Project Title

Transforming Knee-Arthroplasty to Day-Surgery Enhanced-Recovery Model Via Care Redesign

Project Lead and Members

Project leads: Mr Ashton Neoh Eng Chuan (Principal Physiotherapist); Dr Kelvin Tan Guoping (Senior Consultant, Orthopaedic Department)

Project members:

- Ms Yap Yan Mei, Senior Physiotherapist
- Ms Clara Wong Xiu Qing, Principal Physiotherapist
- Ms Justina Wong, Nurse Clinician
- Ms Adeline Tang Lai San, Nurse Manager
- Ms Tok Xue Hui, Senior Occupational Therapist
- Ms Joelle Yong Xinni, Coordinator

Organisation(s) Involved

Tan Tock Seng Hospital

Healthcare Family Group(s) Involved in this Project

Allied Health, Nursing

Applicable Specialty or Discipline

Physiotherapy, Orthopaedic, Occupational Therapy

Project Period

Start date: Mar 2019

Completed date: On-going

Aims

- To review practices in TTSH and redesign the model of care to bring about systemic change in managing patients undergoing uni-compartmental knee arthroplasty (UKA).
- To safely reduce the average length of stay (ALOS) post-UKA, improve bed availability, reduce costs, and improved patient outcomes

Background

See poster appended/ below

Methods

See poster appended/ below

Results

See poster appended/ below

Lessons Learnt

Patient receptiveness is crucial in determining the success of the project. Previously, KA patients and their family members remained sceptical on whether early discharge after surgery was possible. We listened to patients to better understand their perspectives and concerns. With all involved healthcare professionals reinforcing the discharge end-point and the implementation of pre-operative 1-to-1 personalised care planning session, patients were more receptive to the idea of early discharge.

We learnt that early patient engagement and adequate reinforcements are important to increase self-efficacy and build trust in patients and their family members to adopt new changes.

Conclusion

See poster appended/ below

Additional Information

Since Jan-20, the UKA DSER model was integrated into routine clinical workflows and demonstrated a sustained outcome of reduction in ALOS, costs savings and positive patients' feedback. The model scaled to TKA patients in Jul-21 and has become routine clinical practice for eligible TKA patients.

Project Category

Care & Process Redesign

Quality Improvement, Clinical Practice Improvement, Workflow Redesign, Value Based Care, Discharge Planning

Keywords

Enhanced Recovery After Surgery Model, Day Surgery Enhanced Recovery Model

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Transforming Knee-Arthroplasty to Day-Surgery Enhanced-Recovery Model Via Care Redesign

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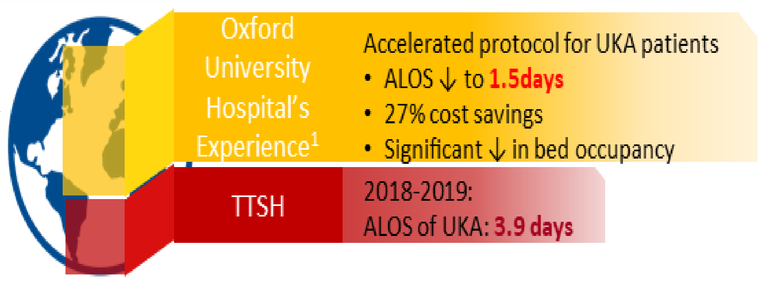
BACKGROUND AND IMPETUS FOR CHANGE

TTSH uni-compartmental knee arthroplasty (UKA) model of care was redesigned to bring about systemic change for patients undergoing UKA by implementing a novel Day Surgery Enhanced-Recovery (DSER) model.



With the COVID-19 pandemic, demand for general ward (GW) beds and manpower in TTSH rose. Elective surgeries including knee arthroplasty (KA) were held off to conserve GW beds. This accelerated adoption of DSER model for UKA patients. Subsequently, due to remarkable results achieved, the DSER model was scaled up to total KA (TKA) patients.

TTSH is one of Singapore's largest hospitals with high bed occupancy rates. To improve bed availability for emergency admissions, it is crucial to facilitate safe and timely discharge following elective surgery. Evidence from overseas practice illustrated good clinical outcomes from an accelerated program, hence the team decided to embark on this project.

