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# Beneficiaries' Willingness to Pay for Resuscitation Provided by Ambulance Attendants: A Survey Using the Contingent Valuation Approach

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## Abstract

**Background:** Japanese emergency medical services (EMS) can be used by anyone for free. Recently, EMS usage has increased; the increased costs and the prolonged time for ambulance transport have become recent social problems. **Objective:** We surveyed the willingness to pay (WTP) for resuscitation provided by EMS. **Methods:** In November 2011, men and women (3160) aged 20 - 59 years were asked to assume that they were experiencing a cardiopulmonary arrest (CPA), and their WTP for EMS services was assessed in the following three situations: Case A, ambulance transport alone; Case B, chest compression in addition to ambulance transport; and Case C, artificial ventilation through chest compression and intratracheal intubation, in addition to ambulance transport. We calculated the mean WTP for each case. **Results:** The WTP for Case A, B, and C were ¥6,696 ($65.0), ¥16,081 ($156.1), and ¥27,505 ($267.0), respectively. The WTP for Case B was significantly higher in respondents aged 40 - 59 years compared to those aged 20 - 39 years. The WTP for case B and C were significantly higher in males compared to females. WTP was significantly lower in students than it was in private employees. Although women's intention to pay was higher than that of men, their WTP was lower than that of men. Public employees' and students' intention to pay was significantly lower than that of private employees. **Conclusions:** Our study provides information about the optimal fee for EMS, which will be useful for discussions on the feasibility of introducing a fee for EMS in Japan.

## Keywords

Emergency Medical Services, Willingness to Pay, Chest Compression,

Tracheal Intubation, Resuscitation

## 1. Introduction

The number of dispatched ambulances in Japan has been increasing with every consecutive year. In 2016, there were 5,980,000 requests for an ambulance throughout Japan, which means that an ambulance was dispatched once every 5.3 seconds [1]. Each year, more than one hundred thousand patients with cardio pulmonary arrest (CPA) are transported to an emergency hospital in an ambulance [2]. There are three crews members, with at least one emergency life-saving technician, in an ambulance. Emergency life-saving technicians are specially educated and trained to provide an advanced level of emergency care [3] [4] [5]. Therefore, patients can be transported to a hospital while they receive primary care from the ambulance attendants, such as resuscitation maneuvers like artificial ventilation through chest compression and intratracheal intubation [6] [7] [8].

Although, the Japanese emergency medical services (EMS) are available, as a public service, for a person who requires ambulance transport to a medical institution urgently, approximately half of the patients who were actually transported to a hospital by ambulance had mild only symptoms [9]. Further, there has been an increase in the number of the cases in which a person with mild symptoms was transported to the hospital in an ambulance, especially in the metropolitan area of Japan. Additionally, some individuals called for an ambulance because they had no other means of transportation [10]. Consequently, the time taken to arrive at the hospital has increased with each consecutive year, which has become a serious social problem.

Irrespective of the severity of symptoms, a person can take advantage of the ambulance service, without any charge, by calling 119, since the EMS provided by the fire department are run by each of the cities, towns, and villages, and the operating costs are supported by taxes and national government subsidies. However, it is becoming difficult for many local governments such as local cities, towns, and villages to secure adequate revenue owing to the decrease in tax revenue due to the increasing elderly population, decreased working-age population, and stagnant economy. Currently, the total population of Japan is declining, while it is estimated that the elderly population will increase until 2047 [11], with a concomitant increase in the number of users of EMS [12].

Therefore, people seem to be aware that they may have to pay for the use of ambulances in the future. The cost of operating the EMS will become a serious concern in the near future. Based on the current situation, the Ministry of Finance Japan and the Fire and Disaster Management Agency are aware of the necessity to examine the feasibility of introducing a fee for EMS [13]. However, only a few studies have examined users' intention to pay and willingness to pay

(WTP) for EMS [14] [15] [16]. Therefore, more information is required so that the feasibility of introducing a fee for EMS can be discussed. To this end, the present study examined the WTP for EMS, including ambulance transport and resuscitation maneuvers, to provide basic information for discussions on introducing a fee for EMS in Japan.

