

## **Project Title**

Good Quality Surgery and Pre-operative Optimisation are key drivers of success for our Geriatric Surgical Service in Colorectal Surgery: A 10-year Cumulative Sum (CUSUM) Analysis

## **Project Lead and Members**

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## **Organisation(s) Involved**

Khoo Teck Puat Hospital, National University of Singapore

## **Healthcare Family Group(s) Involved in this Project**

Medical

## **Applicable Specialty or Discipline**

Geriatric Surgery, Colorectal Surgery

## **Aims**

This study aims to evaluate the long-term performance of GSS in terms of post-operative and functional outcomes.

## **Background**

See poster attached/below

## **Methods**

See poster attached/below

## **Results**

See poster attached/below

## **Lessons Learnt**

See poster attached/below

## **Conclusion**

See poster attached/below

## **Additional Information**

Accorded the Singapore Health & Biomedical Congress 2023 (Singapore Young Investigator Award (Clinical Research)) Silver Award

## **Project Category**

Care Continuum

Inpatient Care

Primary Care

## **Keywords**

Colorectal Morbidity, Post-Operative Outcomes, Post-Surgical Recovery

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# Good Quality Surgery and Pre-operative Optimisation are key drivers of success for our Geriatric Surgical Service in Colorectal Surgery: A 10-year cumulative sum (CUSUM) analysis

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## Background

Ageing is associated with reduced vital capacity, lean body mass, cardiac output and sarcopenia. Our institution implemented a Geriatric Surgical Service (GSS) for elderly patients undergoing colorectal surgery. Our initial 3-year experience showed lower major morbidity and mortality. This study aims to evaluate the long-term performance of GSS in terms of post-operative and functional outcomes.

## Methods

This was a single-center retrospective study from July 2010-December 2021. Inclusion criteria for GSS was  $\geq 75$  years, or  $\geq 65$  years with frailty. Emergency surgery was excluded. Our GSS include multidisciplinary assessment by specialised nurse, physiotherapist, anaesthetist, dietician and geriatrician. Prehabilitation was considered for frail patients with Weighted Charlson co-morbidity index (WCIS)  $\geq 4$ .

Composite outcome "failure" was used to assess the effectiveness of GSS – defined as 30-day mortality, length of stay (LOS)  $\geq 14$  days, and/or  $>10\%$  decrease in modified Barthel's index (MBI) at 6 weeks. CUSUM analysis (defined as  $\sum_i^n (X_i - X_{POSSUM})$ ) was used to assess performance of GSS based on failure.

( $X_i = 1$  for failure,  $X_i = 0$  for success;  $X_{POSSUM}$  = predicted morbidity calculated for each respective patient using the P-POSSUM score)

	Phase 1	Phase 2	Phase 3	p-value
Planned ICU/ HDU admission	35 (44.3)	18 (24.3)	24 (30.0)	<b>0.025</b>
Clavien-Dindo $\geq 3A$ complication	6 (7.6)	13 (17.6)	9 (11.3)	0.162
Length of stay	9.3 $\pm$ 11.3	11.2 $\pm$ 11.9	10.3 $\pm$ 9.0	0.561
30-day readmission	8 (10.1)	12 (16.2)	9 (11.3)	0.496
30-day mortality	0	2 (2.7)	2 (2.5)	0.350
$>10\%$ drop in MBI	1 (1.3)	19 (24.3)	7 (8.8)	<b>&lt;0.001</b>
Failure	11 (13.9)	34 (45.9)	21 (26.3)	<b>&lt;0.001</b>

