Original Article

Longitudinal Temporal and Probabilistic Prediction of Survival in a Cohort of Patients With Advanced Cancer

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Abstract

Context. Survival prognostication is important during the end of life. The accuracy of clinician prediction of survival (CPS) over time has not been well characterized.

Objectives. The aims of the study were to examine changes in prognostication accuracy during the last 14 days of life in a cohort of patients with advanced cancer admitted to two acute palliative care units and to compare the accuracy between the temporal and probabilistic approaches.

Methods. Physicians and nurses prognosticated survival daily for cancer patients in two hospitals until death/discharge using two prognostic approaches: temporal and probabilistic. We assessed accuracy for each method daily during the last 14 days of life comparing accuracy at Day −14 (baseline) with accuracy at each time point using a test of proportions.

Results. A total of 6718 temporal and 6621 probabilistic estimations were provided by physicians and nurses for 311 patients, respectively. Median (interquartile range) survival was 8 days (4−20 days). Temporal CPS had low accuracy (10%−40%) and did not change over time. In contrast, probabilistic CPS was significantly more accurate ($P < .05$ at each time point) but decreased close to death.

Conclusion. Probabilistic CPS was consistently more accurate than temporal CPS over the last 14 days of life; however, its accuracy decreased as patients approached death. Our findings suggest that better tools to predict impending death are necessary. J Pain Symptom Manage 2014;48:875−882.

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Accepted for publication: February 18, 2014.

0885-3924/$ - see front matter
http://dx.doi.org/10.1016/j.jpainsymman.2014.02.007

Key Words
Longitudinal, prognosis, advanced cancer, inpatients, accuracy

Introduction

Survival prognostication is important in patients with advanced cancer, particularly during the last few weeks of life. For patients and families, having prognostic information influences treatment preferences, decreases uncertainty, and helps them to plan ahead for both personal and health-care matters.[1–3] For health-care providers, particularly for oncologists, short-term prognostication during the last few weeks of a patient's life is relevant for clinical decision making because discharge planning, code status discussions, goals of care, hospice transfers, and enrollment onto integrated care pathways are dependent on prognosis.[2,4] For institutions, accuracy in prognostication may help to redirect the use of resources from aggressive end-of-life measures to patient comfort.

Clinician prediction of survival (CPS) can be expressed in two ways: 1) temporal CPS: providing an estimated duration of survival or 2) probabilistic CPS: providing the probability that a patient would survive for a predefined length of time (e.g., 90% chance of being alive in 48 hours, 20% chance of being alive at one month). Health-care providers are inaccurate in estimating survival for cancer patients.[5–10] Temporal CPS has reported accuracies between 20% and 30%.[5,6,8,11] A few studies have examined the accuracy of the probabilistic CPS in patients with advanced cancer.[6,12] In a prior study from our group, we showed that clinicians were more accurate in estimating survival with probabilistic CPS than with temporal CPS.[6]

Prognostication is a dynamic process. It changes as a patient progress through the stages of the disease, particularly in the last weeks of life when patients deteriorate rapidly. Most studies evaluating accuracy of prognostication have assessed CPS at a single point in time.[13] A few studies have serially measured accuracy of prognostication.[14–16] However, the methodologies used in these studies are heterogeneous and the conclusions are diverse. A better understanding of how the accuracy of these different prognostication strategies varies over time may allow us to improve our ability to prognosticate. The aim of this study was to examine the changes in prognostication accuracy over time during the last 14 days of life in a cohort of patients with advanced cancer admitted to acute palliative care units using two prognostication strategies. Our secondary objective was to compare the accuracy between temporal and probabilistic CPS and compare between physicians and nurses over time.

Methods

Patients

We enrolled consecutive patients with a diagnosis of advanced cancer who were 18 years of age or older and were admitted to the acute palliative care units (APCU) at M.D. Anderson Cancer Center in the U.S. between May 5, 2010, and July 6, 2010, and Barretos Cancer Center in Brazil between January 27, 2011, and July 1, 2011. Both APCUs are dedicated units staffed by an interdisciplinary team including physicians trained in palliative care, nurses, social workers, and other professionals, who provide intensive symptom support and transition of care for patients with advanced cancer and their families. Nurses and physicians in both units rotated in the APCUs a few days at a time and ensured continuity of care by signing over cases routinely.

The institutional review boards at both institutions approved this study and provided waiver of consent for patient participation. This approach was adopted for this noninterventional study to minimize distress during the consent process and to ensure that we could collect data on consecutive patients. All clinicians who participated in this study signed the informed consent before patient enrollment. Patient demographics, including age, gender, race, education, religion, cancer diagnosis, and length of stay, were obtained from chart review.

Outcomes

Physicians and nurses were asked to prognosticate daily or twice daily, respectively, for cancer patients from APCU admission to death