Introduction

Singapore General Hospital’s Pre-Admission Centre (SGH PAC) is a one-stop preoperative care centre providing pre-surgery counselling, risk assessment and health optimization before surgery. Patients undergo a series of preoperative tests at PAC to assess their ‘fitness’ for surgery.

Frailty is a state of reduced physiological reserve predisposing one to adverse outcomes when exposed to stressors such as surgery. It is one of the strongest predictors of postoperative complications in a recent meta-analysis (Watt et al., 2018). Despite the important association between frailty and postoperative complications, there is no internationally standardised frailty assessment tool for the preoperative setting at present. This is a barrier for identifying frail elderly patients requiring preoperative optimisation. In addition, the current decentralised and unstandardized approach to identify and serve frail elders for preoperative optimisation is expensive due to the unnecessary duplication of services, and poor in equity as many patients are not aware of these beneficial services.

These factors present a great concern in our healthcare system as the ageing population would mean more frail elderly needing surgery. In 2017, among 1800 elderlies aged 70 years who underwent elective surgery at SGH, 13% were identified as being ‘vulnerable to frail’. Thus, SGH has embarked on a transformation project comprising a multi-disciplinary team of anaesthetists, Internal Medicine (IM) physicians, nurses, physiotherapists, dieticians and administrators to design frailty assessment and preoperative services tailored to each patient’s health needs. The project was implemented in January 2019, and improvements of care outcomes from January – December 2019 were compared with a similar patient cohort in 2018.

Methodology

Measurable outcomes were defined to achieve our objective namely reduction in (1) hospital length of stay and (2) severity of postoperative complications experienced.

(A) Prospective observational study to validate the use of Edmonton Frailty Scale (EFS) for frailty assessment

A prospective observational study of 134 elders aged 70 years and above who attended PAC at SGH prior to major abdominal surgery from Dec 2017 – Sep 2018 was conducted, and its feasibility to be administered in a fast-moving outpatient clinic was assessed. The EFS score was a significant predictor of postoperative complications and longer lengths of stay after adjusting for confounders including age, gender, race, surgical disciplines and surgical technique (open or laparoscopic surgery). The average time taken to complete EFS was 3.75 minutes, and there was high inter-rater correlation of scores between 2 nurses assessing the same patient.

(B) Formed a PREPARE team comprising anaesthetists, nurses, physiotherapists and healthcare administrators to facilitate seamless screening, referral and preoperative optimization

Screening is performed by nurses using the EFS, together with the measurement of patients’ anthropomorphic dimensions and vital signs. Patients scheduled for major abdominal surgery and identified as frail on the EFS would have a preoperative optimisation strategy drawn up by their reviewing anaesthetist. This strategy is often made after consultation with IM physicians and allied health members of the PREPARE team. Interventions include preoperative physiotherapy education, inspiratory muscle training and/or preoperative exercise programs conducted by physiotherapists; nutritional supplementation/education by dieticians and optimization of chronic medical problems by the IM physicians, often within the same visit at the PAC. Where appropriate, the PREPARE team would also follow-up on these patients after their surgery, while they are admitted, to ensure continuity of care. To maximise patient convenience and avoid burdening patients with multiple hospital visits, the PREPARE team was embedded in the PAC, so that every elderly patient aged ≥ 65 years would receive mandatory screening in their elective surgical journey at SGH.

Objective

SGH has implemented a frailty assessment tool to identify frail elders during preoperative assessments; and employed a centralised approach of providing in-house prehabilitation to frail patients thereby improving postoperative outcomes and reducing cost.

Results

**Median hospital length of stay in vulnerable-frail patients**

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Pre-Cohort</th>
<th>Post-Cohort</th>
<th>% LOS Reduction / Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastro</td>
<td>12</td>
<td>11</td>
<td>4.32%</td>
</tr>
<tr>
<td>HPB</td>
<td>15</td>
<td>11</td>
<td>27%</td>
</tr>
<tr>
<td>Surg Onco</td>
<td>15</td>
<td>10</td>
<td>21%</td>
</tr>
<tr>
<td>L&amp;D</td>
<td>6</td>
<td>4</td>
<td>33%</td>
</tr>
<tr>
<td>XGI</td>
<td>8.5</td>
<td>13</td>
<td>32%</td>
</tr>
</tbody>
</table>

**Average proportion of vulnerable-frail patients with no complications**

- 24% of patients

**Average bill size post-intervention**

- 21% Anterior Resection
- 7% Colectomy

(C) Engaged primary surgeons to improve PREPARE take-up rate

Word-of-mouth was used to spread awareness of this project to primary surgeons, to gain their support of PREPARE. Increasingly, more and more surgeons started referring patients whom they suspected to be frail for earlier review by the PREPARE team, so that the team would have a longer period to optimize patients prior to their surgery.

(D) Improving take-up rate for PREPARE by Plan-Do-Study-Act

The team had regular process meetings to monitor patients recruited for PREPARE. Through the PDSA cycle, we recognised that the take-up rate for PREPARE could be improved. This was done by (1) Repeat reminders to junior doctors on the availability of this programme (2) Pasting laminated copies of referral criteria in prominent areas of the consult room and (3) Expanding the referral criteria to include all patients with poor baseline functional scores so that they could also benefit from preoperative optimisation. This resulted in an improvement in take-up rate from 9% between Jan to Jun 2019, to 18% between Jul 2019 to Dec 2019 (Fig 1)

Conclusion

We have instituted a centralised and standardised approach for frail patients going for elective surgery. These patients were provided with a personalised prehabilitation strategy, and this was translated into lowered median length of stay, complication rate and bill size for said patients. With greater awareness of the benefits of prehabilitation, we believe PREPAPRE has the potential to be scaled to a nation-wide program, to maximize postoperative outcomes for frail patients.