

Project Title

Less is for More: Lean Cataract Surgery Care Path

Project Lead and Members

Project lead: Adj A/Prof Yip Chee Chew

Project members:

- Lai Foon Wan, Nurse Manager, Day Surgery Centre (KTPH)
- Dr Edwin Seet, Senior Consultant & Head, Anaesthesia Dept
- Prof Chandra Kumar, Senior Consultant, Anaesthesia Dept
- Alice Leong Foong Wah, Deputy Director, Nursing Peri-Ops
- Matron Chia Kwee Lee, Director, Operations & SOC Services
- Rostihar Bte Abdul Karim, Principal Assistant Nurse, OVS
- Lee Soo Cheow, Assistant Nurse Clinician, OVS
- Yeo Ai Ling, Nurse Manager, Day Surgery Centre (AdMC)
- Kendrick Tan, Senior Executive, Operations
- Suriagandhi Selathorai, Executive, Operations

Organisation(s) Involved

Khoo Teck Puat Hospital

Project Period

Start date: 2016

Aims

- To reduce surgery cancellation or delay
- To enable patient cost savings
- To reduce hassle to patients and their Next-of-kin
- To Improve patient safety
- To optimise manpower

Background

See attached

Methods

See attached

Results

See attached

Lessons Learnt

The leader need to identify patient-care problems to be addressed. Being Lean 6-Sigma Black Belt trained, he develops various Quality Improvement (QI) initiatives to solve problems. Strong leadership, emotional intelligence and altruism are key factors to get stakeholders' "buy-in" and work outside their comfort zone to attain change e.g. using non-doctor as physician-extendors. As a clinician educator, he applied evidence-based pedagogy to develop novel training and accreditation systems to produce competent, fit-to-practice service providers. The team boldly challenges the "norm" with innovative care models, yet cautiously assesses risks (after pilot studies and ground feedback) to uphold care standards and patient safety.

Conclusion

See attached

Additional Information

Process mapping is a valuable tool in understanding the weakest link(s) in a work flow. Once the end-to-end process is mapped out, we can identify the area/activity that hindered patient-care service and evaluate their impact/ influence e.g. Prophylactic Pre-operative Antibiotic (eye) Drops (PPAD), initially a mandatory requirement for Cataract Surgery (CS) patients, can be omitted as there are other prophylactic measures in place. This gap was identified and the change was implemented. Overall, by streamlining the care path and using system-based thinking, this project optimizes

resource utilization, increases productivity, reduces patient bill size; and adds convenience, without compromising the quality and safety of care. Continuous improvement and innovation are necessary to address the dynamic and evolving needs of patients.

Project Category

Care Redesign, Workforce Transformation

Keywords

Care Redesign, Workforce Transformation, Care Redesign, Workforce Transformation, Quality Improvement, Safe Care, Improvement Tool, Process Mapping, Workflow Streamlining, Lean Management, Lean Six Sigma, Lead Time, Cost Savings, Patient Satisfaction, Time Savings, Turnaround Time, Ophthalmology, Medical Services, Nursing, Operations, Anaesthesiology, Pre-Operative, Peri-Operative, Multi-Disciplinary Team, Khoo Teck Puat Hospital, Day Surgery Centre, Lean Cataract Surgery Care Path, Cataract Surgery Under Topical Anaesthesia, Cataract Surgery Under Regional Anaesthesia

Name and Email of Project Contact Person(s)

Name: Adj A/Prof Yip Chee Chew

Email: yip.chee.chew@ktph.com.sg

The Lean Cataract Surgery Care Path: Less For More.