STRATEGY

The team utilized the clinical practice improvement (CPI) model and principles:

Project Phase → **Diagnostic Phase** → **Intervention & Implementation Phase** → **Sustaining Improvement Phase**

1. Project Phase

The aim of this phase was to gather evidence to demonstrate a problem worth solving. We revealed that the ALOS of UKA and TKA patients at TTSH were 3.9 days and 4.6 days.

2. Diagnostic Phase

The team mapped out the macro and micro flow of our existing practice. Following which, a root cause analysis of factors leading to delayed discharge post-UKA, and a pareto analysis of the root causes were conducted. Three main root causes for delayed discharge were identified. Each solution was implemented individually in a stepwise manner, allowing for evaluation of effectiveness of each intervention Efficacy of each intervention was also assessed using Plan-Do-Study-Act (PDSA) cycles.

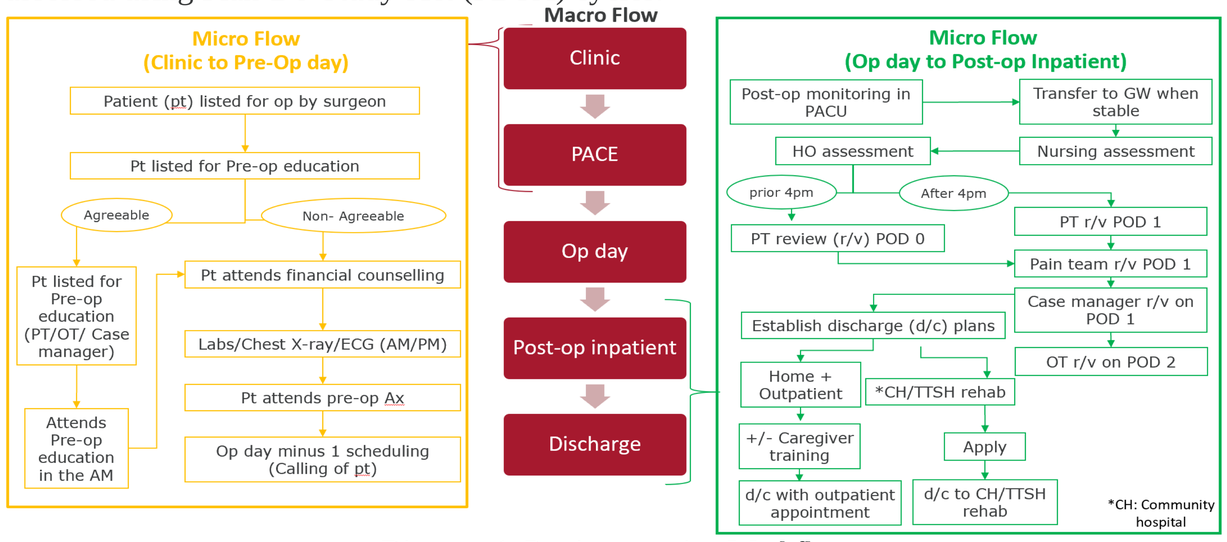


Diagram 1. Pre-intervention Workflow

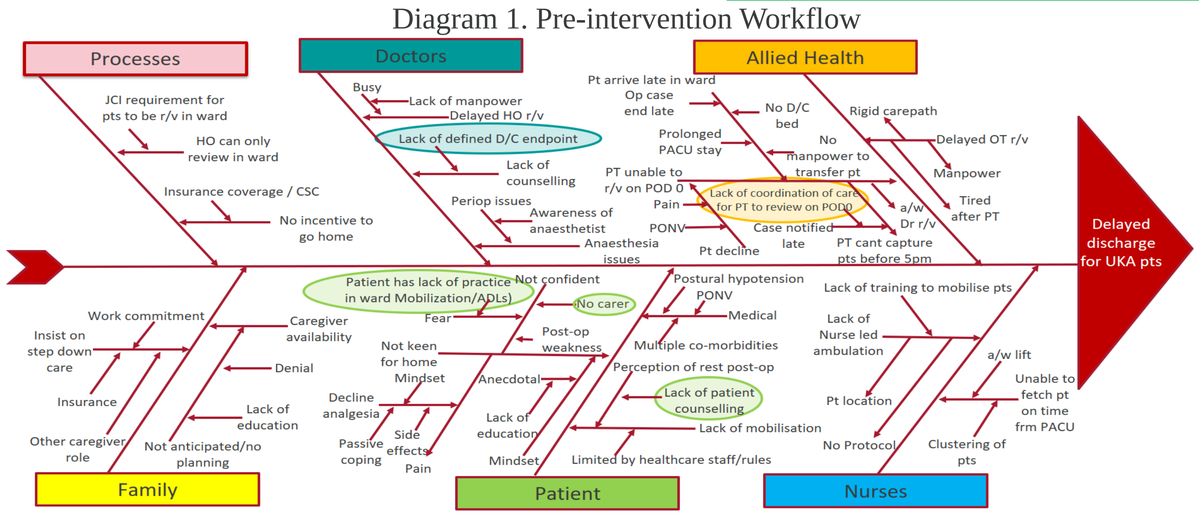


Diagram 2. Root Cause Analysis

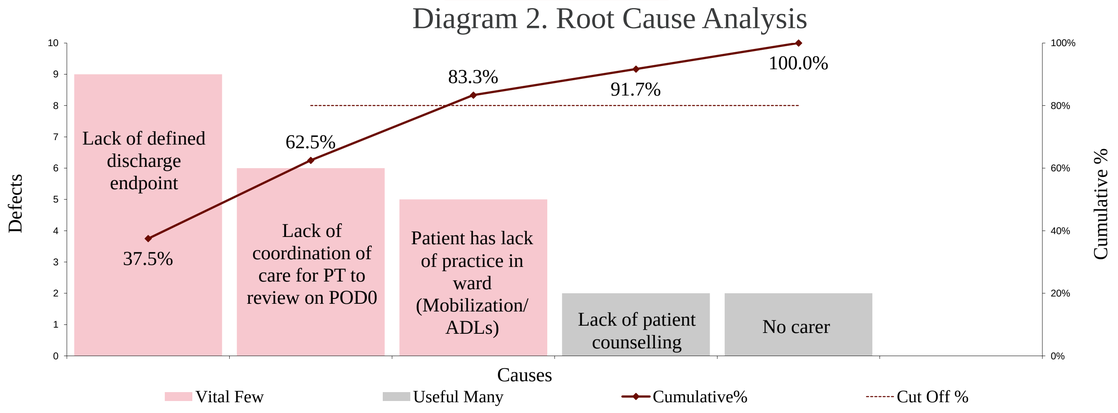


Diagram 3. Pareto Analysis of Identified Root Causes

REDESIGNING THE MODEL & IMPLEMENTATION

3. Intervention & Implementation Phase:

Through care redesign and workforce transformation, a novel DSER model was implemented. In Jun-19, we redesigned the traditional general ward model to shift discharge planning upstream to pre-operative phase which was done post-surgery previously. Post-discharge endpoint was harmonized amongst various healthcare professionals and communicated to patients. During pre-operative clinic consultation, eligible KA patients were identified and underwent a pre-operation education class with the case manager, physiotherapists and/or occupational therapists. This helped to accelerate rehabilitation. In Apr-21, this intervention was enhanced with a 1-to-1 personalised counselling session by the advanced scope care coordinator (ASCC).

At the admission phase, we improved coordination amongst the multi-disciplinary healthcare team and adopted the Enhanced Recovery After Surgery (ERAS) principle of early mobilisation. By conducting early post-operative doctor review on post-operative day (POD) 0, physiotherapists and occupational therapists could now review patients on POD0 and POD 0-1 respectively, initiating early mobilisation. Upskilling of nurses by physiotherapists was also conducted to allow for nurse-led ambulation. This increases patients' mobilization outside therapy sessions and also helps improve their mobility to facilitate early discharge.

Post-discharge, a physiotherapy and nursing session were shifted downstream to be delivered at home for TKA patients as TKA is more extensive than UKA and thus, more painful.

