# Choosing and Doing Wisely: Triage Level I Resuscitation a Possible New Field for Starting Palliative Care and Avoiding Low-Value Care-A nationwide matched-pair retrospective cohort study

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# Abstract

Background The association between palliative care and life-sustaining treatment for patients following emergency department (ED) resuscitation is unclear.

Objective To analyze ED triage level I resuscitation patients the use of palliative care and its life-sustaining treatment usage based on a national representative sample of a population of about 2.3 million.

Methods A matched-pair retrospective cohort study was conducted to examine the association between palliative care and the outcome variables using multivariate logistic regression and Kaplan–Meier survival analyses.

Participants: Between 2009 and 2013, 336 ED triage level I resuscitation patients received palliative care services (palliative care group) in a universal health insurance scheme. Retrospective cohort control selection was matched using a 1:4 ratio for confounding factors with those who received usual care (usual care group).

Main outcomes Outcome variables include numbers of emergency and outpatient department visits, hospitalization days, total medical expenses, life-sustaining treatment utilization, and days of survival after the ED triage level I resuscitation index date.

Results The mean survival post-ED triage level I resuscitation days was less than one year, that, fit the end-of-life definition. Palliative care services provided to 15% of ED triage level I resuscitation patients. The palliative care group was more consistently and significantly associated with less life-sustaining treatment use than the usual care group.

Conclusion Palliative care decisions correlate with the reduction of life-sustaining treatments for patients receiving triage level I resuscitation. Furthermore, triage level □ resuscitation status may present a possible new field for starting palliative care intervention and reducing low-value care.


# Introduction

An emergency department (ED) resuscitation visit means the patient arrives in a critical time-sensitive state that requires immediate resuscitation.[1, 2] The fundamental task of critical care is to initiate timely stabilization, diagnosis, and therapeutic interventions to save a patient's life and improve their prognosis. The constant updating of evidence-based resuscitation, advanced life support, and rapid development of organ replacement life-sustaining treatments have led to good progress in resuscitation practices. However, the inevitability of end-of-life situations leads to complex situations and difficulties in decision making.[3] Triage level I resuscitation accounts for about 1.9 ~ 5% of all ED visits.[4–7] Asian studies showed the overall survival rates upon hospital discharge have ranged from 0.5–8.5%.[8, 9] The post-cardiac arrest resuscitation mean one-year survival rate was shown to be about 5%.[10] However, survival is usually complicated with neurological impairment.[9] If the patient presents with comorbidity resulting in poor prognosis, it could lead to long term disability or even an end-of-life state for frail patients.[11–14]

To avoid low-value care, early identification of the end-of-life state in emergency care is a key priority.[15] In resuscitation, research has shown that medical service providers play a significant role in medical decision making.[16–18] The Choosing Wisely campaign of the American College of Emergency Physicians suggested that decision-makers, ‘Do not delay engaging available palliative and hospice care services in the ED for patients likely to benefit.’[19] The second set of goals of the Choosing Wisely campaign also aims to promote conversations between providers and patients to reach shared-decision making.[20] However, triage level I resuscitation patients or family members frequently miss opportunities for palliative care.[13]

Taiwan Ministry of Health and Welfare (MoHW) launched the Patient Autonomy Act in January 2019. According to the Patient Autonomy Act, any adult person or surrogate(s) can access advance care planning counseling and make the advance directives to refuse life-sustaining treatment for a terminal disease, irreversible comatose condition, vegetative state, advanced dementia, and other intractable illnesses or incurable diseases.[21] The medical decisions for advance medical planning

involve clinical scenarios, the patient's past medical experiences with medical decision making, past experiences of dying and death,[22] family and social contextual factors.[23] Evidence-based post-resuscitation data for a family meeting and discussion is still lacking. Therefore, this study compares the medical utilization, expenses, and life-sustaining treatment usage of resuscitation patients with palliative care with those of usual care patients. We hope our research data provides evidence for emergency care staff to extend palliative care capacity to meet patients' needs and reduce low-value care.

