

Initiating palliative care consultation for acute critically ill patients in the emergency department intensive care unit

Che Yang^a, Tsu-Te Yang^b, Yu-Ju Tsou^a, Ming-Hui Lin^c, Ju-Sing Fan^b, Hsien-Hao Huang^b, Ming-Che Tsai^d, David Hung-Tsang Yen^{b,d,e,*}

^aDepartment of Nursing, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; ^bDepartment of Emergency Department, Taipei Veterans General Hospital, Taipei, Taiwan; School of Medicine, National Yang-Ming University, Taipei, Taiwan, ROC; ^cDepartment of Family Medicine, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; ^dDepartment of Emergency Medicine, School of Medicine, Chung Shan Medical University, Taichung, Taiwan, ROC; ^eInstitute of Emergency and Critical Care Medicine, College of Medicine, National Yang-Ming University, Taipei, Taiwan, ROC

Abstract

Background: Little is known about the characteristics of patients needing palliative care consultation in the emergency department (ED). This study aimed to investigate the impacts of initiating screening in acute critically ill patients needing palliative care on mortality, health care resources, and end-of-life (EOL) care in the intensive care unit in ED (EICU).

Methods: We conducted an analysis study in Taipei Veterans General Hospital. From February 1 to July 31, 2018, acute critically ill patients in EICU were recruited. The primary outcomes were in-hospital mortality and EOL care. The secondary outcomes included clinical characteristics and health care utilization.

Results: A total of 796 patients were screened, with 396 eligible and 400 noneligible patients needing palliative care consultations. The mean age was 74.8 ± 17.1 years, and 62.6% of the patients were male. According to logistic regression analysis, clinical predictors, including age (adjusted odds ratio [AOR], 1.028; 95% CI, 1.015-1.042), respiratory distress and/or respiratory failure (AOR, 2.670; 95% CI, 1.829-3.897), the Acute Physiology and Chronic Health Evaluation II score (AOR, 1.036; 95% CI, 1.009-1.064), Charlson Comorbidity Index score (AOR, 1.212; 95% CI, 1.125-1.306), and Glasgow Coma Scale (AOR, 0.843; 95% CI, 0.802-0.885), were statistically more significant in eligible patients than in noneligible patients. The in-hospital mortality rate was significantly higher in eligible patients than that in noneligible patients (40.7% vs 11.5%, $p < 0.01$). Eligible patients have a higher ratio in both vasopressor and narcotic use and withdrawal of endotracheal tube than noneligible patients ($p < 0.05$).

Conclusion: Our study results demonstrated that initiating palliative consultation for acute critically ill patients in ED had an impact on the utilization of health care resources and quality of EOL care. Further assessments of the viewpoints of ED patients and their family on palliative care consultations and hospice care are required.

Keywords: Emergency service; Hospital; Health care utilization; Palliative care

1. INTRODUCTION

For acute critically ill patients visiting the emergency department (ED), initial resuscitation, stabilization, rapid diagnosis, and curative therapy are the main responsibilities of emergency medicine. In cases where the emergency staffs have difficulty evaluating the palliative care needs of acute critically ill patients, palliative and end-of-life care could not be completely performed.¹⁻⁵ The World Health Organization defines

palliative care as “an approach that improves the quality of life of patients and their families facing the problems associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual.”⁶ It indicates that palliative and curative treatments can be simultaneously provided. A patient does not need to experience impending death to be a candidate for palliative care. Certain patients may benefit from palliative care and management, fulfilling their needs and interests in advance directives.⁷⁻¹² Early screening of patients with advanced illness needing palliative care consultation in the ED would not only result in a significant fulfillment of patients’ goal of care to treatments and the ED’s viewpoints with the patient’s preferred site of care but also increase the number of referrals to the hospice.¹³

Only a small portion (3%-6%) of palliative care consultations originated from emergency providers,^{14,15} suggesting that identifying the clinical characteristics of ED patients significantly needing palliative care consultation may confirm patient goals and desires to treatment and may improve the quality of patient care and outcomes.^{15,16} The Agency for Healthcare Research and

* Address correspondence. Dr. David Hung-Tsang Yen, Department of Emergency Medicine, Taipei Veterans General Hospital, 201, Section 2, Shi-Pai Road, Taipei 112, Taiwan, ROC. E-mail address: hjyen@vghtpe.gov.tw (D.H.-T. Yen).

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Quality/American College of Emergency Physicians Conference, "Improving the Quality and Efficiency of Emergency Care Across the Continuum: A Systems Approach," identified four key research questions. The first question is as follows: Which patients are in greatest need of palliative care services in the ED?¹⁷ In this domain, the following categories of inquiry would be strengthened using descriptive, screening, outcomes, and resource allocation. To enhance the quality of patient care in the ED by starting an initiative that better integrates palliative principle into daily practice, Lamba et al¹⁸ suggested that proper identification of patients in greatest need of palliative care services in the ED was the first question that should be answered. Early referral from the ED to palliative care for patients with advanced, incurable cancer would significantly increase the possibility that patients received a consultation.¹⁸ Ways on how to generalize this approach for patients with and without advanced cancer requires further investigation.

By using a modified Delphi technique, George et al¹⁹ developed a simple, content-validated screening tool used by ED providers to identify ED patients with significant palliative care needs, which contains three steps: (1) presence of a life-limiting illness, (2) unmet palliative needs, and (3) hospital admission. A recent study demonstrated that a specific vulnerable population, elderly patients from long-term facility with severe acute illness presenting to the ED as level I emergency severity index, has high resource utilization and mortality and seldom receives early palliative care in the ED.²⁰ However, few studies that initiated ED palliative care screening using this tool based on acute critically ill patients' (patients who presented to the ED with subsequent hospital admissions) clinical characteristics, including outcomes, medical care utilization, and end-of-life care, have been conducted. A feasible model of the intensive care unit in ED (EICU) provided continuously both curative care and mixed with palliative care for critically ill patients in the ED.^{21,22} Understanding this information will allow us to identify priorities and unmet needs for improving palliative care in the ED. Hence, this study aimed to investigate the impacts of initiating palliative care screening in acute critically ill patients in the ED, particularly focusing on survival, health care utilization, and end-of-life care in hospitalization.