Yip, C.C.¹; Lai, F.W.³; Tan, K.⁶; Suriagandhi,S.⁶; Peh, K.K.¹; Lekha,G¹; Chia, K.L.⁴; Leong, A.³; Abdul Karim, R.¹; Lee, S.C.¹; Tan,K.S.⁵; Tan, C.C.L.⁶; Chandra,K²; Seet, E.²

¹Ophthalmology & Visual Sciences, ²Anaesthesia, ³Peri-Ops, ⁴Nursing SOC, ⁵Finance, ⁶Operations; Khoo Teck Puat Hospital

Background & Objectives

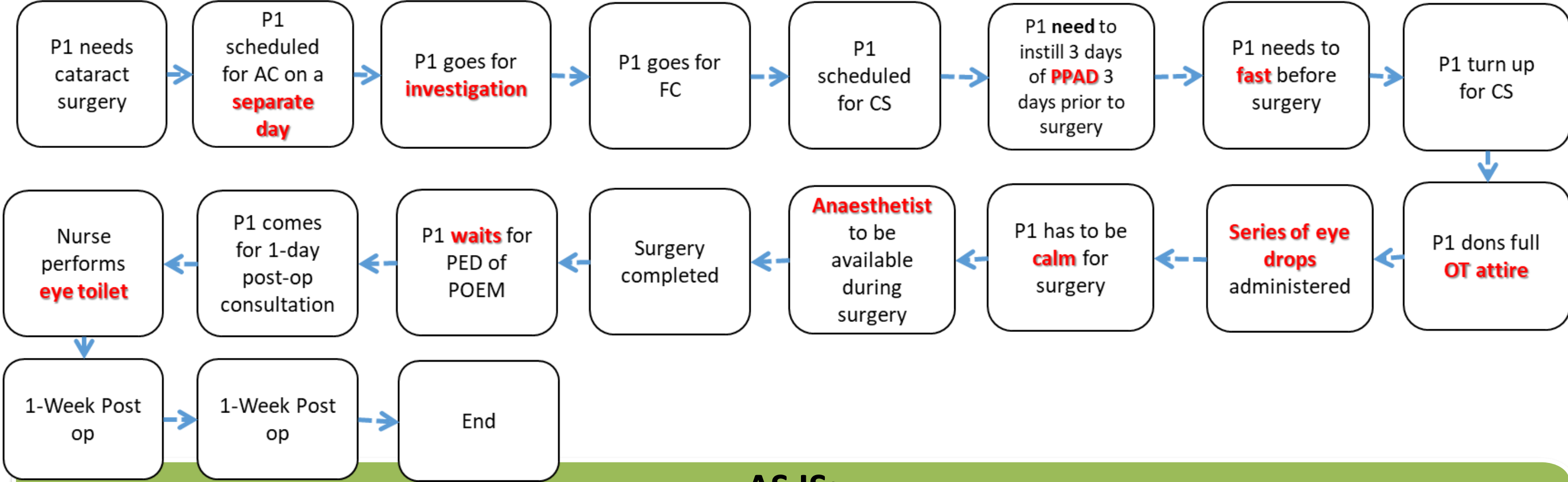
This is a collaborative project by Ophthalmology & Visual Sciences (OVS), Day Surgery Centre (DSC), Nursing and Anaesthesia Departments of Yishun Health. A new Lean Cataract Surgery Care Path (LCSCP) was derived and implemented. Through LCSCP, the four departments modified the pre-operative and perioperative care for patients listed for Cataract Surgery under Topical Anaesthesia (CSUTA) and Cataract Surgery under Regional Anaesthesia (CSURA). It started in 2016 as a series of quality improvement initiatives on the various touchpoints of a Cataract Surgery (CS) patient's journey. This is an on-going project.

Objectives of the LCSCP are:

1. To **reduce** surgery cancellation or delay
2. To **enable** patient cost savings
3. To **reduce** hassle to patients
4. To **improve** patient safety

Assessment of problem

A CS patient's journey was mapped out. Below is a brief extract of the patient's journey which highlights the areas for improvement.