# Methods

### Setting

Taiwan opened the first hospital-based hospice ward in 1990. The Hospice Palliative Care Act was implemented in 2000. Since then the universal National Health Insurance has provided hospice and palliative care. The care setting includes inpatient hospice wards, home and community hospice care, and hospital admission hospice shared care categories. For disease category consideration, the palliative services were initially designed for cancer and motor neuron disease and then expanded to include eight types of noncancer patients in 2009.[24] Starting from 2006, National Health Insurance (NHI) enrolled persons to record palliative and life-sustaining treatment willingness consent on their NHI IC cards. About 15% of people signed the document expressing their palliative care wishes as of 2015.[25] In 2015, approximately 37,000 terminal-illness patients received different kinds of palliative care services.[25]

### Study design and data source

This nationwide retrospective cohort study with matched-pair controls using Taiwan's National Health Insurance Research Database (NHIRD). NHIRD includes all the inpatient and ambulatory care claim data of a sample of about one million national representative claims from September 1, 2009, to December 31, 2013, provided by the single-payer.[26, 27] The claim data included the date of ED; disease diagnoses based on the International Classification of Disease, Ninth Revision, Clinical Modification codes; laboratory workup; and medication. NHIRD was validated for accuracy in diagnostic coding,[28] comorbidities,[29] severity,[30] and end-of-life state healthcare resource utilization.[31] We included all patients with ED visits triage level I resuscitation between September 1, 2009, and December 31, 2013. Patients who used palliative services before the ED resuscitation date were excluded.

### Ethics

Medical utilization claims data used in this study were from Taiwan's NHIRD, which is available for research access. To protect participant privacy, the electronic database was decoded with patient identification scrambled for further academic access for research. According to the National Health Research Institutes' regulations, informed consent is not required because of the use of decoded and scrambled patient identification. Our study was approved by the Institutional Review Board of Yang-Ming University (YM-107035E). No specific funding was received.

### Identification of study cohort

The national insurance palliative care payment scheme was extended to non-cancer patients with critical illness in the year 2009. Therefore, we identified patients at hospitals receiving ED triage level I (requiring immediate resuscitation) from September 1, 2009, and December 31, 2013. Post-triage level I resuscitation patients were our target study population. The palliative care group taken as our study sample includes patients encountering post-triage level I resuscitation with critical illness followed by palliative care services. Those who received any palliative services before ED triage level I resuscitation were excluded. The date the patient was exposed to their first palliative service was taken as the index date. The usual care group selection was matched in a 1:4 ratio for each palliative care patient's event year, season, gender, age, and Charlson Comorbidity Index (CCI). We retrieved the utilization data of medical services of both groups after the index date and followed them until the patient died or the end of the study period. The clinical course after the index date, including disposition, medical utilization, and outcomes, was analyzed.

### Measures of variables

Outcome and control variables were chosen based on a conceptual framework for determining life-sustaining treatment.[32] Participants' demographic characteristics included gender, age, occupation, and living status. We used the CCI to identify disease characteristics one year before the index date. Outcome variables included numbers of ED and outpatient department visits, number of hospitalization days, total medical expense, life-sustaining treatments (including intensive care unit care, cardiopulmonary resuscitation, nasogastric tube use, mechanical ventilation, and hemodialysis) utilization, and days of survival after the index date. These outcomes were identified from inpatient claims by specific codes.

### Statistical methods

Baseline patient characteristics, medical utilization, and outcomes were compared among groups: (1) palliative group, and (2) usual care group. Differences in outcome variables were examined across gender, age, survival status, occupation, income and CCI. ICD-9 codes for primary diagnoses, including palliative services-related codes from inpatient and outpatient NHI claims in the year before death, were used to identify comorbidities. The Deyo-Charlson comorbidity index was calculated by these ICD-9 codes and categorized as 0, 1, or ≧2 comorbid conditions. The interval between the date of ED resuscitation visit and the date of palliative care till death or research termination was calculated. Continuous variables were compared among the different groups using t-tests, and categorical variables using the Chi-squared test. Chi-square tests and t-tests were used to measure the distribution of covariates between the groups with and without palliative care usage, and a p-value <0.005 indicated a meaningful difference. Skewed distributed continuous data were described as medians with 25th to 75th percentiles (interquartile range). To understand the difference between patients of the two groups in regard to their survival, medical expenses, and life-sustaining treatment usage, Kaplan–Meier survival analysis was used for comparison, and the log-rank test was applied to measure statistical significance.