## 2. Methods

### 2.1. Subjects and Survey Method

We conducted an Internet panel survey through a company in November 2011. All respondents were registered as panel members with the company. First, to recruit the respondents for the present study, the survey company created a list by random sampling from all registers. Next, an email asking whether they were interested in participating in our survey was sent to all individuals on this list. The registration was closed when the number of respondents in each group reached the target sample size. Then, an Internet-based questionnaire using the contingent valuation approach (CVA) was filled by persons aged 20 - 59 years who were registered as panel members with the company. The respondents completed and transmitted their responses via mail. Inclusion and Exclusion criteria are shown in Table 1.

### 2.2. Contents of the Survey

The subjects were asked about their age, sex, household structure, occupation, and their history of attending a cardiopulmonary resuscitation (CPR) training course [how to perform chest compressions, how to use automated external defibrillator (AED), and how to perform artificial ventilation]. Furthermore, they were asked about the WTP in the three cases shown in Table 2, "assuming that they had a cardiopulmonary arrest (CPA)".

### 2.3. Calculation of WTP

The exchange rate of the yen to US dollar in this study was, 103.0 JPY (¥) = 1.00 USD (as on September 2, 2016). Numbers with upper and lower limits of 0.5% of WTP values in all 3 cases were excluded from the calculation. The respondents who entered ¥0 into all the fields for Cases A, B, and C were not included in the calculation of the WTP, since it was judged that they had no intention to pay for the EMS. The mean WTP for each case was calculated according to sex, age category (20s - 30s and 40s - 50s), occupation, and history of attending a CPR training course.

**Table 1.** Inclusion and exclusion criteria.

| | |
|---|---|
| Inclusion criteria | ✓ Men and women aged 20 - 59 years old who were registered with the Internet panel survey company. |
| Exclusion criteria | ✓ Medical workers such as physicians, nurses, and ambulance attendants.<br>✓ Respondents with unknown occupation. |

**Table 2.** Questionnaire.

| | |
|---|---|
| Question | Currently the costs necessary for ambulance transport and life support that are provided by the emergency services are not demanded from the user. Please specify the amount that you would pay for each case if you had to pay these costs. Please enter "0" if it is unlikely that you would pay for the costs. |
| Case A | Please assume that you had CPA[a] suddenly. Immediately, you would be transported to a hospital via an ambulance with ambulance attendants. However, no critical care would be provided in the ambulance and only ambulance transport to a hospital would be conducted. |
| Case B | Generally, a patient with CPA is more likely to die within several minutes when no procedure is provided. However, it has been reported that the survival rate is improved when a chest compression is provided. In Case B, chest compression as critical care would be provided by ambulance attendants in the ambulance during ambulance transport. (ambulance transport and chest compression) |
| Case C | On the other hand, as critical for the care for some patients with CPA, an air passage may be secured by inserting a tube into the airway directly, in combination with mechanical ventilation to deliver oxygen artificially. This procedure may improve the survival rate to some extent, although it has been reported that the rate may not be changed by the procedure, and it remains controversial. In Case C, ambulance attendants would provide critical care by mechanical ventilation, by using devices in addition to chest compression. (ambulance transport and mechanical ventilation through chest compression and intratracheal intubation) |

[a]CPA: Cardiopulmonary arrest.

### 2.4. Statistical Analysis

Statistical analyses were conducted to examine the differences in WTP using a t-test or Welch's t-test as appropriate for age category, sex, and experience of attending a CPR training course. Differences according to occupation were also analyzed. For the difference of the means among the occupations, we conducted the Kruskal-Wallis test followed by the Steel's test for multiple comparisons, using the data of private employees as a control.

A logistic regression analysis was carried out to investigate the tendency of WTP for the use of EMS. The intention of presence or absence to pay for using EMS was the dependent variable. The independent variables included sex, age, occupation, and experience of a CPR training course. People who answered ¥0 for all three cases were classified as those who did not intend to pay for the use of EMS and those who responded to any one of the three cases were classified as those who intended to pay. JMP® version 11.2 (SAS Institute Inc., Cary, NC, USA) was used for the analyses. The level of significance was set at $P < 0.05$.