2. METHODS

2.1. Study design

We conducted a prospectively registered and retrospective analysis study to investigate the clinical characteristics, health care utilizations, and outcomes of screening acute critically ill patients significantly needing palliative care consultations in the ED in a single medical center. According to the law "Hospice Palliative Care Act,"²³ the palliative care consultation was considered as standard of care in hospitalization. This project was reviewed and approved by Taipei Veterans General Hospital Institutional Research Board (VGHIRB) (Number: 2018-07-039AC), and the requirement of informed consent was waived.

2.2. Setting

Taipei Veterans General Hospital, a 3000-bed university-affiliated medical center, has an annual ED census of $85\ 182 \pm 1821$ (mean \pm SD) during the past 5 years. The ED provides patient care to all who seek acute care annually. The EICU, containing 13 beds and located within the ED, implements sustainable emergency and critical quality of care for acute critically ill patients who cannot be immediately admitted to specialized critical care unit after initial ED resuscitation and stabilization. All EICU settings comply with the regulations for an intensive care unit (ICU) setting issued from the Ministry of Health and

Welfare (MOHW) of the central government. All EICU patients are limited to ED patients' admission only, not for upstairs specialty patients. The EICU is staffed by emergency physicians (EPs), in collaboration with other specialty physicians, who will be in charge thereafter. All the staffed EPs are board-certified intensivists accredited by the Joint Committee of Intensive Care Medicine in Taiwan. In this study, the mean ED length of stay was 9.9 hours for all recruited patients before EICU admissions. On admission to the EICU, a routine data sheet, which included patient identification number, age, sex, admission diagnoses, subsequent dispositions, and the evaluation checklists of the needs for palliative care, was prospectively maintained for all patients. The operative system in our EICU uses a semi-open model that both EPs and other subspecialists collaboratively use in taking care of all patients with critical illnesses. For further information about our EICU setting, please refer to our previous study.²¹

2.3. Participants

Initiation of palliative care consultation screening was performed for acute critically ill patients who needed critical care in the ED from February 1 to July 31, 2018. Acute critically ill patients were initially resuscitated, diagnosed, and managed by EPs in the ED and were simultaneously assessed by subspecialty physicians, who collaborated with the on-duty EP to perform any aggressive interventions, procedures, and therapies and who subsequently determined if hospital admissions were required based on individual patient clinical needs and hospital admission resources, also including EICU admission. We recruited patients aged ≥ 20 years with acute critical illnesses who were admitted in the EICU after an ED visit. Patients' medical charts were comprehensively reviewed and recorded. Exclusion criteria included the following: age < 20 years and charts lacking certain important information or incomplete data collection.

2.4. Study protocol

We adapted a modified simple, content-validated screening tool, developed by George et al,¹⁹ to identify significant unmet palliative care needs among ED patients with acute critical and life-limiting illnesses under the consensus of two board-certified palliative and hospice care specialists and two board-certified EPs. The modified screening tool contains 15 items that are divided into two steps: (1) presence of an acute severe life-threatening or life-limiting illness and (2) unmet palliative care needs. The EPs performed clinical rounds of all newly admitted patients in the morning from Monday to Friday, confirmed the initial documentation of both the main diagnosis of acute critical illness, and screened the patients' eligibility for palliative care consultation regarding all items, please refer to Table 1. When patients had one or more items of the acute critical and life-limiting illness accompanied with two or more items of unmet palliative care needs, they were categorized as the palliative care eligible group. If patients did not meet the criteria for the eligible group, they belonged to the palliative care noneligible group. The case manager performed clinical rounds together with EP and communicated with the patients and their families the details of possible unmet palliative care needs. We collected the clinical data from the electronic chart system in our electronic information system. Once the patient's data entry was started during ED visit, all patients were registered in a hospital patient database. Subsequently, these data were entered into a Microsoft Excel database for later analysis. Variables possibly related to acute illness and palliative care needs and referrals for this study were defined before abstracting data from the data bank and medical chart. Two trained research authors blindly entered the abstracted data for study analyses. The clinical characteristics

Table 1
The screening items for needs assessment of palliative care consultation among 796 patients at the time of admission

| Items | N = 796 (%) |
|--|-------------|
| A. Acute critical and life-limiting illness | |
| 1. Advanced cancer, metastatic or locally aggressive disease | 89 (11.2) |
| 2. Advanced COPD who needs long-term oxygen therapy or respiratory failure requiring assisted ventilation | 11 (1.4) |
| 3. End-stage liver disease, for example, cirrhosis, that repeatedly appears with jaundice, ascites, peritonitis, hepatic coma, esophageal varices | 13 (1.6) |
| 4. Acute or chronic renal failure, decision of not receiving dialysis | 19 (2.4) |
| 5. Advanced cardiovascular diseases (chronic heart failure NYHA III or IV, chest pain, or dyspnea while in minimal exercise or exertion, or devastating inoperable peripheral vascular diseases) | 40 (5.0) |
| 6. Advanced central neurological diseases (e.g., stroke, dementia) in long-term bed-bound, combined with repeatedly or severely progressive deterioration or recurrent pneumonia, shortness of breath, or respiratory failure requiring hospital admission | 191 (24.0) |
| 7. Septic shock, ARDS, multiple organ failure, or impending death (other devastating diseases) | 248 (31.2) |
| 8. Very severely frail (completely dependent, approaching the end-of-life, CSHA-CFS > scale 8 and 9) | 27 (3.4) |
| B. The unmet palliative care needs | |
| 1. Medical care staffs would not be surprised if the patient died within 12 months of this episode (surprise question) | 350 (44.0) |
| 2. Appearing progressive functional deterioration with ≥ 3 ADLs needing for assistance | 187 (23.5) |
| 3. Appearing biopsychosocial discomforts needing hospital admission | 101 (12.7) |
| 4. Patients with three or more unexpected emergency department visits or hospital admissions within 6 months, with symptoms consistent with a terminal or degenerative chronic medical condition | 143 (18.0) |
| 5. Bed-bound patients with long-term unhealed bed sore or ulceration | 76 (9.5) |
| 6. Needing complicated medical care and assistance of medical decisions, including do-not-resuscitate order, ventilator, or nutritional supports | 339 (42.6) |
| 7. Patient's family request of palliative care | 27 (3.4) |

