Original Article

Objective Palliative Prognostic Score Among Patients With Advanced Cancer

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Abstract

Context. The accurate prediction of survival is one of the key factors in the decision-making process for patients with advanced illnesses.

Objectives. This study aimed to develop a short-term prognostic prediction method that included such objective factors as medical history, vital signs, and blood tests for use with patients with advanced cancer.

Methods. Medical records gathered at the admission of patients with advanced cancer to the hospice palliative care unit at a tertiary hospital in Taiwan were reviewed retrospectively. The records included demographics, history of cancer treatments, performance status, vital signs, and biological parameters, Multivariate logistic regression analyses and receiver operating characteristic curves were used for model development.

Results. The Objective Palliative Prognostic Score was determined by using six objective predictors identified by multivariate logistic regression analysis. The predictors include heart rate >120/min, white blood cells >11,000/mm^3, platelets <130,000/mm^3, serum creatinine level >1.3 mg/dL, serum potassium level >5 mg/dL, and no history of chemotherapy. The area under the receiver operating characteristic curve used to predict seven-day survival was 82.0% (95% confidence interval 75.2%–88.8%). If any three predictors of the six were reached, death within seven days was predicted with 68.8% sensitivity, 86.0% specificity, 55.9% positive predictive value, and 91.4% negative predictive value.

Conclusion. The Objective Palliative Prognostic Score consists of six objective predictors for the estimation of seven-day survival among patients with advanced cancer and showed a relatively high accuracy, specificity, and negative predictive value. Objective signs, such as vital signs and blood test results, may help clinicians make decisions at the end of life. J Pain Symptom Manage 2015;49:690–696.

Key Words

Advanced cancer, palliative care, objective, prognosis, survival, prediction

Introduction

Decision making is an important issue in palliative care, especially as patients approach the end of life. For patients, families, and physicians, timing the shift from life-prolonging therapy to more palliative approaches that focus on quality of life and comfort is challenging. The accurate prediction of survival is one of the key factors in the decision-making process, from goal setting in the early stages of palliative care, which include caregiving or expectations of care, to

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ethical issues at the end of life; such ethical issues include withholding and withdrawing treatment, palliative sedation, and nutrition support.[1] However, traditional prediction by physicians is unreliable, and most physician prognoses tend to be both imprecise and overly optimistic.[2,3]

Many previous studies have formulated survival predictions according to a variety of items, including performance status, symptoms, and biological parameters.[4–9] These predictions could significantly help physicians in decision making and in providing patients and their families with useful information for goal setting.[6,10,11] However, most of these predictions include subjective factors, such as patient symptoms and performance status,[12–16] which may be influenced by treatment, time, and physician. These subjective factors also may be evaluated differently by each caregiver and may be estimated with difficulty by junior physicians. Thus, the idea of being able to create a prognosis from objective factors, such as vital signs and blood test, is appealing to clinicians.

A previous study conducted in Italy revealed that white blood cell (WBC) count, lymphocyte percentage, and pseudocholinesterase levels were independent objective predictors of survival.[17] Other studies have been conducted recently. These studies found that some objective factors, such as leukocytosis, lymphocytopenia, thrombocytopenia, elevated C-reactive protein (CRP), decreased albumin level, high lactate dehydrogenase level, high blood urea nitrogen (BUN) level, and high respiratory rate, have prognostic significance in shorter survival.[18–23]

Decision making in the very late stages of life has more ethical concerns and is more patient-centered, which makes it more difficult for physicians. The diagnosis of death is central to optimal decision making at the end of life. However, diagnosing death is often a complex process that has many obstacles, which lend difficulty to the clear recognition of the dying phase.[24] Thus, increasing interest has been directed toward the prediction of short-term survival.[14,19,21,25,26] Chiang et al. constructed a seven-day survival prediction model based on cognitive status, edema, Eastern Cooperative Oncology Group (ECOG) performance status, BUN and respiratory rate, with a good area under the curve (AUC) of 0.81 ($P < 0.001$, 95% confidence interval [9% CI] 0.76–0.86).[19] Ohde et al.[21] also suggested a two-week prognostic prediction model for terminal patients with cancer that comprised five items: anorexia, dyspnea, edema, BUN >25.0 mg/dL, and platelets <260,000/mm^3, with a good AUC of 0.83 (95% CI 0.75, 0.91). However, both studies still have subjective factors that may potentially be judged inaccurately by physicians.

This study primarily aims to develop a validated short-term prognostic prediction method comprising objective factors to facilitate the decision making of patients with advanced cancer, their relatives, and physicians in the very late stages of life.

Methods

In this cross-sectional study, records of patients with advanced cancer admitted to the Hospice Palliative Care Unit of the China Medical University Hospital in Taiwan from June 2005 to September 2007 were retrospectively analyzed. Patients had to be 20 years of age or older, admitted to the Hospice Palliative Care Unit, have a complete medical record for vital signs, and routinely have had a basic blood test at admission. For the patients who were admitted more than twice, the first admission was selected for use in the study. A total of 240 patients were enrolled in this study; six were excluded because of the lack of survival data. Finally, 234 patients with advanced cancer were selected. The ethics committee of the China Medical University Hospital approved the study.

All potential objective prognostic predictors, including demographic data, diagnostic and therapeutic information, health performance status, vital signs, and biological parameters, were collected by three experienced hospice physicians and registered nurses within 24 hours of hospice admission. The three hospice physicians, all specialists in Hospice and Palliative Medicine in Taiwan, each have more than five years' experience working on a hospice ward. The potential parameters were based on previous studies or on physicians' clinical experience.[18,19,21–23,27] Demographic data included gender, age, and body mass index; the body weight of bedridden patients was measured by an in-bed scale. Diagnostic and therapeutic information, including the primary site of malignancy, metastases, and history of radiation therapy or chemotherapy, were taken from each patient's medical record. Health performance status was evaluated and recorded using the ECOG performance status scale. Vital signs recorded at admission included blood pressure, heart rate, and oxygen usage. Laboratory tests were conducted through routine blood drawing at admission. The evaluated parameters included WBC, hemoglobin, platelets, alanine aminotransferase, aspartate aminotransferase, BUN, creatinine (Cr), total bilirubin, albumin, CRP, potassium (K), sodium (Na), and calcium (Ca). Survival days were defined as the period from the date of admission to the Hospice Palliative Care Unit to the date of death. Patients who survived for more than seven days were labeled as "long survivors," and those who died within seven days were labeled as "short survivors."