AS IS:

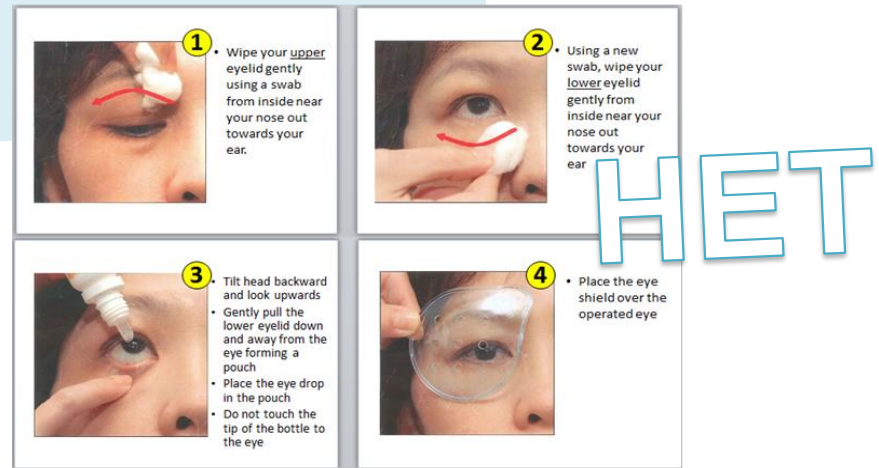
All CS patients need to undergo the following:

Proceed to Anesthesia clinic (AC) for Pre-operative assessment (POA) before surgery.	Conventional Pre-Operative Regime (CPOR) that takes a minimum of 40 mins
Blood investigations (Renal Panel with Glucose) and Electrocardiogram (ECG) during their POA upon listing for surgery.	Have stable blood pressure
Instilling 3 days of Prophylactic Pre-operative Antibiotic (eye) Drops (PPAD) 3 days prior to surgery	Anaesthetist does intra-operative monitoring for CSUTA patients.
Fast before surgery	wait for Patient Education & Dispensing (PED) of their Post-Operative Eye Medication (POEM) before discharge
Donning of full Operating Theatre (OT) "Baju" / attire before entering OT	Eye toilet is performed by the EC nurse on the 1st post-operative day after CS

TO BE:

Patients were classified based on topical (CSUTA) and Regional (CSURA) surgery. CSURA patients were further categorised as **complicated** if they have any of medical or surgical risk factors.

1. Pre-Operative	1. Intra-Operative	1. Post-Operative
Eye Clinic(EC) Nurse-led Pre-Operative Assessment (NLPOA) for CSUTA and 2 nd Eye CSURA Patients No fasting for CSUTA and CSURA(uncomplicated) No blood investigations and ECG test for CSUTA and CSURA (uncomplicated) Omission of PPAD via Removal of Eye Medications for Value-add and Efficiency (REMOVE)	Anxiety Reduction via Optimised Medical Aromatherapy (AROMA) Donning of Kimono over street clothes New Combination Regimen Eye drops (Combo-R) instead of CPOR Nurse-led Peri-operative Anesthetic Care (NPAC) for CSUTA patients	Nurse-led Medication Education & Dispensing System (NMEDS) Home Eye Toilet (HET)
Medical Risk Factors Uncontrolled medical problems, Uncontrolled hypertension, BP>180/110 mmHg, Uncontrolled diabetes, Chest pain, Unable to lie flat, Chronic cough,History of syncope, On warfarin, Dementia, Psychological conditions		
Surgical Risk Factors Posterior polar, Small pupil, Dense / hard cataracts, Lax zonules, Shallow anterior chambers, Post-vitrectomy, Post- multiple intravitreal injections >4, One-eyed patient		



Method of preparation of the new Combination Regime (Combo-R) under strict sterile conditions.