Of the 796 screened patients, 27.9% (222/796) has one item, 22.4% (178/796) has two items, and 2.5% (20/796) has three items of the critical and life-limiting illnesses. Of the 420 patients having one or more items of acute critical and life-limiting illnesses, 5.7% (24/420) has one item, 21.7% (91/420) has two items, 38.8% (163/420) has three items, 30.2% (127/420) has four items, and 3.6% (15/420) has five or more items of the unmet palliative care needs.

ADL = activities of daily living; ARDS = adult respiratory distress syndrome; BMI = body mass index; COPD = chronic obstructive pulmonary disease; CSHA-CFS = Chinese-Canadian study of health and aging clinical frailty scale;⁴⁰ NYHA = New York Heart Association.

of all patients included age, sex, insurance status, living conditions, marital status, religion, educational level, current alcohol consumption or smoking status, triage category, Glasgow Coma Scale (GCS), mean blood pressure, Charlson Comorbidity Index (CCI), Acute Physiology and Chronic Health Evaluation II (APACHE II) score, main diagnosis of acute critical illness, ED length of stay (LOS), EICU LOS, hospital LOS, total hospital expenses, and outcomes (survival or mortality). We also documented the procedures and management of end-of-life care, including endotracheal (ET) intubation and ventilator support, cardiopulmonary resuscitation (CPR), epinephrine use, cardioversion or defibrillation, vasopressor use, ventilator support, extracorporeal membrane oxygenation, withdrawal of ET tube, and narcotics used in dying condition. Our hospital palliative care team includes doctors and nurses, care managers, social workers, psychologists, and chaplains.

2.5. Outcome measures

The primary outcomes of studied patients were inhospital mortality and the procedures and management of end-of-life care. The secondary outcomes included clinical characteristics and health care utilization.

2.6. Statistical data analysis

Data were expressed as mean \pm SD and number (%) for continuous and categorical variables, respectively. The distribution of data was assessed using the Kolmogorov-Smirnov test. Numerical variables were compared using a two-sample *t* test (parametric data) or Mann-Whitney *U* test (nonparametric data). Categorical variables were compared using the two-sided chi-square or Fisher's exact test. Factors showing statistical significance ($p < 0.05$) in the univariate analysis were included in multiple regression analysis. Survival time was calculated from the date of admission to the date of death using the Kaplan-Meier method, and the difference of survival time between the

eligible and noneligible groups was compared using log-rank test. $p < 0.05$ was considered statistically significant. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) Statistics version 22.0 (SPSS Inc, Chicago, IL, USA).

3. RESULTS

During the study, a total of 796 patients were evaluated for eligibility for the unmet palliative care needs in addition to clinical service rounds. Table 1 shows the screening items for palliative care assessment including both the diagnoses of acute critical and life-limiting illnesses and the unmet palliative care needs. The eligible patients were defined as having one of the acute critical and life-limiting illness in item A and two or more unmet palliative care needs in item B. In acute critical and life-limiting illness, patients with septic shock, acute respiratory distress syndrome (ARDS), multiple organ failure, or impending death were the most common in 31.2% (248/796), followed by advanced central neurological diseases in long-term bed-bound combined with repeatedly or severely progressive deterioration or recurrent pneumonia or respiratory failure requiring hospital admission in 24% (191/796) and terminal cancer in 11.2% (89/796). The assessment of unmet palliative care needs was demonstrated in item B. The most common characteristic was that medical staffs would not be surprised if the patients die within 12 months in 44.0% (350/796), followed by needing complicated medical care and discussion with family of medical decisions, including do-not-resuscitate (DNR) order, ventilator, or nutritional supports in 42.6% (339/796) and appearing progressive functional deterioration with three or more activities of daily living needing assistance in 23.5% (187/796), respectively. Overall, a total of 396 eligible patients were screened and recommended to have palliative care consultation or referral.

Table 2.**Comparison of clinical characteristics between 396 eligible patients and 400 noneligible patients needing palliative care consultation**

