Prognosis: How do we estimate it and why is it important?

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Prognosis: The Definition

- prog·no·sis ***noun*** \präg-ˈnō-səs\
- : a doctor's opinion about how someone will recover from an illness or injury
- : a judgment about what is going to happen in the future

< http://www.merriam-webster.com/dictionary/prognosis>

- Many cultures recognize impending death. In the holy city of Varanasi (Hindu capital of India), families and priests bring dying people to end their lives in charity hospices.
- When asked how they know when to bring patients to the hospice the family members and priests answered, "when the patient no longer wanted to eat or drink".
- A 14-day stay is allowed but 10% died on the day of admission, 84% in the first week, and all by 17 days. Our system is very different from this, but still faces the same prognostication concerns.

http://www.independent.co.uk/news/world/asia/varanasi-the-last-stop-before-nirvana-1805245.html

Basu, M. Hotel Dealth. CNN Interactive Online. http://www.cnn.com/interactive/2014/04/world/india-hotel-death/index.html

Survival Estimation in Palliative Care. Prtenoy, RK and Bruera E. Topics in Palliative Care. Volume 4. Oxford University Press, Mar 30, 2000.

Photograph by Atul Loke / Panos Pictures for CNN.
http://www.cnn.com/interactive/2014/04/world/india-hotel-death/index.html

Prognosis: Why Bother?

- **Patient autonomy and need to know:** Palliative care patients recognize that their disease is progressing inexorably, but deserve to share the physician's estimation of life expectancy in order to make their own end of life decisions, both practical and spiritual.
- **Practical implications in planning care:** Patients and their families may need to plan time together and make decisions about estate management, funeral planning and other practical issues.
- **Timing of palliative care referral:** The average referral time is 1-2 months before death, though more than 6 months of benefits are available, including drug coverage, home care and nursing support. Patients should be referred when they have a life-threatening illness and will live for months rather than years.

Are medical staff effective in prognosticating?

Significant variation exists among health professionals in ability to predict survival:

- In one study, 14 oncologists treating 9 major adult solid malignancies were asked to complete questionnaires predicting survival based on performance status, oral intake, and other clinical factors when patients experienced progressive disease after standard chemotherapies. Clinically predicted survival (cps) was calculated by the oncologists from the date of progressive disease to the predicted date of death. Actual survival (as) was compared with cps using Kaplan-Meier survival curves, and factors affecting inaccurate prediction were determined by logistic regression analysis. The prediction of survival time was considered accurate when the cps/as ratio was between 0.67 and 1.33.

RESULTS:

- The study cohort consisted of 75 patients. Median cps was 120 days (interquartile range: 60-180 days), and median as was 121 days (interquartile range: 40-234 days). **The participating oncologists accurately predicted as within a 33% range 36% of the time; the survival time was overestimated 36% of time and underestimated 28% of the time.** The **factors affecting the accuracy of the survival estimate were the experience of the oncologist, patient age, and information given about the palliative care unit.**

Taniyama TK[1], Hashimoto K[1], Katsumata N[2], Hirakawa A[3], Yonemori K[1], Yunokawa M[1], Shimizu C[1], Tamura K[1], Ando M[4], Fujiwara Y[1]. Can oncologists predict survival for patients with progressive disease after standard chemotherapies? Curr Oncol. 2014 Apr;21(2):84-90. doi: 10.3747/co.21.1743.

- **<u>What tools are available to help in prognostication?</u>**
- **Palliative Performance Scale, modified from the Karnofsky Performance Scale used by oncologists**
- This scale assesses function ranging from 0% (death) to 100% (normal function), and was developed by the Victoria Hospice as a communication tool and for prognostic use.