To obtain the contribution of each predictor to the overall explanatory power of the model, we conducted further subgroup analyses for each stratum of gender, age group, income, living area, CCI and occupation of palliative service and life-sustaining treatment using the full model without the stratifying variable. We use multivariate logistic regression analysis. The dichotomous dependent variable was whether or not life-sustaining treatment was used. Predictor variables included gender, age, income, living area, and CCI. Adjusted odds ratio with 95% confidence intervals were derived from logistic regression analysis and statistical significance was set at p values less than .005 after adjustment for risk factors. All analyses were performed using Statistical Analysis Software version 9.4 (SAS Institute Inc., Cary, NC, USA).

## Results

### Baseline characteristics

During the 5-year study period, 21,494 ED triage level I resuscitation cases were selected from the NHIRD. We identified 336 subjects who received palliative services after the triage level I resuscitation date. Following the Pitman efficiency index,[33] we included retrospective control cohort selection that was matched using a 1:4 ratio for 1,344 controls (figure 1). As indicated in Figure 1, the overall percentage of patients receiving palliative care among the whole ED triage level I resuscitation population is 15%. All characteristics were balanced before cohort entry between cases and controls. There was no significant difference in sociodemographic variables such as gender, age, income, occupation, place of residence and comorbidity distribution, as seen in Table 1. This study cohort consisted of 1,680 ED triage level I resuscitation cases with a mean age of 70 years, 61.3% of whom were male. The median insured salary was US Dollar 880 per month, and more than 93% were CCI>1. During follow-up, most of the covariates remained comparable between the two groups.

### Analysis of medical expenses and life-sustaining treatment utilization

The length of survival, medical utilization, expenses, and life-sustaining treatment utilization of the palliative group and usual care group are illustrated in Table 2. Table 2 shows the palliative group died after 107.3 days on average and the usual care group died 302.2 days after the post-triage level I resuscitation date on average. The usual care group had five-fold more ED

visits, three-fold more hospitalizations, and about four-fold more ICU admissions compared with the palliative group patients. Meanwhile, the usual care group had significantly higher medical expenses, hemodialysis, cardiopulmonary resuscitation, ventilator use and total amount of life-sustaining treatment usage than the usual care group. No significant difference in nasogastric tube feeding was found among the two groups (p=0.28).

### Predictors of life-sustaining treatments use

Various clinical factors of different life-sustaining treatments usages after the index-date were examined by multivariate analysis (table 3). In nasogastric tube feeding usage, palliative group was significantly higher than usual care group; adjusted odds ratio was 2.4 (95 % CI 1.87-3.21; p<.0001); about hemodialysis usage, palliative group was significant lower than usual care group, with adjusted odds ratio of 0.38 (95 % CI 0.25-0.58; p<.0001); as shown in Table 3, palliative group had significant lower cardiopulmonary resuscitation usage compared with usual care group, with adjusted odds ratio of 0.24 (95 % CI 0.16-0.38; p<.0001); about ventilator usage, palliative group had significantly lower usage compared with usual care group, with adjusted odds ratio of 0.42 (95 % CI 0.33-0.55; p<.0001). Comparing Kaplan–Meier survival estimates of the palliative group and usual care group, the survival curve shows a significant decline in the palliative group (Log-rank test, p<0.001) (figure 2).

## Discussion

According to our study, the choice of palliative care does have a significant impact on lower duration of life with disability, medical expenses, and life-sustaining treatment. The survival days were significantly shorter in the palliative group when compared with the usual care group. For both groups, the mean number of survival days was within one year, meaning the triage level I resuscitation patients may be suitable for consideration of the initiation of end-of-life service.[34] The palliative group also had significantly less ED and outpatient department visits, hospitalizations, and ICU admissions. Moreover, medical expenses and life-sustaining treatment use was also reduced.

### Methods discussion

This study compared patients who received or without palliative care after successful ED resuscitation. The major methodology issue could be confounding by palliative service choice indication. Since 2009, Taiwan's universal signal payer scheme, palliative care coverage expanded to eight noncancer irreversible advanced stage organ-system dysfunctions.[24] Therefore Taiwan's NHI is designated as offering 'good access, comprehensive and low-cost healthcare system'[35] and high-quality palliative care services.[36] Taiwan expanded palliative care policy reimbursed full palliative care services that positively increased cancer[37] and noncancer palliative care access and utilization in Taiwan.[38] Meanwhile, the choice of palliative care designation associated with early palliative care consultation service,[39] provider reimbursement policy,[40] patients' prognostic awareness and advance directives completion,[41] family's diagnostic and prognostic awareness.[39] We do agree the choice of palliative care is the main influencer of healthcare utilization. The greater use of medical utilization and life-sustaining treatment is most likely because of the usual care group with longer survival post-resuscitation. However, to prevent vulnerable state post-resuscitation suffering, we propose that ED triage level Ⅰ resuscitation state may be a possible new field for physicians choosing and family doing wisely implementing value care.