| Variable | N = 796 (%) | Eligible patients | Noneligible patients | p |
|--|-------------------|-------------------|----------------------|--------|
| | | N = 396 (%) | N = 400(%) | |
| Age, y* | 74.8 ± 17.1 | 81.6 ± 13.8 | 68.2 ± 17.5 | <0.001 |
| Female sex | 298 (37.4) | 148 (37.4) | 150 (37.5) | 0.971 |
| Insurance status* | | | | <0.001 |
| National health insurance only | 521 (65.5) | 224 (56.6) | 297 (74.2) | |
| With Medicaid | 275 (34.5) | 172 (43.4) | 103 (25.8) | |
| Living conditions* | | | | <0.001 |
| With family | 630 (79.1) | 307 (77.5) | 323 (80.8) | |
| Veterans home | 21 (2.6) | 16 (4.0) | 5 (1.3) | |
| Long-term care facilities | 65 (8.2) | 45 (11.4) | 20 (5.0) | |
| Solitary living | 67 (8.4) | 21 (5.3) | 46 (11.5) | |
| Others | 13 (1.6) | 7 (1.8) | 6 (1.5) | |
| Marital status* | | | | <0.001 |
| Single | 89 (11.2) | 31 (7.8) | 58 (14.5) | |
| Married | 475 (59.7) | 245 (61.9) | 230 (57.5) | |
| Divorced | 49 (6.2) | 14 (3.5) | 35 (8.8) | |
| Widow or widower | 183 (23.0) | 106 (26.8) | 77 (19.3) | |
| Religion | | | | 0.152 |
| Taoism | 145 (18.2) | 66 (16.7) | 79 (19.8) | |
| Buddhism | 273 (34.3) | 135 (34.1) | 135 (33.8) | |
| Catholic/Christian | 64 (8.0) | 41 (10.4) | 23 (5.8) | |
| Others | 4 (0.5) | 2 (0.5) | 2 (0.5) | |
| None | 310 (38.9) | 161 (40.7) | 161 (40.3) | |
| Educational level | | | | 0.900 |
| Higher than high school | 350 (44.0) | 175 (44.2) | 175 (43.8) | |
| Lower than high school | 446 (56.0) | 221 (55.8) | 225 (56.2) | |
| Current alcohol consumption* | 27 (3.4) | 6 (1.5) | 21 (5.3) | 0.004 |
| Current smoker* | 83 (10.4) | 22 (5.6) | 61 (15.3) | <0.001 |
| TTAS* | | | | <0.001 |
| 1 | 240 (30.2) | 156 (39.4) | 84 (21.0) | |
| 2 | 307 (38.6) | 148 (37.4) | 159 (39.8) | |
| 3 | 245 (30.8) | 92 (23.2) | 154 (38.4) | |
| 4 | 4 (0.5) | 0 (0) | 4 (1.0) | |
| Glasgow Coma Scale* | 11.8 ± 4.1 | 10.1 ± 4.5 | 13.4 ± 3.0 | <0.001 |
| Mean blood pressure in the emergency department (ED), mmHg | 94.1 ± 23.9 | 92.6 ± 23.4 | 95.4 ± 24.3 | 0.134 |
| Charlson Comorbidity Index* | 6.1 ± 2.9 | 7.1 ± 2.6 | 5.0 ± 2.8 | <0.001 |
| APACHE II score at admission* | 20.0 ± 8.3 | 23.0 ± 7.7 | 17.1 ± 7.7 | <0.001 |
| 0-14 | 213 (26.6) | 55 (13.9) | 158 (39.5) | |
| 15-24 | 343 (43.1) | 170 (42.9) | 173 (43.3) | |
| >24 | 240 (30.2) | 171 (43.2) | 69 (17.3) | |
| Acute critical illness* | | | | <0.001 |
| 1. Respiratory distress and/or respiratory failure | 265 (33.3) | 188 (47.5) | 77 (19.3) | |
| 2. Cardiovascular emergency | 122 (15.3) | 41 (10.4) | 81 (20.3) | |
| 3. Postcardiac arrest | 10 (1.3) | 6 (1.5) | 4 (1.0) | |
| 4. Sepsis/septic shock | 157 (19.7) | 84 (21.2) | 73 (18.3) | |
| 5. Neurological emergency | 62 (7.8) | 22 (5.6) | 40 (10.0) | |
| 6. Acute renal failure/uremia/electrolyte imbalance | 37 (4.6) | 13 (3.3) | 24 (6.0) | |
| 7. Gastrointestinal emergency | 38 (4.8) | 10 (2.5) | 28 (7.0) | |
| 8. Metabolic emergency | 39 (4.9) | 13 (3.3) | 26 (6.5) | |
| 9. Drug overdose/intoxication | 16 (2.0) | 3 (0.8) | 13 (3.3) | |
| 10. Multiple systemic dysfunctions | 7 (0.9) | 4 (1.0) | 3 (0.8) | |
| 11. Trauma | 38 (4.8) | 8 (2.0) | 30 (7.5) | |
| 12. Internal bleeding | 4 (0.5) | 3 (0.8) | 1 (0.3) | |
| 13. Others | 1 (0.1) | 1 (0.3) | 0 (0) | |
| ED length of stay, h | 9.9 ± 15.4 | 9.3 ± 13.4 | 10.5 ± 17.2 | 0.256 |
| Total ED expenses (point) | 17 869.2 ± 9633.8 | 17 785.7 ± 8220.3 | 17 949.7 ± 10832.8 | 0.815 |
| EICU length of stay, h* | 44.2 ± 30.4 | 47.1 ± 33.4 | 41.2 ± 26.8 | 0.007 |
| Hospital length of stay, h | 449.3 ± 434.1 | 455.5 ± 440.1 | 443.2 ± 428.5 | 0.691 |
| Total hospital expenses (point) | 246 029 ± 413 191 | 223 009 ± 249 452 | 268 820 ± 526 803 | 0.117 |
| Inhospital mortality* | 207 (26.0) | 161 (40.7) | 46 (11.5) | <0.001 |

Results expressed as number (%) for categorical variables and mean ± SD for numerical variables.

APACHE = Acute Physiology and Chronic Health Evaluation; ED = emergency department; EICU = intensive care unit in ED; TTAS = Taiwan Triage and Acuity Scale.