## 3. Results

### 3.1. Response Rate

The response rate for the current internet survey was 32.8%; responses were received from 3160 people. Of those, 352 medical workers, such as physicians, nurses, and ambulance attendants, were excluded according to the exclusion

criteria. The data of 28 subjects at the extreme top or bottom 0.5%, and 55 subjects whose occupation was unknown, were also excluded. Finally, the responses of 2725 subjects were included in the present analysis.

### 3.2. Basic Characteristics of Subjects

Table 3 shows the basic characteristics of the 2725 subjects, according to age category, sex, occupation, and history of attending a CPR training course. The number of respondents who entered ¥0 into all the fields of the WTP was 1246 (45.7%).

**Table 3.** Characteristics of the study group.

| Category | Classification | No. of Respondents | % |
|---|---|---|---|
| Age category | 20 - 39 years old | 1289 | 47.3 |
| | 40 - 59 years old | 1436 | 52.7 |
| Sex | Male | 1346 | 49.4 |
| | Female | 1379 | 50.6 |
| Household structure | Live alone | 444 | 16.3 |
| | Live with spouse | 492 | 18.1 |
| | Live with spouse and children | 908 | 33.3 |
| | Live with parents | 263 | 9.7 |
| | Live with parents, brothers and sisters | 215 | 7.9 |
| | Live with parents, spouse and children | 172 | 6.3 |
| | Live with parents and children | 98 | 3.6 |
| | Other | 133 | 4.9 |
| Occupation | Private employee | 1250 | 45.9 |
| | Public employee | 202 | 7.4 |
| | Technical specialist | 16 | 0.6 |
| | Self-employed people | 175 | 6.4 |
| | Free-lancer | 76 | 2.8 |
| | Part-time worker | 232 | 8.5 |
| | Student | 89 | 3.3 |
| | Housewife/Housekeeping husband | 539 | 19.8 |
| | Unemployed | 146 | 5.4 |
| Experience of attending CPR[a] training course | No | 1551 | 56.9 |
| | Yes | 1174 | 43.1 |
| Intention to pay for the EMS | No | 1246 | 45.7 |
| | Yes | 1479 | 54.3 |

[a]CPR: Cardiopulmonary resuscitation.

### 3.3. Distribution of WTP

Figure 1 shows the percentages of WTP for the three cases. The number of respondents who answered ¥0 was the largest in Case A, followed by Case B, and the smallest was in Case C. Conversely, the percentage of the respondents who answered ¥10,000 ($97.1) or more increased from A to C.

### 3.4. WTP According to Various Groups

Table 4 shows the mean WTP of the 1479 respondents who indicated the intention to pay for resuscitation, according to age category, sex, occupation, and history of attending a CPR training course. The WTP increased from A to B. A significant difference based on sex was observed in Case B and C, and in Case B

