

**Project Title**

Superior Outcomes in Total Knee Replacement Value Driven Outcomes (VDO) Project

**Project Lead and Members**

Project lead: Asst Prof Philip McGraw

Project members: Asst Prof Wang Lushun, Dr Ashish R.Satapathy, Fione Gun, Cheong Siew Jing, Tang Min Yee, Joyce Ong, Zarina Ahmad, A/Prof Fareed Kagda

**Organisation(s) Involved**

Ng Teng Fong General Hospital, Jurong Community Hospital

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

Medical, Healthcare Administration

**Applicable Specialty or Discipline**

Orthopaedic Surgery, Clinical Research

**Project Period**

Start date: 2020

**Aims**

This study aims to assess and determine the impacts of various improvement plans on clinical outcomes and costs following TKR VDO Project implementation.

**Background**

See poster appended / below

**Methods**

See poster appended / below

## **Results**

See poster appended / below

## **Lessons Learnt**

- The superior outcomes in TKR VDO Project have shown improved, sustained effective based-care in TKR surgery.
- Strong leaderships, support from multidisciplinary care team, standardised care processes and a robust NGEMR TKR Clinical Pathway are key success factors of TKR VDO Project.

## **Conclusion**

See poster appended / below

## **Project Category**

Care & Process Redesign, Quality Improvement, Workflow Redesign, Value Based Care

## **Keywords**

Total Knee Replacement Surgery, Clinical Quality Indicators

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# SUPERIOR OUTCOMES IN TOTAL KNEE REPLACEMENT VALUE DRIVEN OUTCOMES (VDO) PROJECT

**MEMBERS: ASST PROF PHILIP MCGRAW, ASST PROF WANG LUSHUN, DR ASHISH R.SATAPATHY, FIONE GUN, CHEONG SIEW JING, TANG MIN YEE, JOYCE ONG, ZARINA AHMAD, A/PROF FAREED KAGDA (SPONSOR)**

- ✓ SAFETY
- ✓ QUALITY
- ✓ PATIENT EXPERIENCE
- ✓ PRODUCTIVITY
- ✓ COST

## Define Problem, Set Aim

### Opportunity for Improvement

Total Knee Replacement (“TKR”) surgery has become one of the most successful surgical interventions; providing substantial pain relief and functional improvement in patients suffering with knee arthritis [10].

With the transformation to value-based health care being a key strategic priority in NUHS, the Department of Orthopaedic Surgery has embarked on TKR VDO project since 2017 by delivering value-based care with enduring results, at reasonable costs.

#### Reference:

Yong, E. L., Ganesan, G., Kramer, M. S., Logan, S., Lau, T. C., Cauley, J. A., & Tan, K. B. (2019). Hip fractures in Singapore: ethnic differences and temporal trends in the new millennium. *Osteoporosis International*, 30(4), 879-886.

### Aim

This study aims to assess and determine the impacts of various improvement plans on clinical outcomes and costs following TKR VDO Project implementation.

## Establish Measures

### Baseline Performance

Baseline all-or-none composite “Clinical Quality Index (CQI)”, in addition to “Mean Costs” were extracted retrospectively between January 2016 to December 2020 on monthly basis, and thereafter tracked and monitored on monthly basis.

The 7 clinical quality indicators are:

1. Length of Stay (LOS) ≤ 5 days	4. DVT Prophylaxis Within Episode
2. (No) Blood Transfusion	5. (No) Post-op Complication ≤ 30 days
3. (No) Inpatient Mortality	6. (No) 30-Day Readmission (All Cause)
	7. (No) Unplanned Return to OT Within the Same Episode

