Mean age of patients with TBI was 33.4 (SD 14.3) years and that of family members who answered the questionnaire was 53.3 (SD 14.5) years. Mean time after injury was 8.0 (SD 6.7) years. Of the 483 cases, 94.7% had severe TBI with coma (a Glasgow Coma Scale score of 8 or lower) at the time of injury. As a general rule, the 509 families had no relationship to our survey team. Prior to the study, all families gave informed consent to participate in the research, which had been approved by the Institute's review board in Tokyo Medical and Dental University.

To evaluate the burden on families of patients with TBI, we estimated 1-year WTP models for 2 different treatment programs: a year-long program for recovering from sequelae of TBI and a year-long program for surviving an incurable terminal disease. We administered a questionnaire that consisted of 2 different questions to the 509 families of patients with TBI. Specifically, we asked them about WTP for a program to enable recovery from sequelae of TBI and also about WTP for a program enabling survival of an incurable terminal disease. Table I shows the 2 questions that were actually used.

Willingness-to-pay (WTP) and contingent valuation method (CVM) (2, 3)

WTP can be estimated using either direct or indirect methods. Indirect or revealed preference methods of WTP infer valuation from actual decisions individuals make. One of the most commonly used direct techniques for eliciting WTP is contingent valuation (CV). The CV method (CVM) uses survey questions to elicit people's preference for public goods by finding out what they would be willing to pay for specified improvements in them. The method is thus aimed at eliciting their WTP in dollars. It circumvents the absence of markets for public goods by presenting consumers with hypothetical markets that provide an opportunity to buy the goods in question. The hypothetical market may be modelled after either a private goods market or a political market. Because the elicited WTP values are contingent upon the particular hypothetical market to the respondent, this approach came to be called the CVM. This approach consists of surveying a sample of respondents and directly asking them what they would be willing to pay for the goods in question. A CV question can be posed in 1 of 2 ways: open-ended or closed-ended. In an open-ended question, respondents

Table I. Questions on 2 different situations

1. For recovery from sequelae of traumatic brain injury (TBI).
An epoch-making treatment method that enables patients to recover from sequelae of TBI has been developed and it is assumed that they can completely return to the state before TBI in 1 year. However, it is assumed that you have to pay the total amount from your own money for the treatment without insurance. What is the maximum in tens of thousands of yen that you are willing to pay for the 1-year treatment of your family member with TBI? Please enter the amount in parentheses.

2. For survival from incurable terminal disease.
It is assumed that an important member of your family suffers from an incurable illness and is going to die in several years. An epoch-making treatment that can enable patients to survive the terminal disease has been developed and it is assumed that they can completely return to a state before the disease and heal over in 1 year. However, it is assumed that you have to pay the total amount out of your own money for the treatment without insurance. What is the maximum in tens of thousands of yen that you are willing to pay for the 1-year treatment of your family member's incurable terminal disease? Please enter the amount in parentheses.

are asked to state the maximum dollar amount they would be willing to pay to obtain the goods in question. In a closed-ended CV question, respondents are asked whether they would be willing to pay a specified dollar amount to obtain the goods in question.

In this study, we used open-ended questions to capture the real burden to families of patients with TBI.

Statistics

Statistical analysis was carried out with the Statistical Package for SPSS 12.0 J. The results were expressed as average, SD or percentage. For all statistical tests, a probability level of 0.05 was taken as significant.

RESULTS

The average WTP for the program for surviving an incurable terminal disease in a year was estimated to be approximately 8,342,953 Japanese yen (75,934 US dollars) per respondent. The average WTP for the program for recovering from sequelae of TBI in a year was estimated to be approximately 8,694,502 Japanese yen (79,134 US dollars) per respondent. There was no significant difference between these 2 different WTP models (paired *t*-test, two-tailed; *df* = 508, *p* = 0.575) (Table II).

DISCUSSION

Patients with TBI are not only physically impaired, but also have impairment of higher cortical functions, exhibiting cognitive dysfunction and abnormal psychosocial behaviour. Hence, both physical and cognitive rehabilitation are said to be essential for patients with TBI (4). Interest in patients with TBI became a matter of concern in Japan in the 1990s (5). However, rehabilitation programs focusing on various sequelae caused by TBI are not provided in many districts, and welfare services for cognitive disorders are scarce. To help support the need for advanced rehabilitation programs for these kinds of sequelae in Japan, it would be useful to determine how greatly family members of patients with TBI feel burdened by the various sequelae of TBI.

Table II. Comparison of willingness-to-pay (WTP) between 2 different programs in patients with traumatic brain injury (TBI)

| WTP (Japanese yen) | For recovery from sequelae of TBI <i>n</i> (%) | For survival from incurable terminal disease <i>n</i> (%) |
|-----------------------|--|---|
| 0 | 103 (20.2) | 45 (8.8) |
| <5,000,000 | 189 (37.1) | 215 (42.2) |
| 5,000,000–9,990,000 | 56 (11.0) | 78 (15.3) |
| 10,000,000–29,990,000 | 109 (21.4) | 125 (24.6) |
| 30,000,000–49,990,000 | 27 (5.3) | 24 (4.7) |
| 50,000,000–99,990,000 | 17 (3.3) | 19 (3.7) |
| >100,000,000 | 8 (1.6) | 3 (0.6) |
| Total | 509 (100) | 509 (100) |
| Mean | 8,694,502 Japanese yen (79,134 US dollars) | 8,342,953 Japanese yen* (75,934 US dollars) |

*Not significant difference (paired *t*-test, two-tailed; *df* = 508, *p* = 0.575).

Mean annual income in Japan (6); 4,478,000 Japanese yen (40,772 US dollars).

The WTP approach is a benefit valuation method that captures both tangible and intangible benefits and is in accordance with valuation concepts used in economics. We report the results of a study in which we used the CVM to value intangible suffering against recovery from sequelae of TBI.

WTP for recovery from sequelae of TBI (8,694,502 Japanese yen; 79,134 US dollars) was not far removed from that of survival from incurable terminal disease (8,342,953 Japanese yen; 75,934 US dollars). This result indicates that family members feel as great a burden from sequelae of TBI as from a terminal disease. This WTP for recovery from sequelae of TBI (216.8 US dollars/day) is more than 3 times that for the removal of physical pain resulting from permanently disabling occupational injuries in Taiwan. The maximum WTP was 65.1 US dollars/day in that study (7). In another study (8), median WTP to avoid the average mother's and child's colds are 37 US dollars and 57 US dollars, respectively, a finding similar to this study, in that family members feel a burden due to the problems of patients.

Although the amount that families can actually pay has limitations, this CVM result remarkably indicates the considerable suffering and torment endured by family members of patients with TBI. The Japanese government and social welfare agencies must plan valid medical and social services for the treatment of patients with TBI and assist families both financially and in matters of quality of life.

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