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## Guideline for Estimating Length of Survival in Palliative Patients

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Physicians are frequently asked questions around expected time of survival, mostly by patients and families. Additionally, with increasing availability and awareness of palliative care services, there will be a need to define eligibility criteria, which will be in part based on prognosis.

Physicians by and large know that their estimates are just that: estimates. Patients and families generally understand that as well. However, prognosticating carries with it some risks. Overestimating the length of survival (the more common error, according to studies) leaves families feeling they have been robbed of time. Underestimating leaves the patient and family wondering when the end is about to appear, and perhaps questioning the credibility of the source of that information. All involved need to realize that estimates are not guarantees, and that conditions at this time of life may change rapidly.

A number of studies have attempted to address the issue of estimating length of survival in individuals with terminal disease<sup>1</sup>. Although there are no mechanisms to predict the future with certainty, the following may help in determining the matter for the patient at hand.

### A. Diagnosis with a poor prognosis

Some illnesses are associated with a diagnosis that virtually always carries a poor prognosis. Examples would include pancreatic cancer, most biliary tract cancers, metastatic adenocarcinomas of unknown primary, and untreated small cell lung cancers.

### B. Circumstances with a very poor prognosis

In addition to the functional decline is usually seen in the terminal phase of progressive illness, there are some circumstances that have a very poor prognosis in specific illnesses:

<i>Cancer:</i>	<ul style="list-style-type: none"> <li>- multiple metastases to the brain, liver, or lung</li> <li>- refractory hypercalcemia</li> <li>- ongoing bleeding from tumour, or bone marrow failure without transfusions</li> </ul>
<i>CHF:</i>	<ul style="list-style-type: none"> <li>- hemodynamic failure requiring inotropic support</li> <li>- progressive renal insufficiency</li> <li>- repeated hospital admissions</li> </ul>
<i>Renal Failure:</i>	<ul style="list-style-type: none"> <li>- discontinuation of dialysis</li> <li>- severe hyperkalemia without treatment</li> </ul>
<i>COPD:</i>	<ul style="list-style-type: none"> <li>- respiratory failure</li> </ul>
<i>Misc:</i>	<ul style="list-style-type: none"> <li>- sepsis in a frail, bedridden patient</li> <li>- any condition causing coma where fluids are not given (e.g. massive CVA, post-resuscitative hypoxic encephalopathy)</li> </ul>

### C. Illnesses showing a momentum of functional decline

The momentum of decline in functional status, when interpreted in the context of other parameters of physiologic decline (such as organ failure), provides some of the most intuitively valid information for prognosticating terminal illness. The underlying premise is that there tends to be a consistency to the rate of functional decline as the end of life nears; rapid changes tend to continue rapidly, and slow changes continue slowly (although the “final changes” often occur quickly).

An illness whose functional decline is noted month-to-month will likely continue for a number of months. An illness whose functional decline is noted weekly is likely to continue for a number of weeks. Daily functional decline may indicate a prognosis limited to days.

By observing the course of the illness thus far, and understanding the illness, one can make general estimates of future deterioration. It would of course be important to distinguish between reversible and irreversible causes resulting in the functional decline.

Clinical prediction of survival has been found to be erroneous (defined as more than double or less than half of actual survival) 30 % of the time in expert hands. Two thirds of errors are based on over-optimism and one third on over pessimism. Pain has not been associated with length of survival (except “unendurable pain” in one study). Treatment with opioid analgesics has not been found to impact length of survival.

The following is a summary of a few studies that address estimating survival in patients with a terminal disease. Initially, study of the Karnofsky Performance Status (Table 1) showed that performance status is an important predictor of survival. Further work has attempted to refine the ability to predict length of survival. Preexisting disease, prior treatment, psychological status and social support may affect the length of survival in a terminal illness.

<b>%</b>	<b>Criteria</b>
100	Normal; no complaints; no evidence of disease
90	Able to carry out normal activity; minor signs or symptoms of disease
80	Normal activity with effort; some signs or symptoms of disease
70	Cares for self; unable to carry on normal activity or do active work
60	Requires occasional assistance, but is able to care for most of his/her needs
50	Requires considerable assistance and frequent medical care
40	Disabled; requires special care and assistance
30	Severely disabled; hospitalization is indicated although death not imminent
20	Very sick; hospitalization necessary, active supportive treatment necessary
10	Moribund; fatal processes progressing rapidly
0	Dead

The Palliative Performance Scale (PPS) is a modification of the Karnofsky Performance Scale (KPS), designed specifically for measurement of physical status in Palliative Care (Table 2).<sup>2</sup> Using the Palliative Performance Scale, only about 10% of patients with a score of 50% or less would be expected to survive more than 6 months.<sup>3</sup>

Certain clinical factors increase the predictive value of estimated length of survival when used along with performance status. In one small prospective study, for example, it was demonstrated that there was a significant relationship between length of survival and dysphagia, cognitive failure and weight loss.<sup>4</sup> The presence of all three factors – weight loss of 10 kg or more, MMSE of < 24, and dysphagia to solids or liquids predicted survival of less than 4 weeks with an accuracy of 74 %. The estimates in this study were equivalent to that of two physician estimates.