**p* < 0.05 is considered statistically significant using Mann-Whitney *U* test or chi-square analysis.

Table 2 shows that the mean age of 796 study patients was 74.8 ± 17.1 years, and 62.6% were predominantly male. They were categorized into 396 eligible patients and 400 noneligible patients. The eligible patients were older (81.6 vs 68.2 years) and had more acuity in ED triage (76.8% vs 60.8% in triage 1 and 2), higher CCI (7.1 vs 5.0), lesser GCS (10.1 vs 13.4), more respiratory distress and/or respiratory failure (47.5% vs 19.3%), and longer EICU LOS (47.1 vs 41.2 hours) than that of noneligible patients, respectively ($p < 0.01$). Generally, according to clinical characteristics, eligible patients had a more advancing age and more acute and severe chronic comorbidities than noneligible patients. In addition, eligible patients have higher ratio of diagnosis of respiratory distress and/or respiratory failure and sepsis/septic shock than noneligible patients ($p < 0.05$).

Table 3 shows the results of multiple logistic regression analysis that evaluated the clinical predictors of acute critically ill patients significantly needing palliative care consultations or referrals at the time of ED visits. We found that clinical predictors, including age (adjusted odds ratio [AOR], 1.028; 95% CI, 1.015-1.042), respiratory distress and/or respiratory failure (AOR, 2.670; 95% CI, 1.829-3.897), APACHE II score (AOR, 1.036; 95% CI, 1.009-1.064), CCI (AOR, 1.212; 95% CI, 1.125-1.306), and GCS (AOR, 0.843; 95% CI, 0.802-0.885), were statistically more significant in eligible patients than in noneligible patients.

The in-hospital mortality rate was significantly higher in eligible patients (161/396, 40.7%) than that in noneligible patients (46/400, 11.5%) ($p < 0.001$). Using Kaplan-Meier's survival analysis (Figure), the overall cumulative survival rate was significantly higher in noneligible patients than that in eligible patients (88.5% vs 59.3%, log-rank test, $p < 0.001$).

Table 4 shows the results of health care utilization, resuscitation procedures, or medications during end-of-life care in hospitalization between eligible and noneligible patients with mortality. Regarding in-hospital mortality, eligible patients had significantly lower percentage of ICU mortality (34.2% vs 60.9%) and higher percentage in wards (45.3% vs 32.6%), hospice unit (13.0% vs 0%), and critical against advice discharge (7.5% vs 6.5%) than noneligible patients ($p < 0.001$). During end-of-life care in hospitalization, in-hospital mortality of eligible patients was significantly lower in ET intubation, CPR, cardioversion or defibrillation, epinephrine use, and ventilator support than that of noneligible patients ($p < 0.05$).

4. DISCUSSION

Our study was the first one to investigate the clinical characteristics of acute critically ill patients significantly needing palliative consultation in the ED associated with their outcomes, health care utilization, and end-of-life care. According to regression analyses, we found that eligible patients had a more advancing age (mean, 81.6 vs. 68.2 years; odds ratio [OR], 1.028), higher APACHE II score (mean, 23.0 vs. 17.1; OR, 1.036), higher CCI

(mean, 7.1 vs. 5.0; OR, 1.212), higher ratio of respiratory distress and/or respiratory failure (47.0% vs. 19.3%; OR, 2.670), and poorer level of consciousness (mean GCS, 10.1 vs. 13.4; OR, 0.843) than noneligible patients needing palliative care. Regarding outcomes, health care utilization, and end-of-life care, we found that eligible patients have a higher rate of mortality in association with death in hospice unit and wards but a lower rate of advanced resuscitation management among mortalities, including ET intubation, CPR, epinephrine, and cardioversion or defibrillation in the end-of-life care, than noneligible patients. In this study, the use of screening protocol for palliative care consultation or referral in the ED, focusing on the management of acute illness and symptoms, psychosocial support, and assistance with decision making of resuscitation procedures, was demonstrated to improve the patients' quality of end-of-life care^{2,3} and family satisfaction,⁹ facilitate the efficient allocation of health care utilizations, and furthermore possibly reduce the use of medical services.^{2,20,24}

Palliative care would be essential in the management of critically ill patients,¹³ where certain patients are responding to curative therapy or actively dying during ED visits.^{3,25} Patient- and family-centered care attempts to alleviate the suffering caused by illnesses and is appropriate across all health care deliveries. A previous study showed that critically ill, older adults with multiple diagnosis have substantial palliative care needs in the ED.³ These significant unmet palliative care needs were identified and designed for the ED environment and validated by palliative care experts,¹⁹ who reviewed the articles regarding disease-specific thresholds for palliative care to include appropriate cues for ED providers to sufficiently identify advanced disease status. By adapting most of these screening protocols and adding two items of unmet palliative care needs, with a total of 15 items, we conducted a palliative care needs assessment to identify (1) the presence of a life-limiting illness, (2) unmet palliative care needs, and (3) clinical characteristics and medical utilizations and hospital admission among acute critically ill patients in the ED. Using this screening tool, we identified that nearly half (49.7%, 396/796) of all patients were eligible for palliative care consultations, with greater than one acute critical and life-limiting illness and greater than two unmet palliative care needs (Table 1). Greater than 40% of the study population were considered to be dead within 1 year (surprise question)²⁶ that is feasible, acceptable, and useful in facilitating the advance care planning discussions among medical teams, patients, and families. In addition, according to the results of this study, significant clinical characteristics, including elderly,^{9,20,27,28} high APACHE II score,^{1,3,20,25} poor level of consciousness,²⁸ multiple comorbidities,^{3,9,14} and respiratory distress and/or respiratory failure,¹⁵ and complicated medical care were associated with the previous studies among eligible patients, who were reported to benefit from palliative care consultations or referrals in the ED. Particularly, majority of these patients (88.8%) belonged to nonadvanced cancer patients with high varieties of chronic illnesses and care trajectories in this study. Nonadvanced cancer patients have different symptom prevalence, clinical characteristics related to palliative care needs,¹¹⁻¹³ health care utilizations, and model of delivery to patients with advanced cancer.^{12,29} Hence, further prospective study to investigate this important issue is required.

