Appendix S1: Additional Methodology on Outcome Measures

Caregiver Activation
The Patient Activation Measure was developed by Judith Hibbard and faculty at the University of Oregon using qualitative methods, Rasch analysis, and classical test theory psychometric methods and has been validated in Bengali and Hindi. The Caregiver Activation Measure is a version of PAM. Both survey tools use 13 questions to qualify patients or caregiver respondents on a unidimensional, interval-level, Guttman-like scale. The CG-PAM and the PAM measure respondents on a 0-100 scale. Previous studies suggest that as activation increases, performance on a variety of general and disease-specific self-management behaviors also increases [1].

Knowledge on Cardiac Health Topics
Caregiver knowledge regarding topics related to cardiac health and the patient’s care was assessed through a 10-item instrument developed for this study. Caregivers queries included questions such as, “True or false: The patient should be encouraged to sleep or stay in bed as much as possible after surgery.” A correct answer was assigned “1” and “0” for any responses that were incorrect, “not sure” or missing value. Hence, the range for this instrument was a score of 0-10. There were 2 versions of the questionnaire that covered the same breakdown of topic areas (vitals, hygiene, diet, activity restrictions, physical therapy, exercise, medications). One version was administered within the hospital preoperatively and at discharge, and the other at 30 days post-discharge.

Quality of life – Physical Health Domain
The WHO short form quality of life assessment (WHOQOL-BREF) in Bengali and Hindi was obtained from The WHOQOL Group, Programme on Mental Health. The assessment is composed of 26 items that were structured into four domains: physical health (7 items), psychological health (6 items), social relationships (3 items), and environmental health (8 items), along with 2 items that measured overall quality of life. Items were assessed using a 5-point scale and scores for each of the four domains were adjusted on a scale from 4 to 20, per WHOQOL-BREF scoring protocol [2]. Higher scores reflected better quality of life within that domain.

Post-discharge complications
Post-discharge surgical complications are typically recorded only during hospital readmissions however occasionally it is done, during outpatient urgent care visits. This method underestimates the overall complication rate. Previous research has found that phone surveys with clearly-defined complications can be used as proxies for detecting post-discharge complications in surgical patients [3,4]. A chart review was not utilized for tracking adverse events post-discharge and other outcomes due to the variability in documentation and lack of follow-up at RTIICS.

Appendix S2: Additional Results on Outcome Measures

Quality of life- Psychological, Environmental, and Social Domains

Patient quality of life, evaluated using the WHOQOL-BREF, was measured at 30 days post-discharge and broken down into four domains. The physical health domain was measured at baseline in addition to 30-days post-discharge. Patients in the intervention group versus SoC showed greater improvements in the physical health domain, as compared to baseline (treatment effect, 0.82; 95% CI, 0.14 to 1.48). The other domains were only measured at 30-days post discharge. Psychological health of the intervention group patients was reported to be better than that of SoC group (treatment effect, 0.49; 95% CI, -0.17 to 1.26). Environmental health factors were not ones the intervention targeted; however, the intervention group expressed significantly lower scores than the SoC group (P<0.001). A social health domain score was not calculated due to respondents declining to answer questions regarding sex life and personal relationships, where only 14.4% of patients responded sufficiently.

<table>
<thead>
<tr>
<th>Physical Health Domain</th>
<th>SoC</th>
<th>Intervention</th>
<th>Treatment effect</th>
<th>Adjusted^ P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>6.83 +/- 0.63 (98)</td>
<td>6.32 +/- 0.63 (85)</td>
<td>-0.51 [-0.89, -0.06]</td>
<td>0.024</td>
</tr>
<tr>
<td>30d post-discharge</td>
<td>7.33 +/- 0.46 (98)</td>
<td>7.47 +/- 0.46 (85)</td>
<td>0.14 [-0.29, 0.58]</td>
<td>0.502</td>
</tr>
<tr>
<td>Δ, 30d post-dc vs. Baseline</td>
<td>0.22 +/- 0.47 (98)</td>
<td>1.04 +/- 0.48 (85)</td>
<td>0.82 [0.14, 1.48]</td>
<td>0.018</td>
</tr>
</tbody>
</table>

^Adjusted for patient age, sex, religion, educational level, rural vs. urban habitation, smoking and diabetes status.

<table>
<thead>
<tr>
<th>QOL Domain</th>
<th>SoC</th>
<th>Intervention</th>
<th>Treatment effect</th>
<th>Adjusted^ P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological health</td>
<td>8.29 +/- 0.68 (86)</td>
<td>8.78 +/- 0.73 (62)</td>
<td>0.49 [-0.17,1.26]</td>
<td>0.136</td>
</tr>
<tr>
<td>Environmental health</td>
<td>7.05 +/- 0.55 (86)</td>
<td>6.40 +/- 0.55 (78)</td>
<td>-0.65 [-1.05,-0.31]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Social health</td>
<td>14.80 +/- 1.39 (11)</td>
<td>16.30 +/- 1.35 (16)</td>
<td>1.50 [-0.95, 4.42]</td>
<td>0.191</td>
</tr>
</tbody>
</table>

^Adjusted for patient age, sex, religion, educational level, rural vs. urban habitation, smoking and diabetes status.

The patient was asked the number of days in the past month that he or she took rest instead of working, outside or inside the home. The average number of rest days for patients in the control group was 25.3
(adjusted SD=1.14), and for the intervention group was 27.4 (Adjusted SD=1.11). Although the occupational categories between the two groups did not show a statistically significant difference, a greater percentage of control group patients lived in rural areas, where labor needs may be greater. Families of patients who were in the intervention arm could also have been more aware of when their family member returned to work or been more protective of rest time.

**CG-PAM Levels**

Caregiver Activation Measure (CG-PAM) scores were also converted into levels of activation with the following practical associations: Level 1 = disengaged & overwhelmed, Level 2 = becoming aware but still struggling, Level 3 = taking action, Level 4 = maintaining behaviors. When converted into activation levels, the difference in CG-PAM levels between baseline to discharge and from baseline to 30-days post-discharge between SoC and intervention groups remain statistically significant (P=0.001).

**Fig 1: Adjusted Means of Caregiver Activation Measure (CG-PAM) Levels at Hospital Admission, Discharge, and 30 Days Post-Discharge.**

![Graph showing CG-PAM levels](image)

\[ p = .001, \text{ calculated for difference between baseline and discharge; } P = 0.003, \text{ between baseline and 30 days post-discharge. Error bars indicate standard deviation.} \]

**Healthcare utilization**

The average hospital length of stay post-operation did not significantly differ between the two groups. Adjusted means and standard deviations were 8.7 days, SD=1.4, for the SoC group and 7.8 days, SD=1.4, for the intervention group (treatment effect, 0.9; 95% CI to -2.31, 1.24). Outcomes for 30-day hospital readmission (7.0% vs. 6.8%, for SoC vs. intervention, respectively) and 30-day outpatient care for emergent issues (10.1% vs. 12.5%, for SoC vs. intervention, respectively) were inconclusive. Given the small sample size and rare occurrence, the hospital length of stay, 30-day hospital readmissions and non-readmission healthcare services utilization did not reach significance, although the length of stay post-operation and readmissions did show positive directionality. Seventeen patient-caregiver dyads in the SoC group reported spending additional personal funds on medical care in the 30 days post-discharge,
compared to eleven dyads in the intervention group, amounting to a mean of USD $36.50 (SD=55.54) among the SoC group and USD $195.19 (SD=607.43).