### Patient Cohort

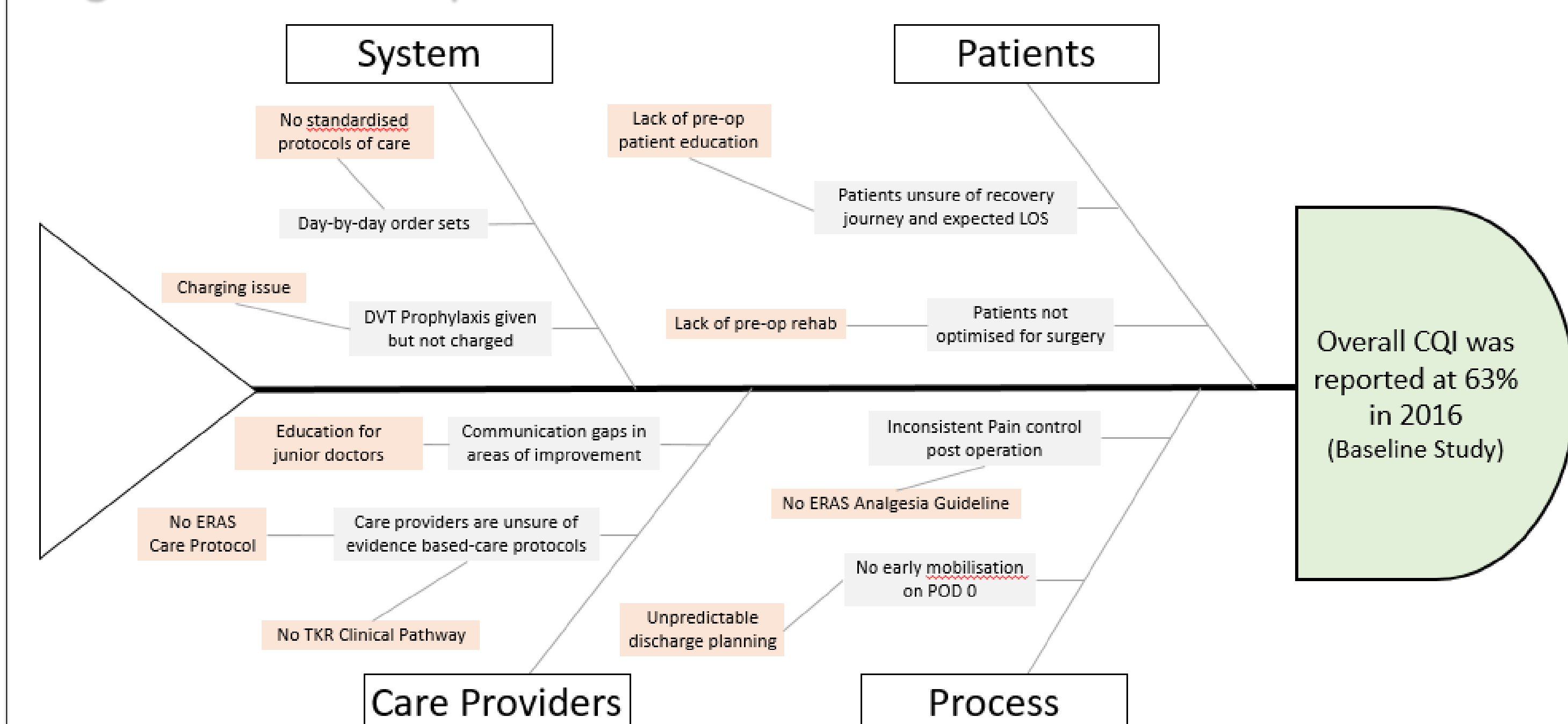
A total of 863 patients were enrolled in the TKR VDO study from 2017 to 2020.

		2016	2017	2018	2019	2020
No of Patients		193	265	256	192	150*
*Covid-19 pandemic						
Age		66.5±8.2	66.4±7.8	66.4±7.8	66.9±7.6	68.2±7.1
Gender	Female	124	171	167	123	88
	Male	69	94	89	69	62

## Analyse Problem

### Root Cause Analysis

Targeted areas of improvement were:



## Acknowledgements

The authors would like to thank the contributions of the multidisciplinary team in the success of TKR surgery, without whom this would not have been possible.

