EMERGENCY LAPAROTOMY AUDIT (EMLA) IN JURONGHEALTH CAMPUS

- ☑ CARE REDESIGN
- ☑ WORKFORCE TRANSFORMATION
- ☐ AUTOMATION, IT, ROBOTICS INNOVATION

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1. Define Problem, Set Aim

Background

- Emergency laparotomy (EL) is known to be associated with high risk of post-operative complications and mortality. It has been identified as a Bellwether procedure by the World Health Organisation. Such procedures are assessed as deserving first cut prioritisation for quality improvement because of expected returns on investments, and a beneficial spill over effect to other surgical procedures.

Problem/Opportunity for Improvement

- Acute surgical emergencies requiring EL involves multidisciplinary time critical interventions. Outcomes are often associated with disproportionate morbidity and mortality compared to elective surgery, especially among the elderly.
- Patients requiring EL often present in physiological extremis. Heterogeneity of practice, isolation of care silos, lack of adequate outcome and process measures, and not designing interventions using frameworks that improve sustainable change all contribute to poorer outcome.

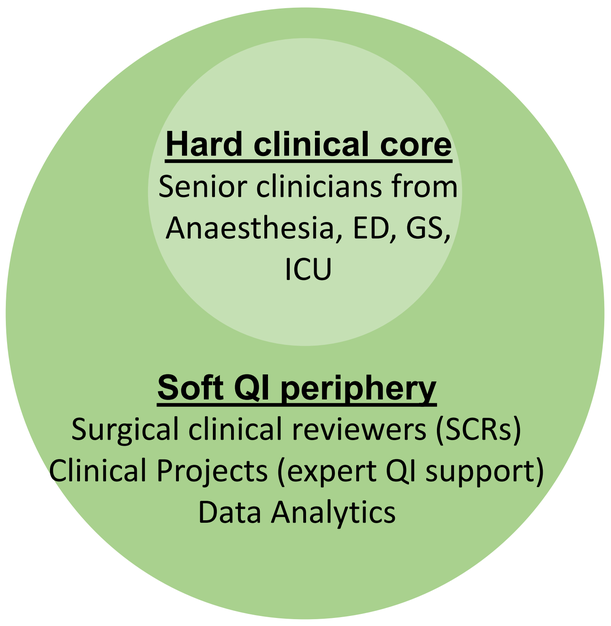
Aim

- To reduce the average length of stay (ALOS), hospital costs and mortality rate of EL.

2. Strategy for Change

"Hard clinical core" + "Soft QI periphery"

- The overall plan consisted of two mutually supportive implementations. The first was a "hard clinical core" consisting of senior clinicians who could identify important clinical interventions and drive these changes in their respective departments (Anaesthesia, ED, GS, ICU).
- The second was a "soft QI periphery" consisting of the in-hospital QI team which was responsible for providing the QI framework including designating project charters, data collection, PDSA cycles, run chart reporting and cost analysis.
- This reworking of the traditional model of quality improvement represents a workforce transformation in the surgical setting.



Three tenents of QI

1) **All QI is local**: needing tailored clinical data capture of process and outcome measures in order to engage local stakeholders to initiate local changes. Almost all of the process and outcome measures for our study were not captured by standard hospital databases. Our participation in NSQIP helped to identify defects in care, which was then addressed by harnessing local data.
2) **Use of QI orthodoxy to sustain QI across disciplines**: hospitals which were allowed the resource and time to familiarize clinicians with QI methodology showed an improvement in outcomes.
3) **Use of risk stratified outcomes**: the collaboration with other NSQIP centres has enabled us to identify deficiencies in care that engages clinicians to do better.