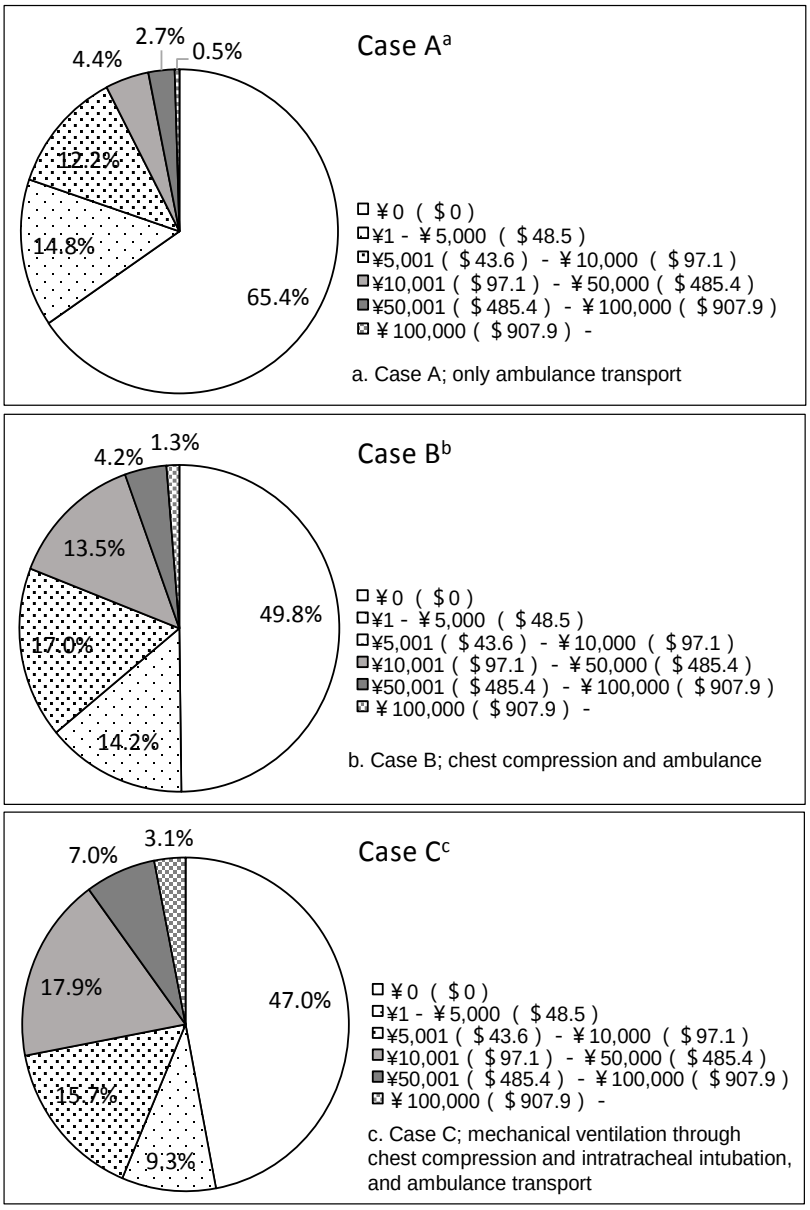


Figure 1. Distribution of WTP.

**Table 4.** WTP of the respondents who indicated their intention to pay for EMS.

| Category | Classification | WTP | | | | | |
|---|---|---|---|---|---|---|---|
| | | Case A[a] | | Case B[b] | | Case C[c] | |
| | | JPY | (USD[d]) | JPY | (USD) | JPY | (USD) |
| Age category | 20 - 39 years old | 6853 | (66.5) | 13,692 | (132.9) | 26,032 | (252.7) |
| | 40 - 59 years old | 8733 | (84.8) | 19,719 | (191.4)* | 31,009 | (301.1) |
| Sex | Male | 9043 | (87.8) | 20,160 | (195.7) | 32,920 | (319.6) |
| | Female | 6672 | (64.8) | 13,655 | (132.6)† | 24,491 | (237.8)† |
| Occupation | Private employee | 9954 | (96.6) | 17,370 | (168.6) | 28,582 | (277.5) |
| | Public employee | 6032 | (58.6) | 11,916 | (115.7) | 20,111 | (195.3) |
| | Technical specialist | 2313 | (22.5) | 9,751 | (94.7) | 16,126 | (156.6) |
| | Self-employed people | 6216 | (60.4) | 19,119 | (185.6) | 41,569 | (403.6) |
| | Free-lancer | 6092 | (59.1) | 18,895 | (183.4) | 23,263 | (225.9) |
| | Part-time worker | 5834 | (56.6) | 22,065 | (214.2) | 33,555 | (325.8) |
| | Student | 1921 | (18.7)‡ | 5713 | (55.5)‡ | 12,697 | (123.3)‡ |
| | Housewife/Housekeeping husband | 6176 | (60.0) | 15,647 | (151.9) | 27,132 | (263.4) |
| | Unemployed | 8706 | (84.5) | 19,500 | (189.3) | 37,360 | (362.7) |
| Experience of attending CPR training course | No | 7201 | (69.9) | 16,023 | (155.6) | 27,358 | (265.6) |
| | Yes | 8692 | (84.4) | 17,985 | (174.6) | 30,367 | (294.8) |
| Mean | | 6696 | (65.0) | 16,081 | (156.1) | 27,505 | (267.0) |

