

Healthcare Costs after Cardiac Arrest in Taiwan, 2006-2012

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Abstract

ABSTRACT

INTRODUCTION

The trend of survival rate of cardiac arrest patients is improving following investment in pre-hospital and hospital settings (1-4). The issue of unlimited resuscitation efforts without evaluation of the appropriateness results in financial burden on healthcare system (5,6). Not only costs till hospital discharge after cardiac arrest, but the annual healthcare costs of survivors should be considered under the assumption that survivors enjoy a good quality of life (7). There were studies reporting the healthcare costs of cardiac arrest survival using different database (8-11). Limited data was available in such a universal health care coverage healthcare system.

OBJECTIVES

This study tempt to use National Health Insurance Research Database (NHIRD) of Taiwan to evaluate the 1-year survival rate and the annual healthcare costs of survivors after cardiac arrest as well as to identify the associated factors.

STUDY PROTOCOLS

The description of the dataset used in this study

The health insurance data in 2005 provided by the National Health Insurance Agency, with "identity number", "birthday", "gender" as the reference. People, age 0-120 with birth date between January 1, 2010 and December 31, 2010, were enrolled. Total 23,251,700 insured persons were sampled and were assigned serial numbers. A random number generator (Oracle's internal random number generator, Oracle DBMS_RANDOM suite) generated 2.1 million random numbers between 1 and 23,251,700. After excluding the recurring random numbers, Duplicates identity numbers were also removed. A total of 2 million random numbers were obtained. A sample of 2 million people will be connected in series with the health insurance database to retrieve the National Health Insurance Research Database (NHIRD) from 1996 to 2010. This 2 million people sample was updated of medical information every year in the future. In order to analyze the representation of dataset, statistical data on age, sex, number of births per year, and average insured amount of 2 million samples were compared with the data of total population published by the Ministry of the Interior, Taiwan. The distribution of the percentage of all age groups of dataset was matched with total population. The number of births per year, and average insured amount between dataset and total population showed no significant difference ($p < 0.05$).

This study yield dataset trace all participants from 2006 till 2012. The reports of emergency department, intensive care unit, ward and death registration were obtained.

Steps:

1. Applying for the dataset. Complete the application process at <https://dep.mohw.gov.tw/DOS/lp-2501-113.html>, including "Usage Information Request Form" and details of requirement for the reason or purpose.
2. Study analyst signed the "Confidentiality agreements", "Declaration of Use".
3. Define the study population.

Selecting patients using ICD-9 code 427.5 combined with a medical procedure code of 47029C (cardiopulmonary resuscitation) from emergency department (ED) reports. Patients younger than 18 years old and uncertain cases not admitted after the index event for whom only outpatient records were available were excluded.

4. Divided study population into non-survival and survival cohorts.

The non-survival cohort comprised patients without medical records in the NHIRD after the day of the ED visit or who were discharged from inpatient care. The retrieved dates of death were verified using the death register.

The survival cohort comprised patients not included in the non-survival cohort and those with medical records for 1 year of follow-up available in the NHIRD.

5. Define and collect variants.

Variants: socioeconomic variables: area of residence (municipalities directly under the central government vs. cities or counties), marital status (single, married, divorced, widowed), and education level (junior high school or higher vs. others). In terms of comorbidities, the following conditions included in the Charlson Comorbidity index were analyzed (16): diabetes mellitus (ICD-9 code: 250), hypertension (401–405), acute coronary syndrome (410–414), heart failure (428), cerebrovascular accident (433–437), chronic obstructive pulmonary disease (COPD) (490–496, 500–508), liver cirrhosis (571.2, 571.5), renal failure (585, 586, 588, 58001–58030), and malignant neoplasms and malignant lymphatic/hematopoietic neoplasms (140–199, 200–208). Procedures performed during resuscitation in the ED—such as cardioversion (47028C), percutaneous coronary intervention (PCI; 36.0–36.03, 36.05–36.09), intra-aortic balloon pumping (IABP; 97.44), pacemaker implant (37.8), open heart surgery including coronary artery bypass graft (CABG; 36.1–36.99), and blood transfusion (94001C, 94002C, 94013C, 94015C, 94003C)—were analyzed. The type of hospital (medical center vs. regional hospital) was included in the analysis.

6. Define study period for analysis.

Survival was followed up for 1 year, and reported as the time elapsed from the day of ED visit until the date of death according to the death register or survival at 1 year after cardiac arrest.

7. Healthcare costs calculation.

The total healthcare costs (in US dollars [\$]) of survivors during 1 year of follow up include outpatient, inpatient, and ED costs. The average exchange rate during the study period was 31.5 Taiwan New Dollars per \$1.

8. Statistical analysis.

The demographic characteristics of the survival and non-survival cohorts were compared, and

the costs of ED visits and any inpatient care were calculated. A survival curve of the study cohort during the 1-year follow-up period was generated using the Kaplan–Meier method. Linear regression was conducted to identify the associations of various factors with 1-year healthcare costs after adjusting for age and sex. The data were analyzed using SAS 9.4 (SAS Institute Inc., Cary, NC, USA). Categorical variables are presented as numbers and percentages and were compared by the chi-square test or Fisher’s exact test. Continuous variables are presented as means and standard deviations (SDs) and were compared by Student’s *t*-test. A *p*-value < 0.05 was considered to indicate significance.

CONCLUSIONS

The findings of this study may add to our knowledge of the health economics and indicate future research about healthcare of cardiac arrest survivors.

CONFLICTS OF INTERESTS

Nothing to declare.

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