Meta-analysis of survival prediction with Palliative Performance Scale


CRD summary
The conclusions of this study that higher Palliative Performance Scale scores were associated with increased survival and that females lived longer than males, with an additional decrease in hazard ratio for females not diagnosed with cancer, are likely to be reliable. The authors highlighted that this may represent an incomplete picture and additional factors should be included in future analyses.

Authors’ objectives
To assess the effectiveness of the Palliative Performance Scale (PPS) and its relationships with other variables (such as age, gender, diagnosis) in survival prediction in palliative care using individual patient data (IPD) meta-analysis.

Searching
The authors of six known PPS survival prediction studies were invited to collaborate in this study. MEDLINE, Web of Science and Google Scholar were used to identify any additional relevant studies. The bibliographies of the six known studies were examined. No additional studies were identified.

Study selection
Studies that used PPS for survival prediction in palliative care patients were eligible for inclusion.

The included studies were conducted in palliative care units, hospital and a community hospice. Study duration ranged from three to 30 months. Mean patient age ranged from 64 to 78 years.

Beyond the six known PPS survival prediction studies, the authors stated neither how studies were assessed for inclusion nor how many reviewers performed the study selection.

Assessment of study quality
The complete individual patient data dataset was given to each group in the collaboration so they could check the analyses.

Published criteria (Altman, McKibbon) were used to assess the methodological quality of the included studies. Criteria assessed included: sample size; inception equivalence of study cohorts; accuracy; and consistency of PPS score measurement.

The authors described neither how the process of validity assessment was undertaken nor how many reviewers were involved in the process.

Data extraction
Each member of the collaborative group submitted the anonymised individual patient data dataset in the form used in their original study. Variables included in the meta-analysis were refined based upon the data submitted by participating groups and the extent to which datasets could be pooled.

Methods of synthesis
Cross-tabulation and $\chi^2$ statistics were used to describe the compatibility of variables across the included studies. Kaplan-Meier survival curves were constructed for each study and across studies grouped by PPS score. Cox proportional hazard models were used to identify significant predictor variables for survival. These were stratified by study to allow for heterogeneity between studies in baseline risk. Models were checked for influential observations, poorly fitted cases and the adequacy of the proportional hazards assumption.

Results of the review
The authors of four studies (n = 1,808) responded to the invitation to collaborate and three were able to provide data that were included in the analysis. A fourth data set was provided by the authors of this paper. Four prognostic variables were compatible across the four studies and were included in the individual patient data dataset: PPS score; gender; age group (19 to 44, 45 to 64, 65 to 74, 75 to 84 and 84+ years); and diagnosis (cancer or non-cancer). To achieve consistency across the studies, four individual patient data cases with survival times beyond 365 days, two cases with PPS scores of more than 80% and two cases in people aged less than 19 years were excluded from the analysis. The final data set represented 80.8% (1,808/2,237) of the participants in the original six studies.

PPS was found to have a statistically significant relationship with survival (p<0.0001). There was a strong ordering effect, where higher PPS scores were associated with longer survival. Initial PPS, gender and cancer by gender interaction were significant variables in the Cox model; females survived for longer than males, with a further decrease in hazard ratio for females not diagnosed with cancer. The PPS results were relatively homogeneous across studies, and the results for gender and cancer status were consistent with confidence intervals overlapping across all studies. Age had no significant effect on survival.

**Authors’ conclusions**

This individual patient data meta-analysis showed that functional status as measured by the PPS was strongly associated with the survival of terminally ill patients, with higher values associated with increased length of survival. Further work was needed to improve reporting of survival times/probabilities and to improve predictive accuracy by including additional variables in the models.

**CRD commentary**

The authors have applied valid analytical techniques to the problem of survival prediction in palliative care. The process methodologies described were appropriate to an individual patient data meta-analysis and appeared to result in inclusion of a large proportion of the available data, although the quality of the source studies was variable. The authors’ conclusions that higher levels of PPS were associated with increased length of survival and that females lived longer than males, with an additional decrease in hazard ratio for females not diagnosed with cancer, are likely to be reliable. A sensitivity analysis that treated PPS score as a continuous variable may have been useful, as some of the PPS categories contained small numbers of patients. As highlighted by the authors in their recommendation for further research to include additional variables in the models, these conclusions may well represent an incomplete picture.

**Implications of the review for practice and research**

**Practice:** The authors did not make any recommendations for practice.

**Research:** Further work was needed to improve reporting of survival times/probabilities and to improve predictive accuracy by including additional variables in the models.

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