### Results discussion

Contemporary palliative care practice and research focuses on disease-oriented (cancer and non-cancer disease)[42, 43] and setting-oriented (palliative ward, ED, intensive care unit, home-based, long-term care facility, and community-based setting) approaches.[44-47] Triage level I resuscitation is a common pathway of patients with advanced and progressive deterioration illnesses, as well as those with incurable frailty or co-existing conditions. Our study showed the average number of survival days of post-ED triage level I resuscitation is 351 days, which fits the definition of palliative care in the time dimension.[34] If the post-resuscitation state means the patient has an incurable or severely disabled state, triage level I resuscitation may be a new palliative field for further study. In order to achieve value-based care, about 30% of total health expenditures could be saved by avoiding repeated ED visits, hospitalization and ICUs stays in the last months of life.[48-50] Our study results showed

that post-resuscitation palliative decisions compatible with careful assessments of non-beneficial treatments in potential do not resuscitate patients[48] and terminal cancer patients[51] can be identified earlier to avoid low-value expenses and reduce suffering.[52] Tube feeding paradoxically higher in palliative care group, this finding also found in many Asia studies .[53, 54] In Asia culture belief, artificial nutrition is basic care for dying patients to prevent become 'hungry ghosts'.[55]

Our study does have limitations. First, palliative care participants were not randomly selected. Nonetheless, claims data from NHIRD represent the diversity of Taiwan's critical care with respect to ED size, location, academic affiliation, and the characteristics and illnesses of patients. Second, we cannot determine the actual reasons why the participants received palliative care service. Moreover, we could not measure directly the timing and number of participants who received palliative services related to life-sustaining treatment use. Third, palliative issues involve the nature of the disease, personal medical experience, family dynamics, and the sociocultural context; in this study, we did not have data representing the sociocultural factors.

## Conclusion

Palliative care decisions correlate with the reduction of life-sustaining treatments for patients receiving triage level I resuscitation. Our data provide real-world post-resuscitation data that may help clinicians and families with evidence-based counseling when facing life-sustaining treatment share decision-making. ED triage level 1 resuscitation status is a potential starting point for early palliative case finding and end-of-life counseling.

## Abbreviations

ED: emergency department; MoHW: Ministry of Health and Welfare; NHI: National Health Insurance; NHIRD: CCI: Charlson Comorbidity Index; ICU: intensive care unit; OPD: outpatient department; NGT: nasogastric tube; IABP: intraaortic balloon pumping; ECMO: extra-corporeal membrane oxygenation; CPR cardiopulmonary resuscitation; USD: US Dollar.

## Declarations

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**Authors' contributors** CY Lin study concept and design, analysis and interpretation of data, preparation of the manuscript. YC Lee supervision for the development of study concept and design, analysis and interpretation of data, preparation of the manuscript.

**Ethics approval and consent to participate** This study approved by Institutional Review Board of National Yang-Ming University-YM107035E on May, 5 2018.

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**Competing interests** The authors declare that they have no competing interests.

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# Tables

Table 1. Baseline demographics of all eligibles among the resuscitation patients with palliative care and usual care