The ultimate aim of end-of-life in palliative care is the achievement of a good death³⁰ that would meet the needs and interests of patients' advance directive and supports from their family,^{7,9,10,31,32} regardless of the pursuit of invasive, life-sustaining procedures or referral to the hospice. According to an integrative literature review, several areas of concern about end-of-life care in the ED are shown, where the preferred place of death is not considered.³³ The result of this recent study indicated that the mortality rate of elderly patients >65 years from a long-term care

Table 3.

Multiple logistic regression with backward analyses of clinical predictors in eligible patients needing palliative care consultation

| Variable | OR (95% CI) | <i>p</i> |
|---|---------------------|----------|
| Age (by 1-y increment) | 1.028 (1.015-1.041) | <0.001 |
| Respiratory distress and/or respiratory failure | 2.670 (1.829-3.897) | <0.001 |
| APACHE II score (by 1-point increment) | 1.036 (1.009-1.064) | 0.010 |
| Charlson Comorbidity Index (by 1-point increment) | 1.212 (1.125-1.306) | <0.001 |
| Glasgow Coma Scale (by 1-point increment) | 0.843 (0.802-0.885) | <0.001 |

APACHE = Acute Physiology and Chronic Health Evaluation; OR = odds ratio.

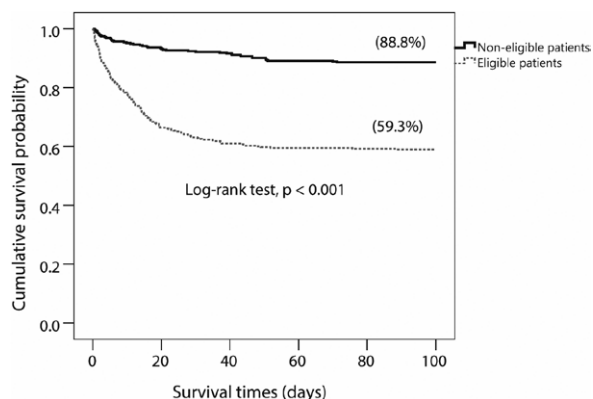


Figure The cumulative survival curve of eligible and noneligible patients.

facility with a level I triage priority was very high, with 54% of patients deceased 30 days after discharge and only 29.8% alive at 12 months.²⁰ ED practitioners can play an important role in the initiation of end-of-life discussions and care plans to identifiable chronic illness trajectories of dying patients and their families.^{8,28,31} Our study demonstrated that inhospital mortality rate was higher (40.7% vs 11.5%), CPR ratio (3.1% vs 21.7%) and ET intubation ratio (14.3% vs 45.7%) were lower, and hospice admission ratio (13.0% vs 0%) at the end-of-life was higher in eligible patients than in noneligible patients. However, improvement in pain management with narcotic use (46.0% vs 30.4%) and both vasopressor use (54.7% vs 69.6%) and epinephrine use (20.5% vs. 45.7%) that would belong to nonbeneficial medical treatments at the end-of-life care between the groups was observed (Table 4). In our hospital, DNR consent increased, with an average of 73.8% (1045/1416), in patients with major noncancer diagnosis between 2010 and 2014 when facing their

beloved with impending death.¹¹ In this study, we found that 156 (96.9%) and 36 (78.3%) eligible and noneligible patients with mortality had DNR consent, respectively. These data indicated that the increase in DNR consent and the concept of good death might be attributed to the early implementation of palliative care consultation from the ED to hospitalization. In addition, <math>< 10\%</math> of patients with mortality were critical against advice discharge, indicating the need for certain policies and strategies that promote home hospice care programs in the future.

In Taiwan, since 1995, the Department of Health, the central government for health, not only launched the hospice care programs³⁴ and provided coverage for hospice home care in 1996, hospice inpatient care in 2000, and hospice shared care program in 2004 but also currently expanded hospice coverage hospice care from terminal cancer patients to terminal noncancer patients, including end-stage brain disease, dementia, heart diseases, lung diseases, liver diseases, and renal diseases.^{11,29} Several policies and strategies had been implemented to facilitate hospice and palliative care, including medical education;³⁵ broadcasts and hospital accreditation program;³⁶ two time amendments of the law “Hospice Palliative Care Act” on 2011 and 2013, respectively;²³ and the provision of insurance reimbursement for these terminal victims. The implementation of these policies would change medical care providers’ clinical practices and also encourage patients and families with concerns about these issues to make “advance directives”^{37,38} as earlier as needed. These study results were demonstrated and also evidenced by the changes of medical resource utilizations and end-of-life care by increasing DNR rates^{11,39} and decreasing cardiac massage and ventilation support in a nationwide survey.³⁹

This study has several limitations. First, since this is a retrospective study, it would be subject to missing or incomplete data. Second, although the inclusion criteria were strictly followed, there may be existing and confounding discrepancies between the criteria and clinical conditions of patients who may be experiencing impending death due to critical illnesses. Third, the total number of patients admitted to ICU was 896 during the study period. Although around 88.8% (796/896) of all EICU patients was recruited in this study, there might exist a selection bias. Besides, the recruited patients were admitted to the EICU, which may have some certain differences in admission criteria to other subspecialty ICU, and those who were not admitted to the EICU may raise another consideration beyond our study designation and protocol. Further study is required to investigate the boarding patients for the holistic evaluation of the values and applications of palliative care consultation in the ED. Fourth, most of the patients admitted to subspecialty ICU received specific operations, interventions, procedures, or managements and were not screened for palliative care consultation in the ED. Fifth, we focus on the investigations of acute illness, health care utilization, and end-of-life care without adequately assessing psychosocial supports and surrogate’s viewpoints. However, we analyzed the place of death and end-of-life care among the mortalities of both groups that would represent the consensus between patient’s autonomy and surrogates or families and subsequently minimize these potential biases. Despite these limitations, this study provides a comprehensive investigation on the clinical characteristics of critically ill patients needing palliative care consultation services, referral in the hospice, and high-risk resuscitation, which may probably progress to patients experiencing impending death within 24 hours from a high variety of specialty EICU admission immediately after ED visits. These regression results offer a clinical predictive scoring model for further prospective investigations to validate these characteristics in the early predictions of acute critically ill patients needing palliative care in the ED.