KARNOFSKY PERFORMANCE STATUS SCALE DEFINITIONS RATING (%) CRITERIA

	100	Normal no complaints; no evidence of disease.
Able to carry on normal activity and to work; no special care needed.	90	Able to carry on 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 to do active work.
Unable to work; able to live at home and care for most personal needs; varying amount of assistance needed.	60	Requires occasional assistance, but is able to care for most of his personal needs.
	50	Requires considerable assistance and frequent medical care.
	40	Disabled; requires special care and assistance.
	30	Severely disabled; hospital admission is indicated although death not imminent.
Unable to care for self; requires equivalent of institutional or hospital care; disease may be progressing rapidly.	20	Very sick; hospital admission necessary; active supportive treatment necessary.
	10	Moribund; fatal processes progressing rapidly.
	0	Dead

Karnofsky Scale

Crooks, V, Waller S, et al. The use of the Karnofsky Performance Scale in determining outcomes and risk in geriatric outpatients. J Gerontol. 1991; 46: M139-M144.

Palliative Performance Scale (PPS)

%	Ambulation	Activity and Evidence of Disease	Self-Care	Intake	Level of Conscious
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 work, some evidence of disease	Full	Normal or reduced	Full
60	Reduced	Unable to do hobby or some housework, significant disease	Occasional assist 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	Unable to do any work, extensive disease	Mainly assistance	Normal or reduced	Full, drowsy, or confusion
30	Totally bed bound	Unable to do any work, extensive disease	Total care	Reduced	Full, drowsy, or confusion
20	Totally bed bound	Unable to do any work, extensive disease	Total care	Minimal sips	Full, drowsy, or confusion
10	Totally bed bound	Unable to do any work, extensive disease	Total care	Mouth care only	Drowsy or coma
0	Death	—	—	—	—

PALLIATIVE PERFORMANCE SCALE (PPS)

%	Ambulation	Activity Level Evidence of Disease	Self-Care	Intake	Level of Consciousness	Estimated Median Survival in Days (a)	(b)	(c)
100	Full	Normal *No Disease*	Full	Normal	Full			
90	Full	Normal *Some Disease*	Full	Normal	Full	N/A		
80	Full	Normal with Effort *Some Disease*	Full	Normal or Reduced	Full		N/A	
70	Reduced	Can't do normal job or work *Some Disease*	Full	As above	Full	145		108
60	Reduced	Can't do hobbies or housework *Significant Disease*	Occasional Assistance Needed	As above	Full or Confusion	29	4	
50	Mainly sit/lie	Can't do any work *Extensive Disease*	Considerable Assistance Needed	As above	Full or Confusion	30	11	
40	Mainly in Bed	As above	Mainly Assistance	As above	Full or Drowsy or Confusion	18	8	41
30	Bed Bound	As above	Total Care	Reduced	As above	8	5	
20	Bed Bound	As above	As above	Minimal	As above	4	2	
10	Bed Bound	As above	As above	Mouth Care Only	Drowsy or Coma	1	1	6
0	Death	-	-	-	--			

A. Survival post-admission to an inpatient palliative unit, all diagnoses (Virik 2002).

B. Days until inpatient death following admission to an acute hospice unit, diagnoses not specified (Anderson 1996).

C. Survival post admission to an inpatient palliative unit, cancer patients only (Morita 1999).

Example

- Mr. Jones is a 73 year old gentleman with pancreatic cancer. He has advanced local disease and has been taking very poor po lately. He was once an avid golfer but now must ambulate with a walker and can only walk short distances before feeling fatigued. He is still able to get around his house with his walker and is able to toilet, dress, and bathe himself. He seems more confused recently, being unsure of where he is at times and asking his wife questions about subjects they just discussed.

Palliative Performance Status for this Patient?

- **Palliative Performance Index:** A scoring system used in a retrospective cohort study in Shimoka, Japan to determine prediction of survival in terminally ill cancer patients. It uses the palliative performance scale and other measures including oral intake, edema, dyspnea at rest and delirium. The higher the score the shorter the length of survival.
  e.g.
  PPI > 6, survival < 3 weeks (sensitivity 80%, specificity 85%)
  PPI > 4, survival < 6 weeks (sensitivity 80%, specificity 77%)

Factor	Partial score
PPS 10–20%	4
PPS 30–50%	2.5
PPS >50%	0
Delirium	4
Dyspnoea at rest	3.5
Oral intake mouthfuls or less	2.5
Oral intake reduced but more than mouthfuls	1
Oral intake normal	0
Oedema	1

Total score (sum of partial scores) and expected survival

- Group A (total score <2.0): greater than 6 weeks
- Group B (2.0–4): 3–6 weeks
- Group C (>4.0): less than 6 weeks

