FIGURE 1 – Rapid Cycle Plan-Do-Study-Act methodology [16]

**FIGURE 2 - Integration of prognostic screening tool and development of supportive care intervention using rapid-cycle PDSA methodology**

**INTEGRATION OF PROGNOSTIC SCREENING INTO ROUTINE ASSESSMENT**

- **PLAN/DO:** Staff informed of prognostic criteria, and criteria displayed on wall chart
  **STUDY/ACT:** Prognostic scoring not routinely considered or completed following random audit

- **PLAN/DO:** Prognostic screening added to agenda for discussion at weekly hepatology MDT
  **STUDY/ACT:** Junior staff not confident in completing scoring (e.g. uncertainty re performance score)

- **PLAN/DO:** Objective guidelines for scoring printed as single sheet and made available to junior staff
  **STUDY/ACT:** Inconsistent documentation of discussions

- **PLAN/DO:** MDT proforma with integrated prognostic screening(completion guidelines on back)
  **STUDY/ACT:** Nursing staff - difficulty locating documentation within large volumes of medical notes

- **PLAN/DO:** MDT proforma sheets coloured blue so easily identified
  **STUDY/ACT:** MDT documentation mass printed and completed for each patient during MDT

- **PLAN/DO:** Prognostic screening and MDT documentation standardised for hepatology inpatients
  **STUDY/ACT:** Random audit demonstrated completion rate of 89%. Proforma adopted.

**DEVELOPMENT OF SUPPORTIVE CARE INTERVENTION**

- **PLAN/DO:** Introduction of prognostic screening identified inpatients with poor prognosis
  **STUDY/ACT:** Patients/families not routinely informed of prognosis or stage of disease prior to discharge

- **PLAN/DO:** Consultant discussion with patient & family prior to discharge when criteria met
  **STUDY/ACT:** Difficult conversations surrounding uncertain trajectory in a complex patient group

- **PLAN/DO:** Communication skills training delivered to hepatology staff by palliative care team
  **STUDY/ACT:** GPs not routinely involved or included in discussions & unaware of progression

- **PLAN/DO:** GP poor prognosis letter template produced & completed for each appropriate patient
  **STUDY/ACT:** Complex palliative care needs identified during prognostic discussions

- **PLAN/DO:** Palliative care consultation offered to patients with complex symptomatic/psychosocial needs + links to community services and opportunities for advance care planning
  **STUDY/ACT:** Difficulties with continuity of care following discharge

- **PLAN/DO:** Hepatology specialist nurse allocated for each patient, with contact details made available
  **STUDY/ACT:** Above features combined and formalised as the ‘supportive care intervention’

**POOR PROGNOSIS SCREENING CRITERIA FOR INPATIENTS WITH CIRRHOSIS**

- Childs Pugh C
- > 2 liver related admissions last 6/12
- Ongoing alcohol use in known ArLD
- Currently unsuitable for transplantation
- WHO performance status 3-4

**SCORE ≥ 3**

**SUPPORTIVE CARE INTERVENTION**

- Consultant led poor prognosis discussion
- Poor prognosis letter to GP
- Opportunity for advance care planning
- Specialist palliative care review if complex symptomatic/social/psychological needs
- Allocation of hepatology specialist nurse

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Retrospective analysis of patient admission and mortality data. Cumulative score of ≥3 selected as trigger for intervention.

**FIGURE 3 - Integration of prognostic screening into weekly hepatology MDT proforma, completed weekly for each hepatology inpatient at University Hospitals Bristol Trust (front and reverse of sheet)**

![LIVER MDT Form](image)

### Calculating the Child Pugh Score for Cirrhosis Mortality

<table>
<thead>
<tr>
<th>Parameter</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin (g/dL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prothrombin</td>
<td></td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>INR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascites</td>
<td>11</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Varices (OESD score)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encephalopathy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>50</td>
<td>60</td>
<td>70</td>
</tr>
</tbody>
</table>

### West Haven Grading of Encephalopathy

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total loss of consciousness (e.g. coma)</td>
</tr>
<tr>
<td>2</td>
<td>Diminished responsiveness to verbal stimuli</td>
</tr>
<tr>
<td>3</td>
<td>Diminished responsiveness to tactile stimuli</td>
</tr>
<tr>
<td>4</td>
<td>Diminished responsiveness to pain stimuli</td>
</tr>
</tbody>
</table>

### WHO performance status

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capacity to carry out all duties of self-care</td>
</tr>
<tr>
<td>2</td>
<td>Ambulatory and capable of all self-care but unable to carry out any work activities, up and about 50% of the time</td>
</tr>
<tr>
<td>3</td>
<td>Ambulatory and capable of only some self-care but unable to carry out any work activities, up and about 25% of the time</td>
</tr>
<tr>
<td>4</td>
<td>ambulatory, requires help with all self-care activities, totally confined to bed or chair</td>
</tr>
</tbody>
</table>

### Suitability for Liver Transplant assessment

A patient’s current suitability for liver transplant assessment and work up is a multifactorial and complex. Decisions regarding who are made at a consultant level with support of the MDT. There are however some clear factors which, when present, render patients unsuitable at the current time, and for whom “unsuitable for transplant work up” can be ticked on the poor prognosis scoring criteria:

- Ongoing alcohol use in the context of previously diagnosed alcohol related liver disorder
- Ongoing destructive substance abuse
- Unattainable life expectancy (e.g. patients with chronic HCC)
- Life expectancy < 1 year due to non-hepatic co-morbidity
- Age > 75 (unless exceptional circumstances)