| | Before Match | | | | | Post Match | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Palliative (n=346) | | Usual care (n=18,613) | | *P*-value | Palliative (n=336) | | Usual care (n=1,344) | | *P*-value |
| | n | (%) | n | (%) | | n | (%) | n | (%) | |
| **Sex** | | | | | | | | | | |
| Female | 136 | 39.3 | 8078 | 43.4 | 0.13 | 130 | 38.7 | 520 | 38.7 | >0.99 |
| Male | 210 | 60.7 | 10535 | 56.6 | | 206 | 61.3 | 824 | 61.3 | |
| **Age** | | | | | | | | | | |
| 18-64 | 119 | 34.4 | 8469 | 45.5 | <.0001 | 110 | 32.7 | 448 | 33.3 | 0.84 |
| ≥65 | 227 | 65.6 | 10144 | 54.5 | | 226 | 67.3 | 896 | 66.7 | |
| **Charlson Comorbidity Index** | | | | | | | | | | |
| CCI=0 | 5 | 1.4 | 5466 | 29.4 | <.0001 | 5 | 1.5 | 26 | 1.9 | 0.68 |
| CCI=1 | 14 | 4.0 | 3362 | 18.1 | | 14 | 4.2 | 68 | 5.1 | |
| CCI>1 | 327 | 94.5 | 9785 | 52.6 | | 317 | 94.3 | 1250 | 93 | |
| **Income level** | | | | | | | | | | |
| Quintile 1 | 170 | 49.1 | 13282 | 71.4 | <.0001 | 140 | 41.7 | 614 | 45.7 | 0.11 |
| Quintile 2 | 95 | 27.5 | 1646 | 8.8 | | 100 | 29.8 | 419 | 31.2 | |
| Quintile 3 | 81 | 23.4 | 3685 | 19.8 | | 96 | 28.6 | 311 | 23.1 | |
| **Occupation** | | | | | | | | | | |
| Dependents of the insured individuals | 89 | 25.7 | 4876 | 26.2 | <.0001 | 87 | 25.9 | 346 | 25.7 | 0.99 |
| Civil servants, teachers, military personnel, veterans | 26 | 7.5 | 1426 | 7.7 | | 26 | 7.7 | 106 | 7.9 | |
| Nonmanual workers and professionals | 9 | 2.6 | 1673 | 9.0 | | 8 | 2.4 | 34 | 2.5 | |
| Manual workers | 80 | 23.1 | 4902 | 26.3 | | 77 | 22.9 | 318 | 23.7 | |
| Other | 33 | 9.5 | 2052 | 11.0 | | 32 | 9.5 | 114 | 8.5 | |
| Missing | 109 | 31.5 | 3684 | 19.8 | | 106 | 31.5 | 426 | 31.7 | |
| **Urbanization** | | | | | | | | | | |
| Urban | 57 | 16.5 | 3828 | 20.6 | <.0001 | 56 | 16.7 | 218 | 16.2 | 0.07 |
| Suburban | 80 | 23.1 | 4106 | 22.1 | | 77 | 22.9 | 235 | 17.5 | |
| Rural | 100 | 28.9 | 465 | 2.5 | | 97 | 28.9 | 465 | 34.6 | |
| Missing | 109 | 31.5 | 3733 | 20.1 | | 106 | 31.5 | 426 | 31.7 | |

Table 2. Palliative care and usual care patients: survival, medical utilization and life-sustaining treatment use

| | Palliative care (n=336) | | Usual care (n=1,344) | | *p value* |
|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | |
| ED survival days | 107.3 | 127.20 | 302.2 | 406.70 | <.0001 |
| Post palliative survival days | 48.7 | 81.87 | 273.8 | 384.90 | <.0001 |
| ED visits | 0.4 | 1.11 | 2.1 | 6.12 | <.0001 |
| Hospitalization | 0.5 | 1.36 | 1.6 | 3.10 | <.0001 |
| ICU admission | 0.003 | 0.055 | 0.014 | 0.118 | 0.011 |
| OPD expense (USD) | 256.2 | 776.1 | 4477.8 | 11,980.5 | <.0001 |
| Hospitalization expense (USD) | 1,233.1 | 5,089.0 | 5,390.2 | 13,118.6 | <.0001 |
| All medical expense (USD) | 1,489.3 | 5,312.0 | 9,898.1 | 19,572.0 | <.0001 |
| Life-sustaining treatments-total | 9.0 | 21.20 | 22.2 | 62.35 | <.0001 |
| Life-sustaining treatment-NGT feeding | 4.9 | 8.89 | 4.3 | 9.98 | 0.28 |
| Life-sustaining treatment- IABP | - | - | 0.03 | 0.24 | - |
| Life-sustaining treatment- ECMO | - | - | 0.02 | 0.20 | - |
| Life-sustaining treatment-Hemodylsis | 1.9 | 12.61 | 13.5 | 56.94 | <.0001 |
| Life-sustaining treatment-CPR | 0.1 | 0.27 | 0.2 | 0.46 | <.0001 |
| Life-sustaining treatment-Ventilator | 2.1 | 6.79 | 4.1 | 14.58 | 0.0003 |

ED: emergency department; ICU: intensive care unit; OPD: outpatient department; NGT: nasogastric tube; IABP: intraaortic balloon pumping; ECMO: extra-corporeal membrane oxygenation; CPR cardiopulmonary resuscitation; USD: US Dollar; Convert USD/TWD 1:30.