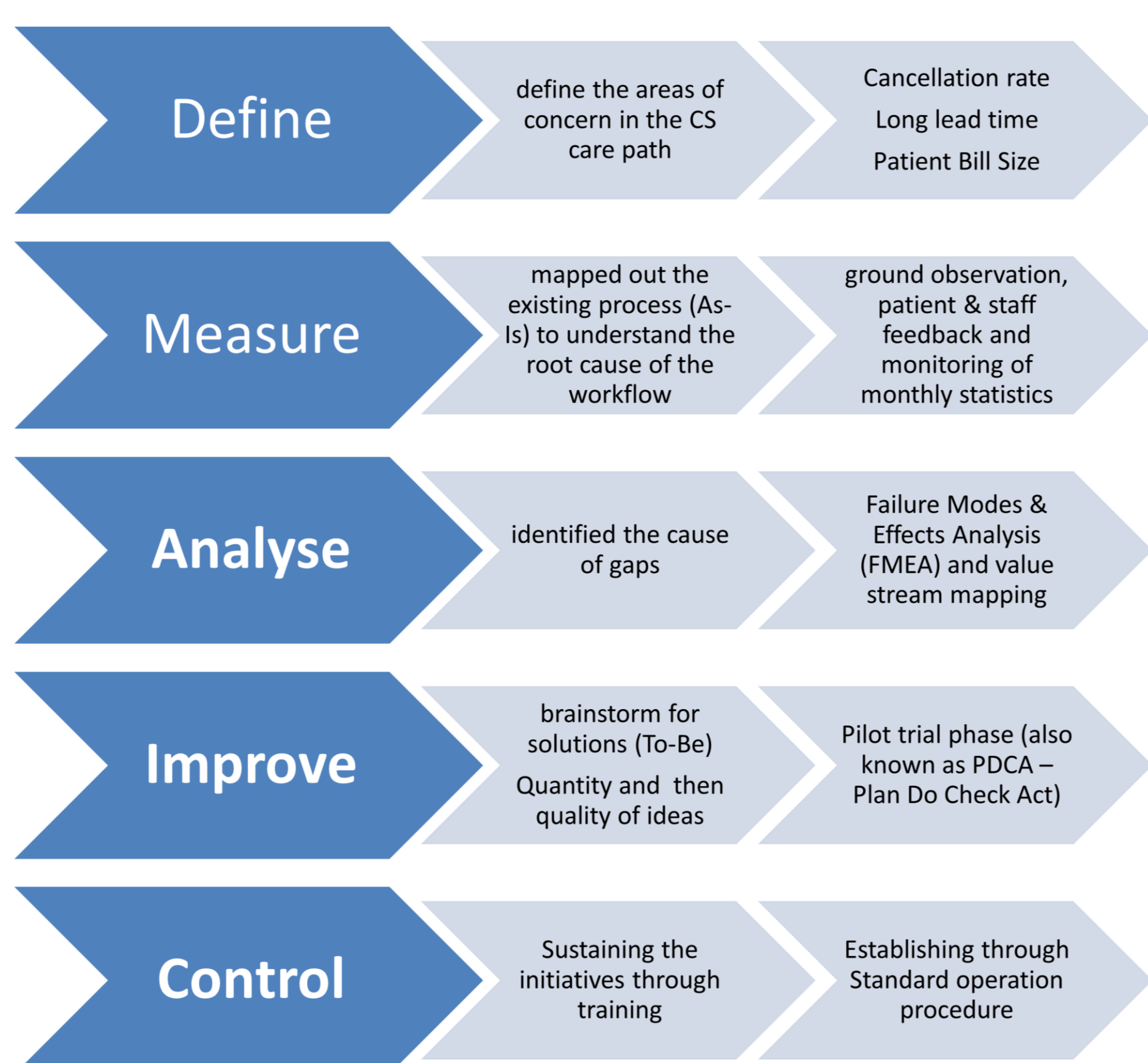
Kimono



Strategy for change

The team applied total organisational approach using lean 6-sigma methodology, with the aim of a sustainable, value-add & affordable CS service.

Lean 6-sigma DMAIC approach:



Results & Measurement of improvement

A hassle-free cataract care path was achieved without compromising quality & safety. As of October 2016 to September 2019 (3 years), **3,139** patients (**39.9%**, CSUTA and uncomplicated CSURA/ Total Cataract cases) have benefited from this initiative.

