Prognosis (“foretelling, foreseeing”) is a term for predicting the likely outcome of one’s current standing. One of the earliest written works of medicine is the Book of Prognostics by Hippocrates, written around 400 BC. This work opens with the following statement: “It appears to me a most excellent thing for the physician to cultivate prognosis; for by foreseeing and foretelling, in the presence of the sick, the present, the past, and the future, and explaining the omissions which patients have been guilty of, he will be the more readily believed to be acquainted with the circumstances of the sick; so that men will have confidence to entrust themselves to such a physician.”

For 19th century physicians, particularly those following the French school of medicine, the main aim of medicine was not to cure disease, but rather to give a medical diagnosis and achieve a satisfying prognosis of the patient’s chances. Only several decades later did the focus of efforts in Western medicine shift to curing disease.

At the end of the nineteenth century prognostication took up approximately ten percent of medical textbooks, by 1970 this had fallen to nearly zero. An article on prognostication in Lancet from 1934 reads: “Of the three great branches of clinical science – diagnosis, prognosis, and treatment – prognosis is admittedly the most difficult. Whilst precise predictions of the future are obviously not possible, relatively simple mathematical modeling techniques can make reasonable estimates of likely outcomes for individual patients. Patient’s prognosis not only depends on their age and primary diagnosis, but also on the severity of their illness, their functional capacity both prior to and during the illness and the number of co-morbidities they are suffering from.

THE COMMON SCENARIO

Imagine you are receiving an unconscious patient on ventilator. On examination, you find out that the patient, a chronic smoker with 40 pack years, k/c/o HT/CAD & DM on treatment for the past 10 years, recently diagnosed right lung cancer on chemotherapy for 8 weeks, developed one episode of GTCS, revived post cardiac arrest in another hospital and connected to ventilator and on inotropic support. CT Brain taken shows multiple metastases. Patient’s family members are called by the doctor to inform the condition. After Doctor’s detailed explanation, the very next common question asked by the family members is “AUR KUCH PROBLEM NAHI HAI KYA?”.

PROGNOSTICATION

“Doctor, if I am dying, don’t use these machines on me.” This sentence is repeatedly heard by physicians. How are we to know that someone “is dying”? Most physicians are willing to forego useless medical interventions when a patient is near death or to shape a plan of care so that it reflects an unavoidably grim prognosis. To accomplish that, physicians need a number of skills and tools, including accurate ways of estimating survival prospects. In this article we review current efforts in that regard and evaluate the challenges and opportunities they present to practitioners and patients.

The day, one is born, not only he is growing in age and size; he is also marching towards death. The organ/organ system which has started its functioning slowly starts to fail also. One is growing day by day, means dying day by day. We know that, the patho-physiology for any disease should be congenital / traumatic/ infection/inflammation/or malignancy. Add one more organ failure.

Every person who is born has to die one day. Date of manufacture/ date of expiry are not only for man made products, but also for man. Every organ which is functioning in our body today will malfunction or stop functioning one day.


End of Life

Most doctors are over optimistic when giving prognosis. They tend to overstate how long the patient may survive. For patients who are critically ill, especially in an ICU, there are plenty of prognostic scoring systems which are more accurate; the most famous of these is APACHE II scale. Knowing the prognosis helps to decide on treatment modalities or to withhold them, which plays an important role in the end of life decisions? Prognostic scoring is also used for cancer outcome predictions.

Estimators that are commonly used are

1. Prognosis-free survival - Length of time during and after medication or treatment during which the disease being treated does not get worse.
2. Survival rate - % of people in treatment group who are alive for a period of time after diagnosis.
Table 1: Karnofsky performance scale (KPS)

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

Table 2: Palliative performance scale (PPS)