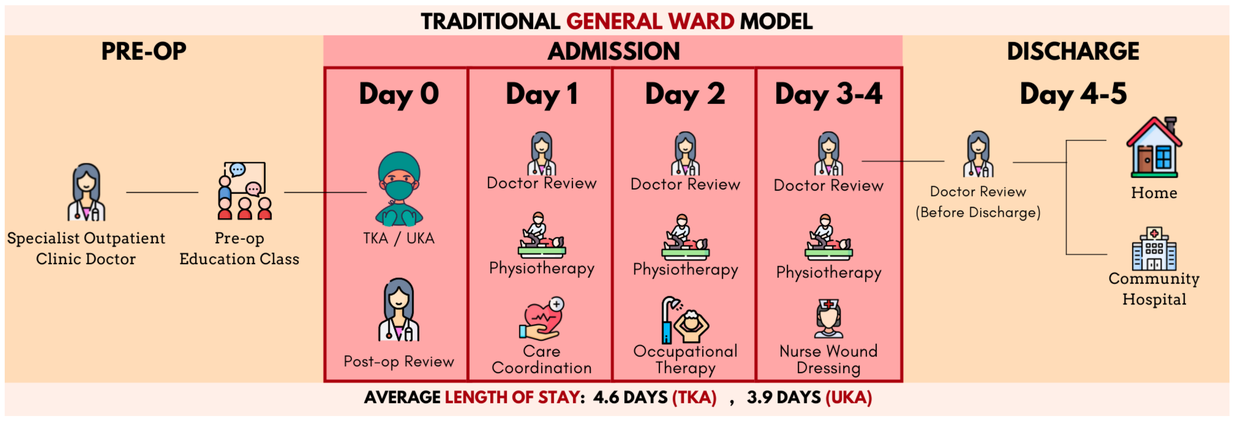


Diagram 4. Traditional General Ward Model for KA patients

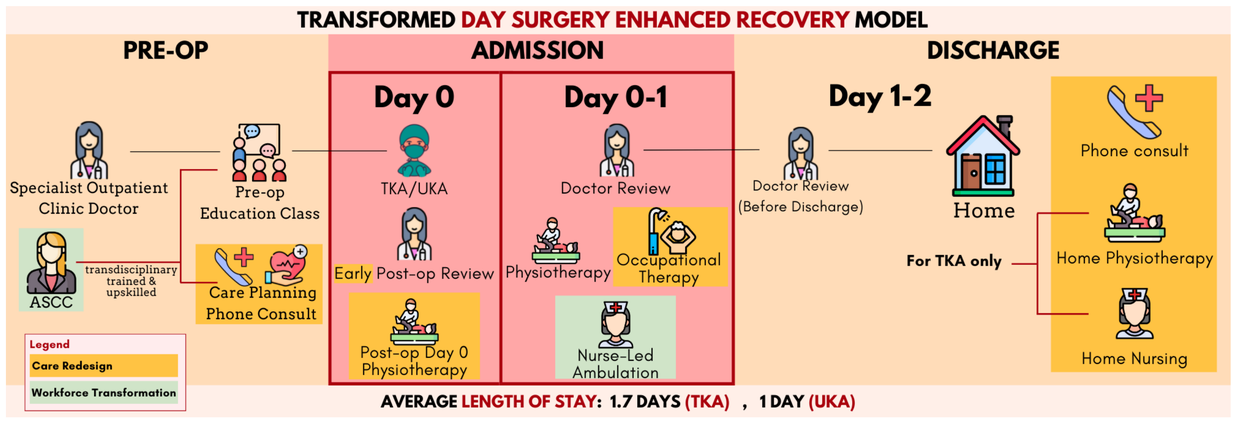
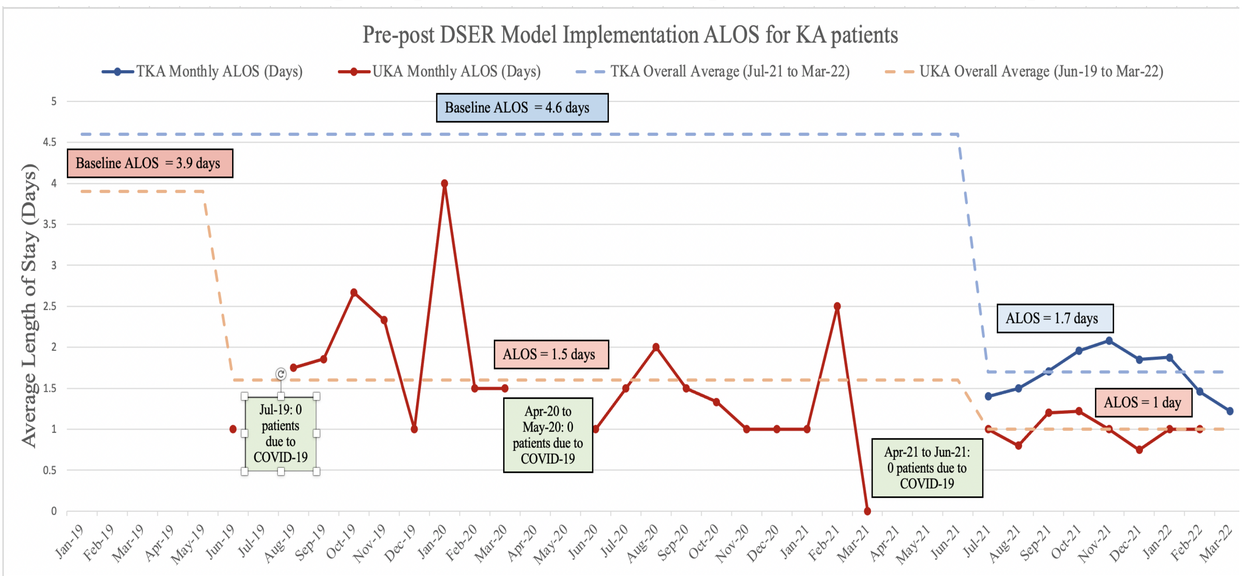