Table 3. Multivariate generalized linear model analysis of life-sustaining treatment

| | Nasogastric tube feeding | | | Hemodialysis | | | Cardiopulmonary resuscitation | | | Ventilator | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | aOR (95% CI) | | p | aOR (95% CI) | | p | aOR (95% CI) | | p | aOR (95% CI) | | p |
| Intercept | - | | 0.697 | - | | 0.004 | - | | 0.000 | - | | 0.623 |
| **Palliative care** (Ref: usual care) YES | 2.4 | (1.87-3.21) | <.001 | 0.4 | (0.25-0.58) | <.001 | 0.2 | (0.16-0.38) | <.001 | 0.4 | (0.33-0.55) | <.001 |
| **Sociodemographic characteristics** | 1.0 | (0.77-1.17) | 0.633 | 0.6 | (0.46-0.79) | 0.000 | 1.2 | (0.96-1.62) | 0.096 | 1.2 | (1.01-1.51) | 0.045 |
| **Gender** (Ref=female) Male | | | | | | | | | | | | |
| **Age Group** (Ref:18-65 yrs) ≧65years old | 1.3 | (1.08-1.68) | 0.008 | 0.7 | (0.52-0.94) | 0.016 | 0.7 | (0.52-0.89) | 0.004 | 0.8 | (0.65-1.01) | 0.057 |
| **Insurance salary** (Ref: USD 730) USD 730920 | 1.3 | (0.95-1.66) | 0.110 | 1.1 | (0.76-1.64) | 0.566 | 0.8 | (0.54-1.10) | 0.152 | 1.1 | (0.85-1.48) | 0.412 |
| USD 920 | 1.0 | (0.75-1.27) | 0.877 | 1.2 | (0.85-1.72) | 0.287 | 1.1 | (0.76-1.46) | 0.752 | 1.1 | (0.84-1.41) | 0.537 |
| **Occupation** (Ref: Dependents of the insured individuals) Civil servants, teachers, military personnel, and veterans | 1.2 | (0.80-1.93) | 0.344 | 1.6 | (0.96-2.83) | 0.072 | 1.4 | (0.80-2.28) | 0.255 | 1.2 | (0.81-1.92) | 0.311 |
| Nonmanual workers and professionals | 1.4 | (0.72-2.77) | 0.313 | 0.8 | (0.31-2.02) | 0.627 | 0.6 | (0.24-1.35) | 0.200 | 0.7 | (0.35-1.31) | 0.248 |
| Manual workers | 1.1 | (0.78-1.45) | 0.704 | 1.2 | (0.81-1.86) | 0.330 | 0.8 | (0.571.23) | 0.360 | 1.0 | (0.72-1.34) | 0.908 |
| Other | 1.1 | (0.74-1.77) | 0.550 | 1.2 | (0.70-2.17) | 0.474 | 1.2 | (0.69-1.97) | 0.577 | 1.2 | (0.77-1.81) | 0.454 |
| Missing | 0.9 | (0.65-1.26) | 0.558 | 0.7 | (0.43-1.02) | 0.063 | 0.8 | (0.53-1.19) | 0.264 | 0.8 | (0.54-1.04) | 0.087 |
| **Urbanization** (Ref: Urban) Suburban | 0.9 | (0.64-1.27) | 0.560 | 0.7 | (0.48-1.13) | 0.156 | 0.8 | (0.52-1.20) | 0.274 | 0.8 | (0.57-1.11) | 0.178 |
| Rural | 1.1 | (0.78-1.46) | 0.697 | 0.6 | (0.42-0.94) | 0.022 | 1.0 | (0.66-1.39) | 0.808 | 1.0 | (0.73-1.35) | 0.961 |
| **Disease characteristics** | 1.2 | (0.73-1.85) | 0.532 | <0.001 | (0.01-999.99) | 0.977 | 1.2 | (0.70-2.08) | 0.491 | 1.8 | (1.11-2.80) | 0.017 |
| **Charlson Comorbidity Index** (Ref: CCI1) CCI=1 | | | | | | | | | | | | |
| CCI=0 | 0.8 | (0.36-1.58) | 0.456 | 0.2 | (0.053-0.55) | 0.003 | 1.7 | (0.77-3.76) | 0.194 | 1.4 | (0.67-2.98) | 0.360 |

aOR: adjusted odds ratio; P: p value; CI: confidence interval; USD: US dollar.