In conclusion, our study suggested that using specific items to select and promote proactive referrals, palliative care

Table 4. Comparison of health care utilization, resuscitation procedures, or medications during end-of-life care in hospitalization between 161 eligible patients with mortality and 46 noneligible patients with mortality

| Variable | Eligible patients with mortality | Noneligible patients with mortality | p |
|-----------------------------------|----------------------------------|-------------------------------------|--------|
| | N = 161 (%) | N = 46 (%) | |
| Place of death* | | | <0.001 |
| Intensive care unit | 55 (34.2) | 28 (60.9) | |
| Wards | 73 (45.3) | 15 (32.6) | |
| Hospice unit | 21 (13.0) | 0 (0) | |
| Critical against advice discharge | 12 (7.5) | 3 (6.5) | |
| End-of-life care | | | |
| ET intubation* | 23 (14.3) | 21 (45.7) | <0.001 |
| CPR* | 5 (3.1) | 10 (21.7) | <0.001 |
| Epinephrine* | 33 (20.5) | 21 (45.7) | 0.001 |
| Cardioversion or defibrillation* | 0 (0) | 2 (4.3) | 0.049 |
| Vasopressors | 88 (54.7) | 32 (69.6) | 0.090 |
| Cardiac pacemaker | 1 (0.6) | 1 (2.2) | 0.396 |
| Ventilator support* | 21 (13.0) | 17 (37.0) | 0.001 |
| ECMO or IABP | 1 (0.6) | 2 (4.3) | 0.125 |
| Withdrawal of ET tube | 5 (3.1) | 0 (0) | 0.589 |
| Narcotics use | 74 (46.0) | 14 (30.4) | 0.065 |

Results expressed as number (%) for categorical variables. CPR = cardiopulmonary resuscitation; ECMO = extracorporeal membrane oxygenation; ET = endotracheal; IABP = intra-aortic balloon pump. *p < 0.05 is considered statistically significant using chi-square analysis or Fisher’s exact test.

consultation could help reallocate and make the most utilization of hospital medical resources, such as ICU (hospital) and hospice units, and also contribute to the practice and quality of end-of-life care. Moreover, further prospective studies on the values and viewpoints of ED patients and their family on palliative care consultations and hospice care are required.