<b>Table 2. Palliative Performance Scale</b>					
<b>%</b>	<b>Ambulation</b>	<b>Activity and Evidence of Disease</b>	<b>Self-Care</b>	<b>Intake</b>	<b>Level of Consciousness</b>
100	Full	Normal Activity No Evidence of Disease	Full	Normal	Full
90	Full	Normal Activity Some Evidence of Disease	Full	Normal	Full
80	Full	Normal Activity with Effort Some Evidence of Disease	Full	Normal or Reduced	Full
70	Reduced	Unable to do Normal Job / Work Some Evidence of Disease	Full	Normal or Reduced	Full
60	Reduced	Unable to do Hobby / House Work Significant Disease	Occasional Assistance Necessary	Normal or Reduced	Full or Confusion
50	Mainly Sit/Lie	Unable to Do Any Work Extensive Disease	Considerable Assistance Required	Normal or Reduced	Full or Confusion
40	Mainly in Bed	As Above	Mainly Assistance	Normal or Reduced	Full or Drowsy or Confusion
30	Totally Bed Bound	As Above	Total Care	Reduced	Full or Drowsy or Confusion
20	As Above	As Above	Total Care	Minimal Sips	Full or Drowsy or Confusion
10	As Above	As Above	Total Care	Mouth Care Only	Drowsy or Coma
0	Death	--	--	--	--

Other studies have used clinical symptoms along with performance scales. The Palliative Prognostic Index (PPI) is an example of such a tool (Table 3), using the PPS along with oral intake, edema, dyspnea at rest and delirium.<sup>5</sup> If the PPI is greater than 6.0, survival is less than three weeks (Sensitivity – 80 %; Specificity – 85 %).

<b>Table 3. Palliative Prognostic Index (PPI)</b>			Max. Possible
Palliative Performance Scale	10 – 20	4.0	4.0
	30 – 50	2.5	
	≥ 60	0	
Oral Intake	Severely Reduced (≤ mouthfuls)	2.5	2.5
	Moderately Reduced (> mouthfuls)	1.0	
	Normal	0	
Edema	Present	1.0	1.0
	Absent	0	
Dyspnea at rest	Present	3.5	3.5
	Absent	0	
Delirium	Present	4.0	4.0
	Absent	0	
<b>Total</b>			15

One prognostic score, the PaP (for “Palliative Prognostic Score” [Table 4]), includes use of anorexia, dyspnea, total white blood count, and lymphocyte percentage along with the KPS and expert clinical prediction of survival.<sup>6</sup> Based on the results of these variables, patients are considered to belong to one of three prognostic groups, reflecting 30-day survival probability of >70%, 30-70%, or <30%.

As in much of palliative care, studies addressing prognosis mostly deal with advanced cancer. The advanced cancer trajectory may be significantly different from that of other advanced illnesses. Diseases resulting in chronic organ failure, such as chronic obstructive pulmonary disease, congestive heart failure, and end-stage liver disease, tend to run a more fluctuating course and result in death in a less predictable time.<sup>7</sup>

It is clear that performance status is related to length of survival. In the cancer population, clinical symptoms of anorexia, weight loss, dysphagia, and cognitive failure have been shown to have predictive value for survival. In any case, it remains that when predicting length of survival it is most useful to have observed the patient over a period of time, to understand the illness, and to have a sense of psychological and social issues involved. It is of course important to have ongoing good communication with the individual and his or her family. Observation over a period of time will provide a sense of the momentum of functional decline. This momentum may provide the most accurate estimate of length of survival

<b>Table 4. PaP Score and Classification of Patients in Three Risk Groups</b>	
Dyspnea	
No	0
Yes	1
Anorexia	
No	0
Yes	1.5
Karnofsky Performance Status	
≥ 30	0
≤ 20	2.5
Clinical Prediction of Survival (weeks)	
>12	0
11 - 12	2.0
9 - 10	2.5
7 - 8	2.5
5 - 6	4.5
3 - 4	6.0
1 - 2	8.5
Total WBC	
Normal (4.8-8.5)	0
High (8.5-11)	0.5
Very high (>11)	1.5
Lymphocyte %	
Normal (20-40)	0
Low (12-19.9)	1.0
Very Low (< 11.9)	2.5
<b>Total</b>	
0 - 17.5	
Risk Groups According to Total Score:	
<u>30-day survival probability</u>	<u>Total Score</u>
> 70%	0 - 5.5
30 - 70%	5.6 - 11.0
< 30 %	11.1 - 17.5

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#### REFERENCES

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- <sup>2</sup> Anderson F, Downing GM, Hill J, Casorso L, Lerch N. Palliative Performance Scale (PPS): A New Tool. *J Palliat Care* 1996; 12(1): 5-11.
- <sup>3</sup> Morita T, Tsunoda J, Inoue S, Chihara S. Validity of the Palliative Performance Scale from a Survival Perspective. *J Pain and Symptom Manage* 1999;18:2-3.

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<sup>4</sup> Bruera E, Miller MJ, Kuehn N, MacEachern T, Hanson J. Estimate of Survival of Patients Admitted to a Palliative Care Unit: A Prospective Study. *J Pain Symptom Manage* 1992; 7(2): 82-86.

<sup>5</sup> Morita T, Tsunoda J, Inoue S, Chihara S. The palliative prognostic index: a scoring system for survival prediction of terminally ill cancer patients. *Supportive Care in Cancer* 1999; 7: 128-33.

<sup>6</sup> Maltoni M, et al. Successful Validation of the Palliative Prognostic Score in Terminally Ill Cancer Patients. *J Pain and Symptom Manage* 1999;17:240-247.

<sup>7</sup> Fox E, et al. Evaluation of Prognostic Criteria for Determining Hospice Eligibility in Patients With Advanced Lung, Heart, or Liver Disease. *JAMA* 1999; 282:1638-45.