The Impact of Elective Surgery Postponement during COVID-19 on Emergency Bellwether Procedures in Singapore

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Introduction

- Elective surgery postponement was a common measure taken during the COVID-19 pandemic to conserve hospital resources and manpower[1]
- However, such measures might lead to collateral damage for patients' health, function and quality of life[2]

Bellwether procedures[3]

- Caesarean section (CS), emergency laparotomy (EL) and open fracture (OF) fixation
- Used as indicators of the adequacy of systems, resources and skills needed to treat a broader range of essential surgical conditions

Aim

- To assess the impact of elective surgery postponement policy on surgical volumes and patient outcomes for the emergency bellwether procedures in SGH

Methodology

Setting
- Singapore General Hospital
- Retrospective cohort study of patients who underwent CS, EL and OF fixation between 1 January 2018 to 31 December 2021

Data Source
- SingHealth Electronic Health Intelligence System (eHIntS)
- Demographics, visit details, operation scheduling, peri-operative details, diagnosis and discharge disposition extracted

Exposure
- Pre-COVID (Jan 2018 – Jan 2020), Elective postponement (EP) (Feb – May 2020), Recovery (Jun – Nov 2020), Post-recovery (Dec 2020 – Dec 2021)

Outcomes
- Monthly surgical volume, length of stay (LOS), intensive care unit (ICU) admission, 30-day mortality

Statistical Analysis
- Monthly surgical volume across 4 time periods
  - Kruskal Wallis test
  - Segmented negative binomial regression models (to evaluate change in volume of EP, recovery and post-recovery compared to the pre-COVID period)
- Clinical outcomes across 4 time periods
  - Kruskal Wallis test or chi-square test as appropriate