3. Interventions and Results

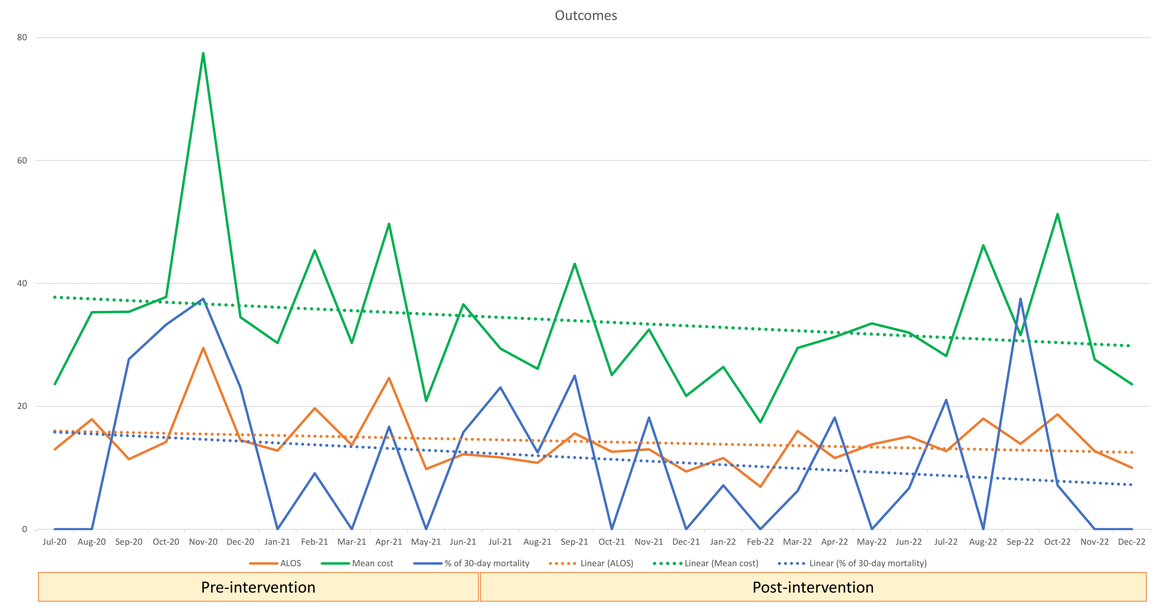
Change management across departments

- Based on consensus during stakeholder meetings, an eight-part intervention bundle was decided, of which three were prioritized as "easier to do, big anticipated effect". This was carried out using a Pareto analysis and Ishikara charting. These prioritised interventions were designated process leads based on the department most likely to determine adherence.

S/N	Phase	Process measures
1	ED	IV antibiotics given within 60 min from Sepsis diagnosis (NEWS criteria)
2	Pre-op	P-POSSUM or NELA scoring documented at consent
3		Decision on need for emergency laparotomy is made by consultant Surgeon
4		Surgery within x hours appropriate to Patient's P status (i.e. ≤ 1hr for P1 cases; ≤ 6hr for P2 cases)
5	Intra-op	Consultant Anesthesiologist AND consultant surgeon are present during emergency laparotomy
6		Goal-directed therapy (for IV infusion and vasopressor) are administered
7		Blood pressure AND body temperature are normal intraoperatively
8	Post-op	Transferred to ICU/HD, if calculated mortality is >5%

- Senior clinicians formed their own sub-project teams within their departments to do deep dives into their respective areas. Change management was coordinated using the IHI model for improvement.
- Each sub-project team identified root causes, designed interventions, and then ran their PDSA cycles. Outcomes and timelines were tracked at core team meetings, Successful interventions were then introduced into the department's standardized workflow.

Reduction in Mortality, Length of Stay and Hospital Costs



- The productivity gain was based on reduction in ALOS, inpatient costs, and overall mortality rate (see Figures 5, 6, 7). We have found a reduction in ALOS for EMLA patients by 2.3 days ($p<0.01$), which could improve hospital efficiency, reduce hospital acquired complications, and reduce hospital costs (5). We have also observed a sustained decreasing trend in the mean monthly inpatient cost, where the mean cost has reduced by 20% ($p<0.01$). With approximately 140 cases per annum, this equates to cost savings of approximately $960k. Finally, 30-day mortality rate of EMLA patients also decreased by 6.11% ($p=0.04$).

4. Future/Scale-up

While there are no plans as yet to widen EMLA beyond NTFGH, the interventions bundle has increased its application to elective surgery, where anaesthetists have since August 2021 monitored and maintained intraoperative normo-thermia.

In addition, scrutiny of the clinical outcomes by prospective clinical review has also identified other areas for future collaboration, especially in misuse of antibiotics and a susceptibility for post-operative delirium among our older patients, both of which have successfully secured funding.

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