[a]Case A: only ambulance transport. [b]Case B: chest compression and ambulance transport. [c]Case C: mechanical ventilation through chest compression and intratracheal intubation, and ambulance transport. [d]US dollar to Japanese yen convert rate; 1 USD = 103.0 JPY as of September 2, 2016. *, †, ‡ indicate $P < 0.05$ (*: vs 20 -39 years old, †: vs Male, ‡: vs Private employee).

according to age category. According to occupation, the WTP was significantly lower in students as compared to that in private employees, in all cases.

### 3.5. Users' Intention to Pay for the Use of Ambulance and Attributes

Table 5 shows the result of intention to pay. Students were least likely to express WTP in all the three groups. As respondents' age increased, the intention to pay increased; the odds ratio for men, public employees, and students were low.

## 4. Discussion

Our study indicated that more than half of the respondents expressed an intention to pay for EMS. The total sum of WTP increased when it was indicated in the survey that resuscitation was needed in addition to ambulance transport. The amount of WTP for each case was significantly different between men and women. Women's intention to pay was higher, while their payment amount for the WTP tended to be lower than that of men. This difference may be because the number of people involved in paid employment is generally smaller in women than that in men [17]. Additionally, there is a difference in the average yearly income of men and women [18]. Consequently, such sex differences in WTP may be revealed. Our results also showed that public employees and

**Table 5.** A logistic regression with the presence or absence of the intention to pay for critical care and with age, sex, occupation, and experience of attending a CPR training course as independent variables.

| Independent variable | CaseA[a] | | | CaseB[b] | | | CaseC[c] | | |
|---|---|---|---|---|---|---|---|---|---|
| | OR[d] | (95% CI[e]) | *P* | OR | (95% CI) | *P* | OR | (95% CI) | *P* |
| Age | 1.008 | (1.000 - 1.017) | 0.043 | 1.009 | (1.001 - 1.017) | 0.026 | 1.008 | (1.001 - 1.016) | 0.034 |
| Sex | | | | | | | | | |
| Female | | reference | | | reference | | | reference | |
| Male | 0.998 | (0.851 - 1.170) | 0.978 | 0.838 | (0.721 - 0.975) | 0.022 | 0.807 | (0.693 - 0.939) | 0.006 |
| Occupation | | | | | | | | | |
| Private employee | | reference | | | reference | | | reference | |
| Public employee | 0.866 | (0.626 - 1.189) | 0.376 | 0.712 | (0.525 - 0.965) | 0.028 | 0.700 | (0.516 - 0.948) | 0.021 |
| Technical specialist | 0.787 | (0.246 - 2.181) | 0.655 | 0.902 | (0.329 - 2.472) | 0.838 | 0.815 | (0.297 - 2.235) | 0.685 |
| Self-employed people | 1.122 | (0.806 - 1.554) | 0.492 | 1.086 | (0.787 - 1.501) | 0.616 | 1.101 | (0.797 - 1.527) | 0.562 |
| Free-lancer | 0.666 | (0.389 - 1.094) | 0.114 | 0.827 | (0.517 - 1.318) | 0.425 | 0.790 | (0.495 - 1.260) | 0.321 |
| Part-time worker | 0.744 | (0.545 - 1.006) | 0.055 | 0.772 | (0.582 - 1.023) | 0.072 | 0.783 | (0.591 - 1.038) | 0.089 |
| Student | 0.232 | (0.106 - 0.449) | <0.01 | 0.486 | (0.297 - 0.778) | 0.002 | 0.553 | (0.345 - 0.874) | 0.011 |
| Housewife/ Housekeeping husband | 1.110 | (0.899 - 1.368) | 0.332 | 0.966 | (0.788 - 1.185) | 0.741 | 0.972 | (0.792 - 1.194) | 0.789 |
| Unemployed | 0.683 | (0.462 - 0.992) | 0.045 | 0.863 | (0.611 - 1.219) | 0.404 | 0.869 | (0.616 - 1.229) | 0.427 |
| Experience of attending CPR[f] training course | | | | | | | | | |
| No | | reference | | | reference | | | reference | |
| Yes | 0.962 | (0.815 - 1.134) | 0.642 | 1.009 | (0.863 - 1.181) | 0.908 | 1.045 | (0.893 - 1.222) | 0.587 |