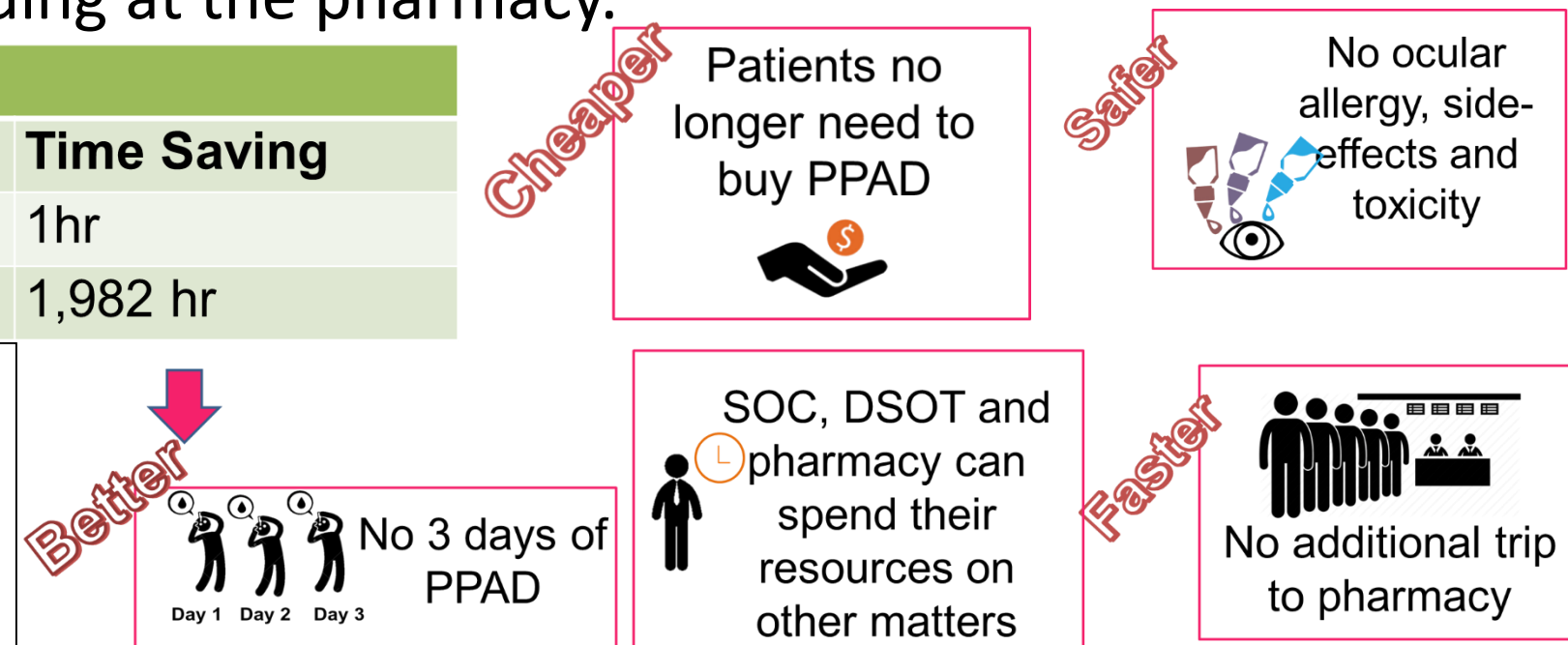
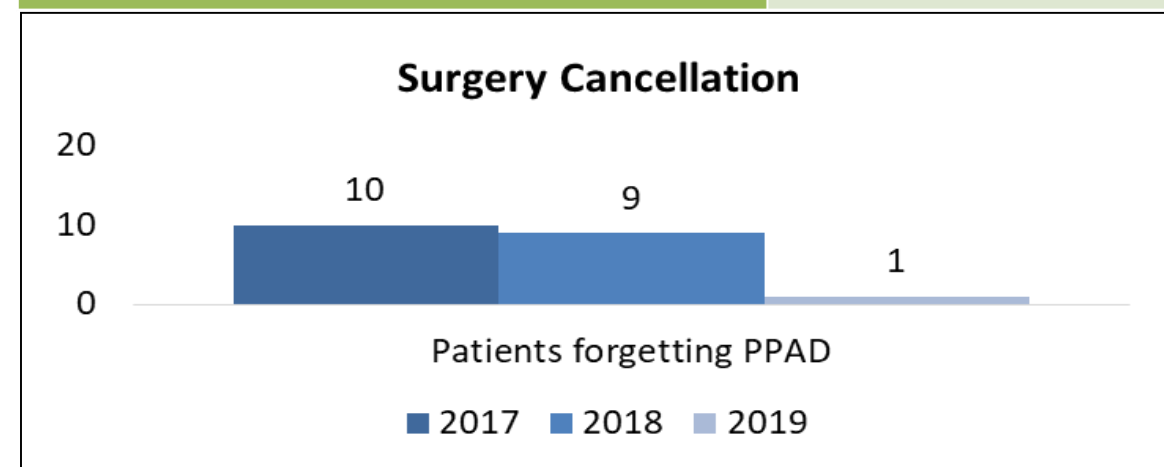
EC NLPOA and Investigation