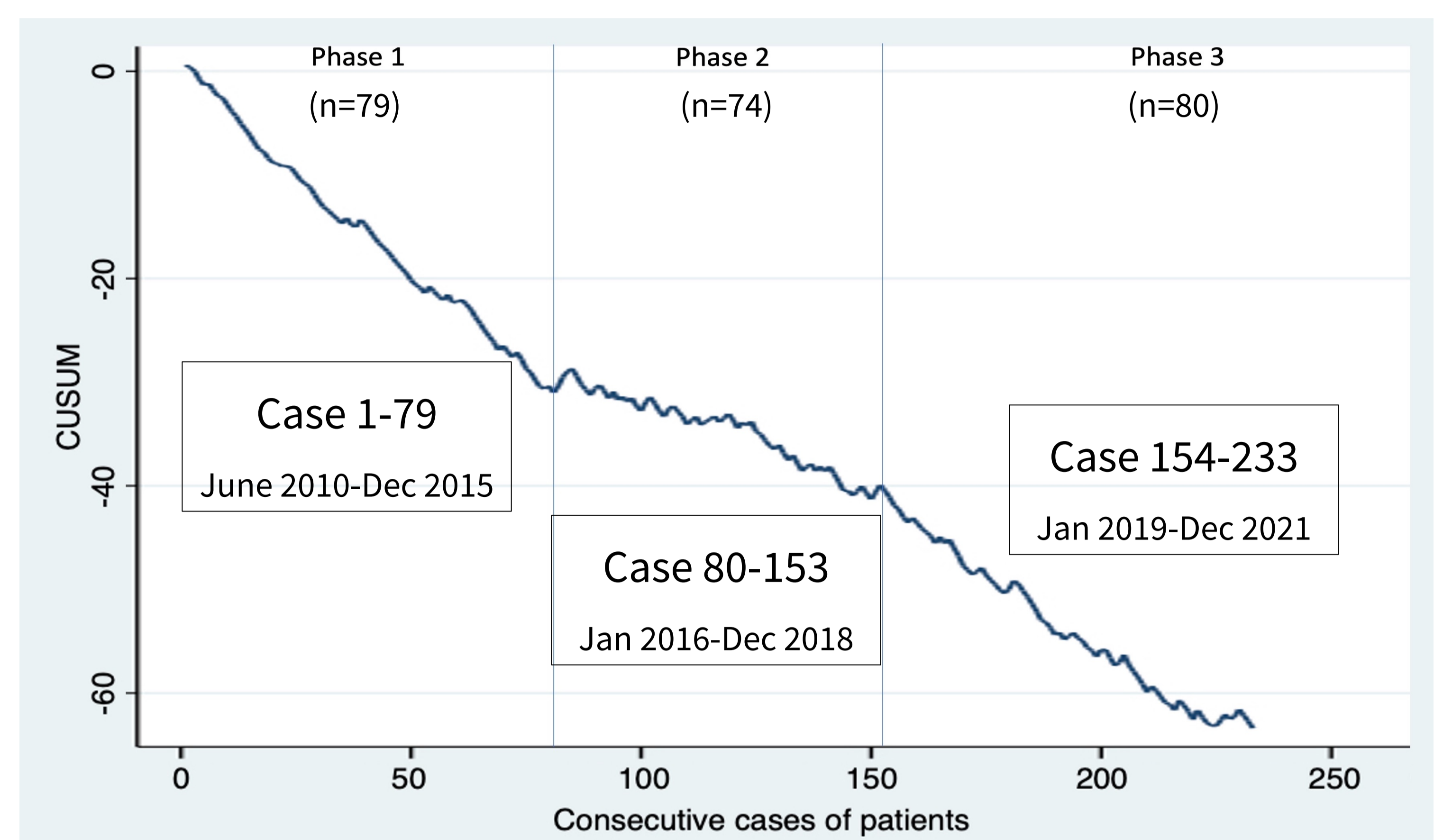
▲ Comparison of post-operative outcomes

## Summary & Conclusion

Our GSS showed sustained and continued improvement in clinical outcomes. Transient inconsistency may be due to the initial learning curve of laparoscopic surgery and selection of patients with more co-morbidities. Good quality surgery and well-optimised patients are paramount for good outcomes in geriatric patients.

## Results

There were 233 patients with mean age of  $79.0 \pm 4.9$  years; 31.3% were frail. There were 62.7% with American Society of Anaesthesiologists (ASA) score of  $\geq 3$ , and 57.5% with WCIS  $\geq 4$ . Majority (85.0%) had colonic tumours, and 48.1% had tumour stage  $\geq 3$ .



▲ CUSUM analysis divided the study cohort into 3 distinct phases

	Phase 1	Phase 2	Phase 3	p-value
Mean age	80.3 $\pm$ 4.4	78.7 $\pm$ 5.2	78.1 $\pm$ 5.0	<b>0.016</b>
Male sex	36 (45.6)	39 (52.7)	42 (52.5)	0.597
WCIS $\geq 4$	30 (38.0)	48 (64.9)	56 (70.0)	<b>&lt;0.001</b>
ASA $\geq 3$	47 (59.5)	40 (54.1)	59 (73.7)	<b>0.032</b>
Frail	19 (24.1)	25 (33.8)	29 (36.3)	0.217
Prehabilitation	47 (59.5)	53 (71.6)	67 (83.8)	<b>0.003</b>
Laparoscopic surgery	19 (24.1)	33 (44.6)	47 (58.7)	<b>&lt;0.001</b>

▲ Comparison of clinical demographics

Multivariate analysis showed that frailty (Odds ratio (OR) 2.4, 95% confidence interval (CI) 1.2, 5.0,  $p=0.015$ ) and major morbidity (OR 22.2, 95% CI: 7.5, 65.6,  $p<0.001$ ) were independent predictors of failure.

Age  $\geq 80$  years, WCIS  $\geq 4$ , prehabilitation, tumour stage  $\geq 3$  and laparoscopic surgery did not predict failure on both univariate and multivariate analysis. Using the same covariates, logistic regression also did not find any significant predictors of major morbidity.

Phase 2 (period of stabilisation) may be due to the initial learning curve for laparoscopic surgery and more patients with increased co-morbidities.

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