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REFERENCES

- Fassier T, Valour E, Colin C, Danet F. Who am I to decide whether this person is to die today? Physicians' life-or-death decisions for elderly critically ill patients at the emergency department-ICU interface: a qualitative study. *Ann Emerg Med* 2016;68:28–39.e3.
- Quest T, Herr S, Lamba S, Weissman D; IPAL-EM Advisory Board. Demonstrations of clinical initiatives to improve palliative care in the emergency department: a report from the IPAL-EM initiative. *Ann Emerg Med* 2013;61:661–7.
- Grudzen CR, Stone SC, Morrison RS. The palliative care model for emergency department patients with advanced illness. *J Palliat Med* 2011;14:945–50.
- Smith AK, Fisher J, Schonberg MA, Pallin DJ, Block SD, Frow L, et al. Am I doing the right thing? Provider perspectives on improving palliative care in the emergency department. *Ann Emerg Med* 2009;54:86–93, 93.e1.
- Decker K, Lee S, Morphet J. The experiences of emergency nurses in providing end-of-life care to patients in the emergency department. *Australas Emerg Nurs J* 2015;18:68–74.
- World Health Organization (WHO). Definition of palliative care. Geneva: WHO. Available at: www.who.int/cancer/palliative/definition/en/. Accessed December 12, 2015.
- American College of Emergency Physicians. Ten things physicians and patients should question. Available at <http://www.choosingwisely.org/societies/american-college-of-emergency-physicians/>. Accessed June 12, 2018.
- Lamba S, DeSandro PL, Todd KH, Bryant EN, Chan GK, Grudzen CR, et al.; Improving Palliative Care in Emergency Medicine Board. Integration of palliative care into emergency medicine: the improving palliative care in emergency medicine (IPAL-EM) collaboration. *J Emerg Med* 2014;46:264–70.
- Mahony SO, Blank A, Simpson J, Persaud J, Huvane B, McAllen S, et al. Preliminary report of a palliative care and case management project in an emergency department for chronically ill elderly patients. *J Urban Health* 2008;85:443–51.
- Weissman DE, Meier DE. Identifying patients in need of a palliative care assessment in the hospital setting: a consensus report from the center to advance palliative care. *J Palliat Med* 2011;14:17–23.
- Chang HT, Lin MH, Chen CK, Chou P, Chen TJ, Hwang SJ. Trends of do-not-resuscitate consent and hospice care utilization among noncancer decedents in a tertiary hospital in Taiwan between 2010 and 2014: a hospital-based observational study. *Medicine (Baltimore)* 2016;95:e5394.
- Hung YS, Chen CH, Yeh KY, Chang H, Huang YC, Chang CL, et al. Potential benefits of palliative care for polysymptomatic patients with late-stage nonmalignant disease in Taiwan. *J Formos Med Assoc* 2013;112:406–15.
- Kelley AS, Morrison RS. Palliative care for the seriously ill. *N Engl J Med* 2015;373:747–55.
- Grudzen CR, Hwang U, Cohen JA, Fischman M, Morrison RS. Characteristics of emergency department patients who receive a palliative care consultation. *J Palliat Med* 2012;15:396–9.
- George NR, Kryworuchko J, Hunold KM, Ouchi K, Berman A, Wright R, et al. Shared decision making to support the provision of palliative and end-of-life care in the emergency department: a consensus statement and research agenda. *Acad Emerg Med* 2016;23:1394–402.
- Meier DE, Morrison RS, Cassel CK. Improving palliative care. *Ann Intern Med* 1997;127:225–30.
- Quest TE, Asplin BR, Cairns CB, Hwang U, Pines JM. Research priorities for palliative and end-of-life care in the emergency setting. *Acad Emerg Med* 2011;18:e70–6.
- Kistler EA, Sean Morrison R, Richardson LD, Ortiz JM, Grudzen CR. Emergency department-triggered palliative care in advanced cancer: proof of concept. *Acad Emerg Med* 2015;22:237–9.
- George N, Barrett N, McPeake L, Goett R, Anderson K, Baird J. Content validation of a novel screening tool to identify emergency department patients with significant palliative care needs. *Acad Emerg Med* 2015;22:823–37.
- Mogul AS, Cline DM, Gabbard J, Bryant C. Missed opportunities: integrating palliative care into the emergency department for older adults presenting as level I triage priority from long-term care facilities. *J Emerg Med* 2019;56:145–52.
- Fu KH, Chen YR, Fan JS, Chen YC, Huang HH, How CK, et al. Emergency department critical care unit for critically ill cardiovascular patients: an observation study. *J Chin Med Assoc* 2017;80:233–44.
- Aslaner MA, Akkaş M, Eroğlu S, Aksu NM, Özmen MM. Admissions of critically ill patients to the ED intensive care unit. *Am J Emerg Med* 2015;33:501–5.
- Ministry of Welfare and Health. Hospice Palliative Care Act. 2013. Available at <http://law.moj.gov.tw/Eng/LawClass/LawContent.aspx?PCODE=L0020066>. Accessed 30 May 2015.
- Mierendorf SM, Gidvani V. Palliative care in the emergency department. *Perm J* 2014;18:77–85.
- Grudzen CR, Richardson LD, Morrison M, Cho E, Morrison RS. Palliative care needs of seriously ill, older adults presenting to the emergency department. *Acad Emerg Med* 2010;17:1253–7.
- Haydar SA, Almeder L, Michalakes L, Han PKJ, Strout TD. Using the surprise question to identify those with unmet palliative care needs in emergency and inpatient settings: what do clinicians think? *J Palliat Med* 2017;20:729–35.
- Beynon T, Gomes B, Murtagh FE, Glucksman E, Parfitt A, Burman R, et al. How common are palliative care needs among older people who die in the emergency department? *Emerg Med J* 2011;28:491–5.
- Yash Pal R, Kuan WS, Koh Y, Venugopal K, Ibrahim I. Death among elderly patients in the emergency department: a needs assessment for end-of-life care. *Singapore Med J* 2017;58:129–33.
- Shih TC, Chang HT, Lin MH, Chen CK, Chen TJ, Hwang SJ. Trends of do-not-resuscitate orders, hospice care utilization, and late referral to hospice care among cancer decedents in a tertiary hospital in Taiwan between 2008 and 2014: a hospital-based observational study. *J Palliat Med* 2017;20:838–44.
- Emanuel EJ, Emanuel LL. The promise of a good death. *Lancet* 1998;351(Suppl 2):SII21–9.
- Lamba S, Mosenthal AC. Hospice and palliative medicine: a novel subspecialty of emergency medicine. *J Emerg Med* 2012;43:849–53.
- Cheng SY, Hu WY, Liu WJ, Yao CA, Chen CY, Chiu TY. Good death study of elderly patients with terminal cancer in Taiwan. *Palliat Med* 2008;22:626–32.
- McCallum KJ, Jackson D, Walthall H, Aveyard H. Exploring the quality of the dying and death experience in the emergency department: an integrative literature review. *Int J Nurs Stud* 2018;85:106–17.
- Tang ST, Chen ML, Huang EW, Koong SL, Lin GL, Hsiao SC. Hospice utilization in taiwan by cancer patients who died between 2000 and 2004. *J Pain Symptom Manage* 2007;33:446–53.
- Lin YH: The influence from palliative care education on the knowledge and attitude of medical students: a medical school survey from 2007 to 2011. Available at http://cetd.tmu.edu.tw/etdservice/view_metadata?etdu n=U0007-0807201315564700& from=DEPT&deptid=D0007007001. Accessed 25 Nov 2017.
- eHospice: Hospice and palliative care in Taiwan. Available at <http://www.ehospice.com/ArticleView/tabid/10686/ArticleId/15164/language/en-GB/Default.aspx>. Accessed Nov 25, 2017.
- Lai YL, Su WH. Palliative medicine and the hospice movement in Taiwan. *Support Care Cancer* 1997;5:348–50.
- Yang CL, Chiu TY, Hsiung YF, Hu WY. Which factors have the greatest influence on bereaved families' willingness to execute advance directives in taiwan? *Cancer Nurs* 2011;34:98–106.
- Cheng MT, Hsih FY, Tsai CL, Tsai HB, Tsai DF, Fang CC. Increased rate of DNR status in hospitalized end-of-life patients in Taiwan. *Intensive Care Med* 2016;42:1816–7.
- Chan DC, Tsou HH, Chen CY, Chen CY. Validation of Chinese-Canadian study of health and aging clinical frailty scale (CSHA-CFS) telephone version. *Arch Gerontol Geriat* 2010;50:e74–e80.