[a]Case A: only ambulance transport. [b]Case B: chest compression and ambulance transport. [c]Case C: mechanical ventilation through chest compression and intratracheal intubation, and ambulance transport. [d]odds ratio. [e]Confidence interval. [f]Cardiopulmonary resuscitation.

students were less likely to express the intention to pay. It is interesting that public employees' intention to pay for EMS was lower than that of private employees. These results may be derived from public employees' awareness that the services should naturally be funded by public money, because EMS staff are also public employees.

Only a few studies have reported the percentage of intention to pay for EMS using questionnaires in Japan. A survey conducted in a metropolitan area showed that 63% of the respondents thought that the user of the ambulance should pay for EMS use, at least in part [14]. Another survey on patients who had undergone an examination in the emergency unit of a hospital reported that 73% of the respondents agreed that patients should be charged for an ambulance [15]. Compared to these reports, the percentage of respondents who expressed the intention to pay was lower in our study. This may be because the previous study [15] was conducted immediately after their use of ambulance transport and emergency care. Consequently, the percentage of the respondents who answered in the affirmative, regardless of the fee for the ambulance, might have been higher.

In a survey conducted in metropolitan areas in Japan, the most common WTP for the use of EMS was ¥3000 ($29.1) - ¥5000 ($48.5) [14]. Similarly, in a survey

conducted in patients who were transported to an emergency hospital, the most common response was ¥10,000 ($97.1) [15]. The results of our survey [WTP of ¥27,505 ($267.0)] might be higher than that observed in previous surveys, because the assumed situation in our study was CPA. The respondents in our study were asked about the payable amount for an ambulance if they had a CPA, which is one of the most critical cases among the emergency transports. However, compared to the data from other countries, a total of ¥27,505 ($267.0) was not considered a large amount. In some countries outside Japan, the system of charging for ambulance transport has been adopted, and there is a fee structure to distinguish an emergency from a non-emergency; the fee structure is different according to the medical skill of the dispatched crew, and there is an additional fee according to the distance that the ambulance has traveled [19] [20]. In the EMS in New York, when an ambulance is dispatched for a person who requires emergency care for a severe condition, at least $1000 (¥103,000) is charged [21].

It should be noted that various factors (such as the psychology or the social situation of the person calling for an ambulance) may influence their decision to call for an ambulance. Another survey (of the WTP by the contingent valuation approach in the situation of a myocardial infarction) revealed that the number of patients who used the EMS did not decrease even if the fee for the ambulance was high [16]. However, according to the original function of the EMS, it is desirable that the costs should be paid using public money for patients requiring the ambulance urgently due to a serious illness.

There are some limitations in this study. First, the study subjects were limited to persons aged 20 - 59 years, which meant that the thoughts of persons younger than 20 years and those aged 60 years or older were not included. Second, this study was a survey of the WTP, in which CPA was assumed to be an extremely serious condition. The results are likely to be different from those of the WTP for ambulance transport for patients with a disease condition that is not serious. Third, this survey was conducted as an Internet questionnaire. This may result in a selection bias of subjects. However, web surveys have recently become a common method of conducting research [22] [23].

## 5. Conclusion

We investigated the WTP for EMS, including ambulance transport and resuscitation, by asking respondents to assume that they were experiencing CPA. The intention to pay for artificial ventilation through chest compression and intratracheal intubation (in addition to ambulance transport) was expressed by 54.3% of the respondents. Our study provides information about the fee that people are ready to pay for EMS in Japan. This information will be useful for discussions on the feasibility of introducing a fee for EMS in Japan.

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