Results

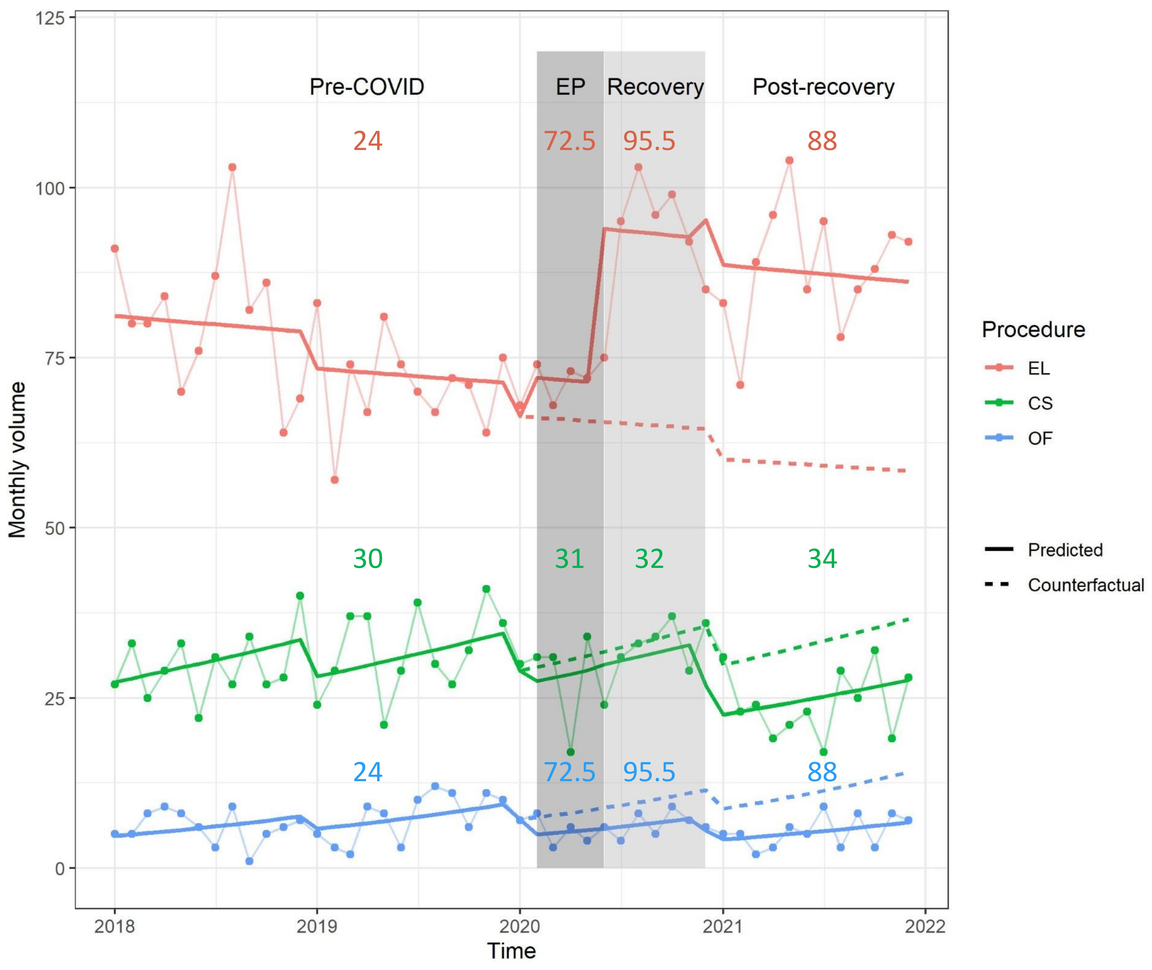

Figure 1: Actual (points, joined by thin lines) and segmented negative binomial regression model predicted volumes (thick solid lines) of bellwether procedures over time. The dotted lines are the counterfactual predicted volumes if elective postponement (EP) (and the resultant recovery and post-recovery periods) did not occur. Median monthly counts in each time period are indicated above plot for each procedure.

Table 1: Clinical outcomes of patients by procedures and time period

Characteristic	Pre-Covid	EP	Recovery	Post-recovery	P value
EL, n	1895	287	560	1144	
LOS (days), median (range)	6 (0 – 332)	5 (1 – 155)	6 (1 – 234)	6 (0 – 280)	**0.011**
ICU admission, n (%)	311 (16.4)	31 (10.8)	65 (11.6)	156 (13.6)	**0.004**
30-day mortality, n (%)	117 (6.2)	10 (3.5)	19 (3.4)	55 (4.8)	**0.024**
Emergency CS, n	768	113	188	327	
LOS (days), median (range)	4 (1 – 36)	4 (1 – 15)	4 (1 – 41)	3 (2 – 70)	**4.96×10^{-5}**
ICU admission, n (%)	4 (0.5)	0	1 (0.5)	2 (0.6)	1
30-day mortality, n (%)	0	0	0	0	
Emergency OF fixation, n	169	21	39	70	
LOS (days), median (range)	4 (0 – 155)	3 (1 – 61)	4 (1 – 59)	4 (0 – 97)	0.614
ICU admission, n (%)	5 (3.0)	1 (4.8)	0	0	0.212
30-day mortality, n (%)	2 (1.2)	0	0	0	1

EP: elective postponement, ICU: intensive care unit, LOS: length of stay

Emergency Laparotomy (EL)

- Monthly volume of EL increased by 43% (95% CI: 23 – 67%) and 48% (95% CI: 21 – 80%) in the recovery and post-recovery period, respectively
- Outcomes were better from the EP period onwards

Emergency Caesarean section (CS)

- No significant change in monthly volumes
- No significant differences in clinical outcomes except for a decrease in LOS during the post-recovery period

Emergency open fracture fixations (OF)

- No significant change in monthly volumes
- No significant differences in clinical outcomes

Conclusion

- Elective surgery postponement in the early COVID-19 pandemic did not affect volumes of emergency CS and OF fixations but led to an increase in volume in EL after the postponement
- Outcomes were not worse throughout the entire period
- Valuable for healthcare systems to invest in data capture systems to track relevant outcomes in real time should such policies be implemented in future crises again to understand the impact and therefore adjust strategies in a timelier fashion

References / Acknowledgements

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