# Figures

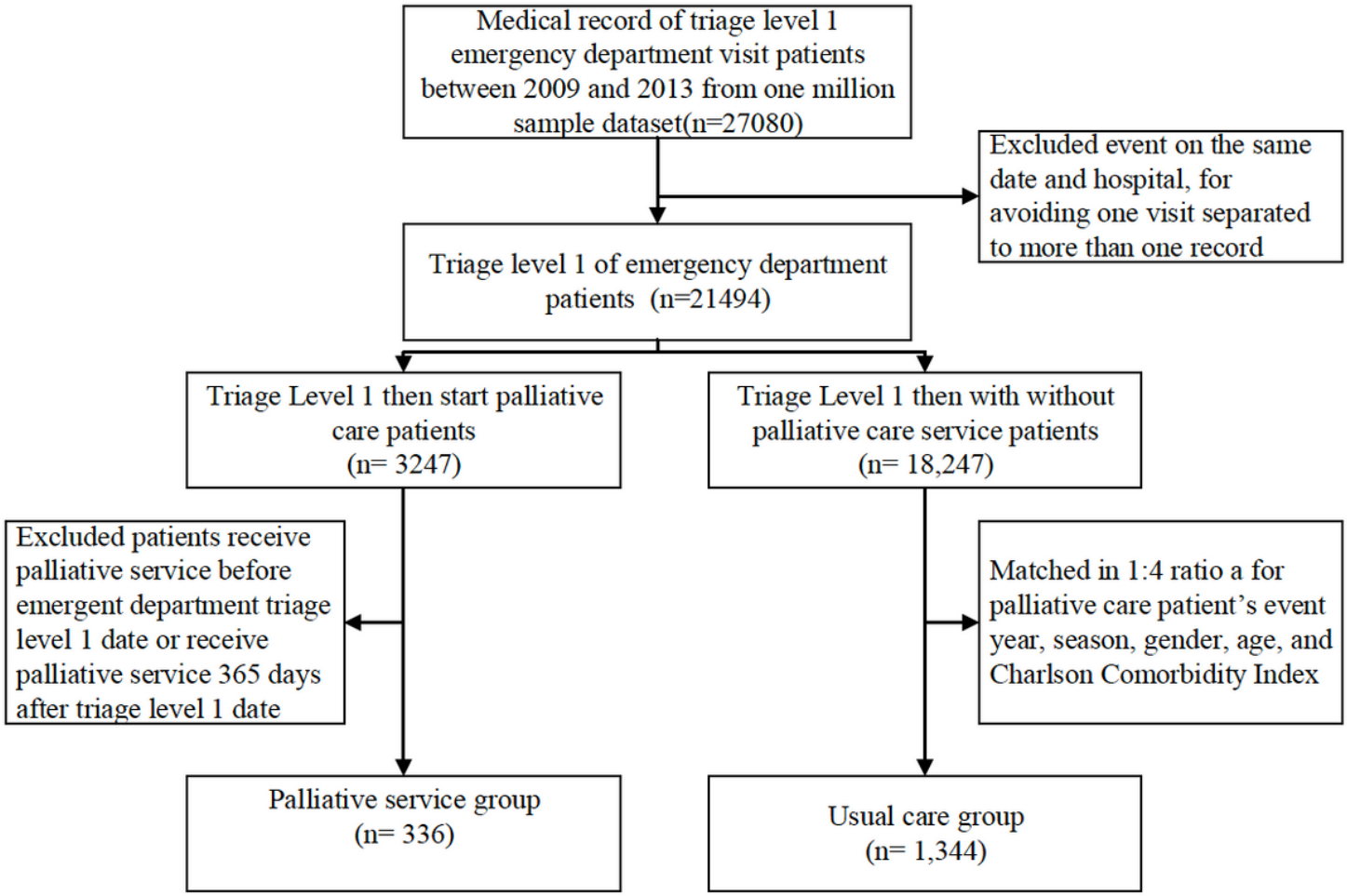


**Figure 1**

Patient flow

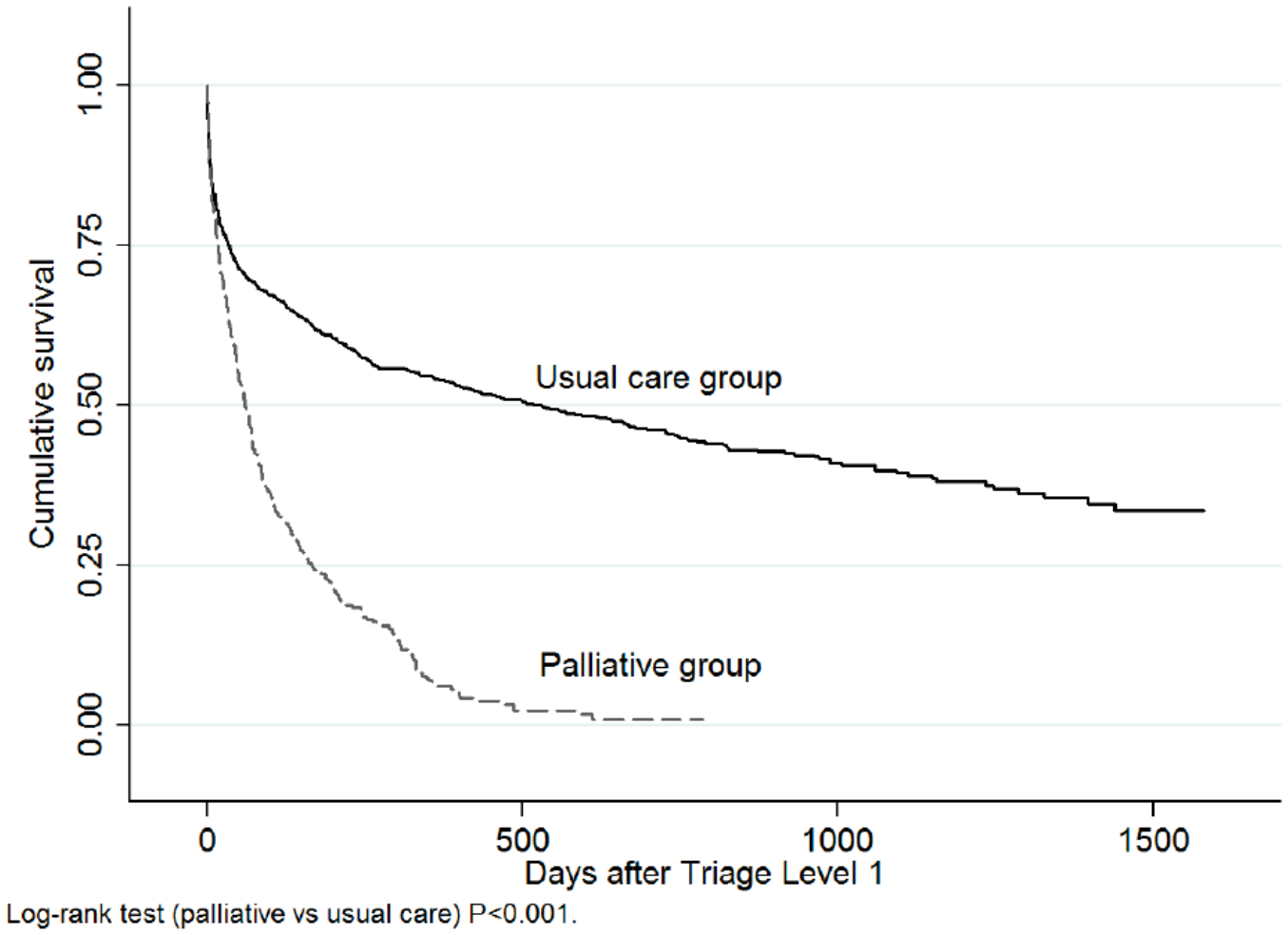


**Figure 2**

Kaplan-Meier estimate plot for survival days post-emergency department resuscitation

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- BMCSTROBEchecklistv4combined.docx