Diagram 5. Transformed DSER Model for KA patients

EVALUATION & MEASUREMENT OF IMPROVEMENT

4. Sustaining Improvement Phase

- From Jun-19 to Jun-21, ALOS of 49 UKA patients admitted to DSW: **1.5** days.
- From Jul-21 to Mar-22, ALOS of 172 TKA patients admitted to DSW: **1.7** days
- From Jul-21 to Mar-22, ALOS of 33 UKA patients: **1** day
- Only 2.4% of UKA and 1.2% of TKA patients required readmission within 7 days, which was comparable to baseline.
- With the reduction of ALOS using DSER model, 711 acute bed days were saved from Jun-19 to Mar-22, which translated to **$386,823** indirect cost savings to the hospital.
- Estimated cost savings for patients are **$1,677.10** per UKA and **$2,342.10** per TKA



Year	2019												2020												2021												2022		
Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
n (TKA)																															5	6	24	24	26	20	16	24	27
n (UKA)						1	0	4	7	3	6	1	1	2	2	0	0	1	2	2	2	3	1	3	1	6	1	0	0	0	5	5	5	9	2	4	1	2	0

Diagram 6. ALOS for KA patients before and after implementation of DSER model

The success of admitting 82 UKA patients and 172 TKA patients to DSW has proven that our novel DSER model is clinically and operationally safe and feasible. Early discharge generated significant cost savings for patients and the hospital, improved turnover rate, and free up acute GW beds for urgent medical cases, optimizing healthcare resources. It enabled patients to recuperate the comfort of their homes and reduced risks of healthcare-associated infections. Unlike the traditional model with 37% of patients discharged to community hospitals post-surgery, all KA patients were discharged home. Upskilling of our healthcare workforce enabled care to be delivered more effectively and efficiently. By instilling a sense of fulfilment, staff satisfaction greatly improved.

CONCLUSION

Achieving primary and stretch goal is possible with a well-coordinated multi-disciplinary team effort. Well-coordinated pre- and post-operative care ensured that patients were discharged earlier. KA patients admitted to the DSW benefitted from the DSER model as there were notable cost savings and early mobilisation which helped improve patient confidence in self-care post-KA. DSW allows the hospital to reap benefits from freeing up bed space in the inpatient wards for acutely ill patients.

Reference: 1. Reilly KA, Beard DJ, Barker KL, Dodd CA, Price AJ, Murray DW. Efficacy of an accelerated recovery protocol for Oxford unicompartmental knee arthroplasty--a randomised controlled trial. Knee. 2005 Oct;12(5):351-7.