<table>
<thead>
<tr>
<th>%</th>
<th>Ambulation</th>
<th>Activity level of disease</th>
<th>Evidence of disease</th>
<th>Self-care</th>
<th>Intake</th>
<th>Level of consciousness</th>
<th>Estimated median survival in days</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Full</td>
<td>Normal</td>
<td>No disease</td>
<td>Full</td>
<td>Normal</td>
<td>Full</td>
<td>NA</td>
</tr>
<tr>
<td>90</td>
<td>Full</td>
<td>Normal</td>
<td>Some disease</td>
<td>Full</td>
<td>Normal</td>
<td>Full</td>
<td>NA</td>
</tr>
<tr>
<td>80</td>
<td>Full</td>
<td>Normal with effort</td>
<td>Some disease</td>
<td>Full</td>
<td>Normal or reduced</td>
<td>Full</td>
<td>145</td>
</tr>
<tr>
<td>70</td>
<td>Reduced</td>
<td>Cant do normal job or work</td>
<td>Some disease</td>
<td>Full</td>
<td>As above</td>
<td>Full</td>
<td>29</td>
</tr>
<tr>
<td>60</td>
<td>Reduced</td>
<td>Cant do hobbies or housework</td>
<td>Significant disease</td>
<td>Occasional assistance needed</td>
<td>As above</td>
<td>Full or confusion</td>
<td>18</td>
</tr>
<tr>
<td>50</td>
<td>Mainly sit/lie</td>
<td>Cant do any work</td>
<td>Extensive disease</td>
<td>Considerable assistance needed</td>
<td>As above</td>
<td>Full or confusion</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
<td>Mainly in bed</td>
<td>As above</td>
<td>Mainly assistance</td>
<td>As above</td>
<td>Full or drowsy or confusion</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Bed bound</td>
<td>As above</td>
<td>Total care</td>
<td>Reduced</td>
<td>As above</td>
<td>E</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>Bed bound</td>
<td>As above</td>
<td>As above</td>
<td>Minimal</td>
<td>As above</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bed bound</td>
<td>As above</td>
<td>As above</td>
<td>Mouth care only</td>
<td>Drowsy or coma</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Death</td>
<td>As above</td>
<td>As above</td>
<td>As above</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
by one characteristic: perhaps those newly diagnosed with a deadly illness or those who had reached a certain stage of such an illness. With the recent introduction of better computing and statistical tools, dramatically improved objective estimates of prognosis have become available. A statistical model that relies on computer analysis can often weigh the elements more accurately and usefully than projections that rely on the average experience of mixed groups or clinicians’ personal experience. A careful consideration of both individual diseases and diseased individuals is required for the restoration of prognosis to the same status as diagnosis and treatment.

PROGNOSTICATION TOOLS

Prognostication index is a global measurement of patients’ functional capacity which includes the following scores/indices.

Only 10% of patients with <50% score survive >6 months. PPS is a modification of KPS (Tables 1 and 2).

PPI >6.0, survival <3 weeks (Sensitivity – 80% Specificity – 85%) (Table 3).

Cardinal Symptoms Predicting Survival

National Hospice study data revealed 5 cardinal symptoms that predict survival - Dyspnea, Anorexia, Weight loss, Dry mouth and Dysphagia. Asthenia, Confusion, Drowsiness and Delirium have also been shown to have prognostic values in advanced cancer cases. Dyspnea predicts <30 days, Anorexia <58 days, Dry mouth <50 days, Dysphagia <30 days and Confusion <38 days. In general, greater the number of symptoms, worse is the prognosis (Table 4).

BIOLGIC PARAMETERS FOR PREDICTING POOR PROGNOSIS

- Low serum Na+ - Persistent hyponatremia in spite of corrective measures.
- Low serum Albumin – denotes long standing malnutrition/DCLD
- High TC / Low lymphocyte % - denotes immunosuppressive state of the patient.
- Thrombocytosis – negative prognostic indicator in multiple cancers.
- High serum Bilirubin – denotes active liver failure or sepsis.
- High Alk.Phosphatase – denotes increased metabolic state at present.
- High LDH – indicating high cell metabolism.
- High CRP – increased metabolism / cell turnover.
- Vit B 12 >600pmol/L - Hematologic disorders like chronic myelogenous leukemia, promyelocytic leukemia, polycythemia Vera, hyper eosinophilic syndrome, acute hepatitis, cirrhosis, hepatocellular carcinoma and metastatic liver disease.
- Uric Acid >7.2/dl – denotes high cell turnover and hyper metabolism.
• Malignant Hypercalcemia - in bone tumor/metastatic disease.

**GSF Prognostic Indicator guidance (gold standards framework)**

Earlier identification of people nearing the end of their life and inclusion on the register leads to earlier planning and better coordinated care.

It has three steps

**IDENTIFY → ASSESS → PLAN**

**IDENTIFY** patients in their last year and what stage are they.

**ACCESS** Current and future clinical and personal needs.

**PLAN** Planning the treatment as per the patient / his family’s decision.

Patients with cancer have sharp decline in functional status and quality of life in the last months of life. Identifying where the patient lies in the course of disease is important (Figure 2).

These models are not dictators, but only tools. They will be most helpful when well understood and thoughtfully applied, and their use warrants careful evaluation. Adjectives such as rarely and usually are notoriously ambiguous whereas numbers are clear and compact. The strongest argument for prognostic indices is that they facilitate professional communication. Some illnesses are associated with a diagnosis that virtually carries a poor prognosis like pancreatic cancer, biliary tract cancer and metastatic adenocarcinoma of unknown primary and untreated small cell lung cancer. There are circumstances that have a very poor prognosis in specific illnesses, given in Table 5.

**CONCLUSION**

Doctors face two challenges in prognosticating near the end of life: formulating accurate predictions and communicating them. If doctors are better able to anticipate death, they will be likely to help the patient and his family to make judicious use of medical treatments. Increased accuracy of prognosis helps patients and family to make directive decisions, allow for preparations and help avoid burdensome treatments.

Hippocratic writers characterized the physician’s role thus:

“Declare the past, diagnose the present, foretell the future; practice these arts.”

“Life is short, the art long, opportunity fleeting, experience treacherous, and judgment difficult.”

**REFERENCES**

1. Hipócrates, Hippocrates; with an English Translation WHS Jones. 1979: William Heinemann