PPI > 6, survival < 3 weeks (sensitivity 80%, specificity 85%)
PPI > 4, survival < 6 weeks (sensitivity 80%, specificity 77%)

Palliative Prognostic Index

Re-using our example…

- Mr. Jones is a 73 year old gentleman with pancreatic cancer. He has advanced local disease and has been taking very poor po lately (1 Boost shake and 1-3 bites of each meal). He was once an avid golfer but now must ambulate with a walker and can only walk short distances before feeling fatigued. He is still able to get around his house with his walker and is able to toilet, dress, and bathe himself. He seems more confused recently, being unsure of where he is at times and asking his wife questions about subjects they just discussed. He does not feel short of breath at rest but quickly becomes short of breath with even small amounts of exertion No edema on exam.

Palliative Prognostic Index for this Patient?

How Effective Are these tools?

- Study performed at UNC,where patients were assigned a score on the PPS ranging from 0% to 100% at initial consultation.
- Standardized symptom assessments were carried out daily
- Survival was determined by medical record review and search of the National Death Index.
- Of 261 patients seen since January 2002, 157 had cancer and 104 had other diagnoses.
- PPS scores ranged from 10% to 80% with 92% of the scores between 10% and 40%.
- Survival ranged from 0 to 30 months, with a median of 9 days.
- By 90 days, 83% of patients had died.
- Proportional hazards regression estimates showed that a 10% decrement in PPS score was associated with a hazard ratio of 1.65 (95% confidence interval [CI]: 1.42-1.92).
- Proportional odds regression models showed that a lower PPS was significantly associated with higher levels of dyspnea.

TABLE 2. RELATIONSHIP OF BASELINE PPS AND SYMPTOM SCORES TO SURVIVAL: PROPORTIONAL HAZARDS REGRESSION MODEL (n = 212)

Variable	*Hazard ratio*	*95% Confidence interval*	p *value*
PPS[a]	1.65	1.42–1.92	<0.0001
Dyspnea	1.11	1.01–1.23	0.04
Pain	1.04	0.94–1.16	0.41
Fatigue	1.05	0.96–1.16	0.28
Agitated delirium	1.02	0.91–1.14	0.73

[a]Estimate for a 10% lower PPS score. Other estimates correspond to a 10% higher score.
PPS, Palliative Performance Scale.

Olajide O[1], Hanson L, Usher BM, Qaqish BF, Schwartz R, Bernard S. **Validation of the palliative performance scale in the acute tertiary care hospital setting.** J Palliat Med. 2007 Feb;10(1):111-7.

Barriers to clearly communicating a bad prognosis:

- For the physician acknowledging a poor prognosis seems to be an admission of failure
- The patient may feel abandoned
- The patient may be harmed by anxiety and despair
- The physician may have unresolved issues about mortality
- The physician feels discomfort with the patient's anticipated emotional response

- Others that you all have experienced?

- **Patient experiences:**
- Most are generally satisfied with the way news is presented
- Prefer physicians to get to the point quickly
- 22-26% of patients felt the need for more information
- Best given in person, not over phone and not in the recovery room
- Patients informed by a physician whom they know well are more satisfied

Z. Chouliara, N. Kearney, D. Stott, A. Molassiotis, and M. Miller. Perceptions of older people with cancer of information, decision making and treatment: a systematic review of selected literatureAnn Oncol (November 2004) 15 (11): 1596-1602 doi:10.1093/annonc/mdh423

McKee, Nora. Communicating Prognosis. University of Saskatchewan.<http://www.usask.ca/cme/learning_resources/CPL_resources/palliative_care/commprognosis.php>

Reasons to have these conversations:

- A study of 1231 patients with stage IV lung or colorectal cancer found that patients who have end-of-life discussions with their physician prior to the last month of life were less likely to receive highly aggressive care, such as hospitalizations and chemotherapy

Mack JW, Cronin A, Keating NL, Taback N, Huskamp HA, Malin JL, Earle CC, Weeks JC. Associations between end-of-life discussion characteristics and care received near death: a prospective cohort study. J Clin Oncol. 2012;30(35):4387.