Tests	Before NLPOA	After NLPOA	Lead Time	Before NLPOA	After NLPOA
Consultation	S\$ 37 (Doctor)	S\$ 6 (Nurse)	Pre-op Assessment	0 – 14 Days	Same-day
ECG	S\$ 14.00	-	Cataract Surgery	From 1 Month	2 Weeks
Blood test	S\$ 40.40	-			
Patient Cost Savings		S\$ 85.40			

- Costs-to-Deliver Outcomes decreased with the provision of POA by trained EC Nurses instead of Medical Officers in AC. The reduced manpower costs amounts to **\$24,000/year**.
- Nurses need not do ECG & blood investigations, equating to about **15 minutes** time saving per patient. The hospital saves **261hrs** per annum.

- REMOVE:** One bottle of PPAD (Chloramphenicol) costs **\$0.85**. Obviating this will save cost & the hassle of its collection & queuing at the pharmacy.

Savings	Cost Saving	Time Saving
Per patient	\$0.85	1hr
Between Dec 18 – Dec 19	\$1,684.70	1,982 hr



→ Cancellation rate due to PPAD is reduced

- Donning of Kimono:** As patient only dons on kimono, there would only be laundry cost, this amounts to a total OT cost savings of \$6,905.80 per annum.

	Complicated RA (\$)	Uncomplicated RA (\$)
Disposable gown (OT "baju")	\$7.20	Not applicable
Laundry cost for kimono	Not applicable	\$0.60
Total	\$7.20	\$0.60
Total cost savings		\$6.60

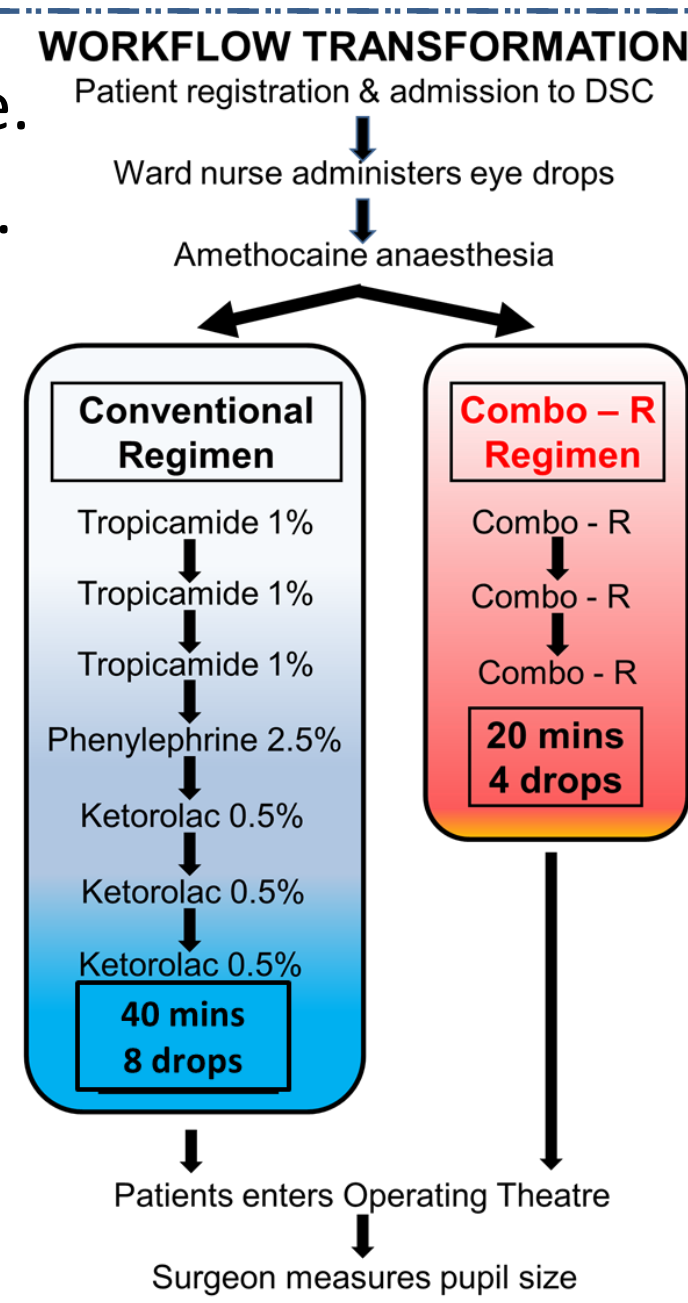
Time Savings	As is - Wearing and taking out disposable gown	To be - Donning/ removal of kimono
Time Spent	10-20 Min (before and after)	4 Min (before and after)
Total		16 Min time savings per patient

- Obviating risks of a fall** due to baju changing.

- COMBO-R:** Pre-dilation using CPOR takes **40** minutes per case. But with the new COMBO-R, it would take **20** minutes per case.
- DSC usually encounter 12 cases a day. That is about 4 hours of time saving per day. This can translate to better utilisation of manpower.

	As Is (CPOR)	To Be (Combo-R)
Pre-dilation eye drops	40 minutes per case	20 minutes per case
Total time saved per day	20 minutes per case or 240 minutes / 4 hours per day*	
Projected time savings per year	60,000 minutes / 1,000 hours of time savings per year**	

- A vial of Ketorolac 0.5% is used per week for every cataract cases. With the adoption of Combo-R in all cataract surgery cases, the total cost savings amount to \$419.12 per year (52 weeks' x \$8.06).



- AROMA:** Results shows that compared to control patients, AROMA patients had, on average, lower blood pressure, pulse, respirations & lower perceived anxiety.

- NMED:** DSC nurses trained to function as pharmacy-extenders to dispense Post-Operative Eye Medication. There were no drug dispensing-related complication reported by the surgeon post-operatively. The Post-Operative Turnaround Time is significantly shorter (36% reduction) with NMEDS as the medications are dispensed soon after surgery.
- Pharmacy department **reduced their number of trips to DSC by 83%** (from 6 trips to 1) and **saved 145 hours per year**.

	AS IS	TO BE	TO BE	Manpower cost savings per year
Pharmacist's trip to DSC	6 trips per day	1 trip per day		
Travel time spent per trip	7 mins	7 mins		
Total time spent per year	175 hrs per year	30 hrs		
Total time savings per year		145 hrs per year		\$ 7,762

- HET:** Performing HET by the patient or relative will thus reduce clinic TAT and free up nursing manpower for other tasks.
- Turnaround time per patient (n=21) reduced by 14 minutes

Conclusion

- The LCSCP **optimizes resource utilization, increases productivity, reduces cost & enhances patients' experience** without compromising quality & safety.