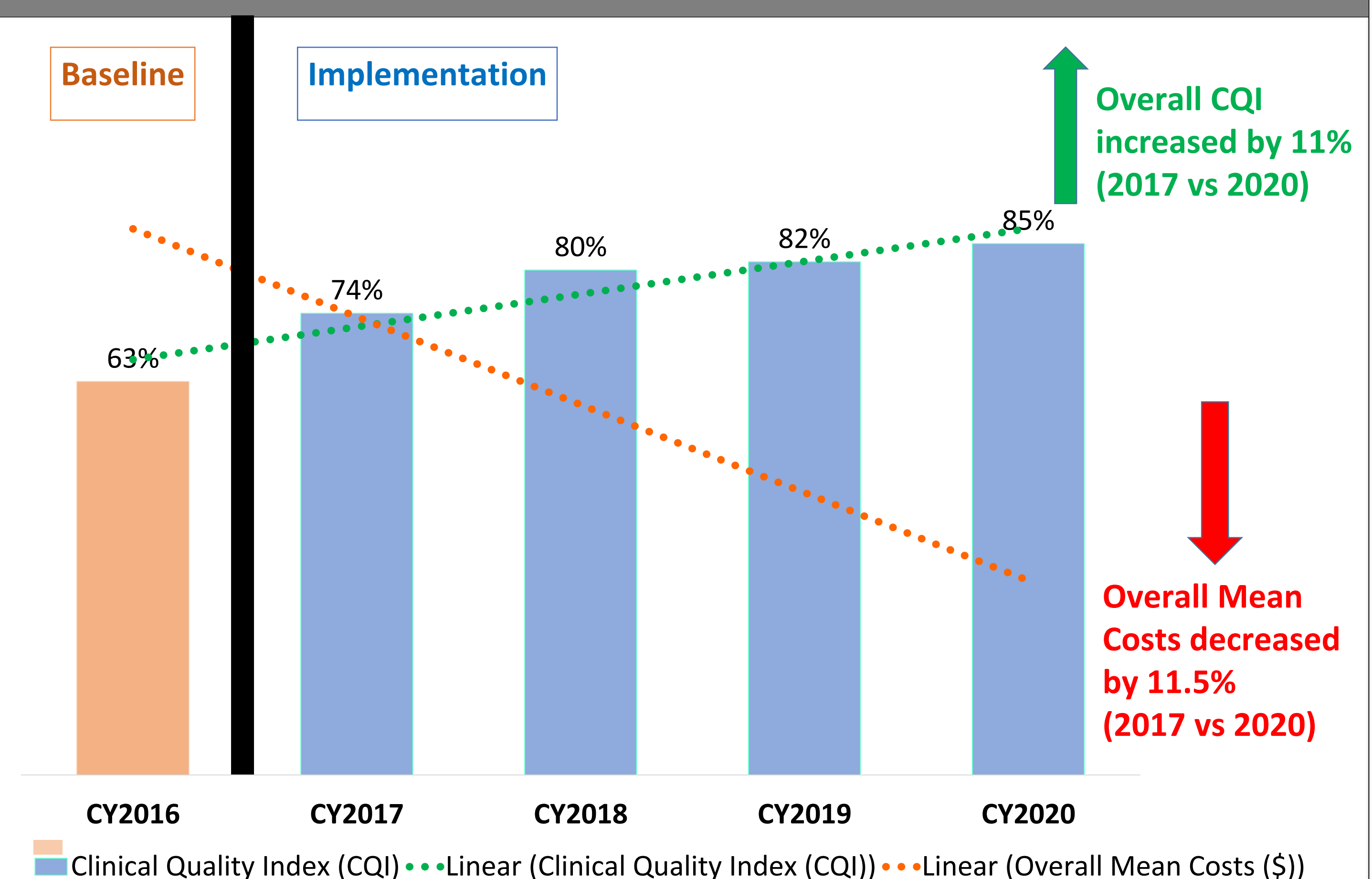
## Test & Implement Changes

Cycle	Plan	Do	Study	Act
1.	Compare VDO performance before and after TKR Pathway implementation	Implementation and enhancement of NGEMR TKR Clinical Pathway	Improvement in performance and decreased in variance	Standardised protocol of care and on-going education for junior doctors
2.	Compare calf pumps administration and charging	Reminders to care providers	Improvement in charging	Regular monitoring on charging
3.	Compare implants and consumable costs	GPO contract for implants and revision of consumables package	Improvement in costs	Costs monitoring and deep dive into costs analysis
4.	Standardised Perioperative phases of care	Implementation of TKR ERAS Protocol in TKR surgery	Improvement in patient outcomes and costs	Regular monitoring of performance

No	Clinical Quality Indicators (CQI, %)	2016 (n=193)	2017 (n=265)	2018 (n=256)	2019 (n=192)	2020 (n=150)
1.	Length of Stay (LOS) ≤ 5 days	76%	85%	90%	90%	96%
2.	DVT Prophylaxis Within Episode	93%	97%	97%	97%	97%
3.	(No) Blood Transfusion	92%	92%	93%	98%	95%
4.	(No) Unplanned Return to OT Within the Same Episode	99%	100%	100%	100%	100%
5.	(No) Post-op Complication ≤ 30 days	94%	94%	96%	95%	91%
6.	(No) 30-Day Readmission (All Cause)	94%	97%	98%	97%	99%
7.	(No) Inpatient Mortality	100%	100%	100%	100%	100%

Comparing performance before and after **TKR VDO implementation**, **Overall Mean CQI increased** and **Overall Mean Costs decreased** year-on-year. There were no cases of mortality or unplanned return to the operating theatre.

### TKR VDO Performance (CY2017 - CY2020)



Comparing 2017 to 2020, the **Overall CQI improved by 11%** with **Overall Mean Costs decreased by 11.5%**.

## Spread Changes, Learning Points

### Spread Change

- Educating and familiarising doctors with the benefits of standardised care protocols that improves team communication and expectation.
- Using NGEMR TKR Clinical Pathway as a powerful tool to facilitate and coordinate care amongst multi-disciplinary team.
- Emphasising on effective value-based care through TKR VDO Project that improves patient outcomes and satisfaction.

### Learning Points

- The superior outcomes in TKR VDO Project have shown improved, sustained effective based-care in TKR surgery.
- Strong leaderships, support from multidisciplinary care team, standardised care processes and a robust NGEMR TKR Clinical Pathway are key success factors of TKR VDO Project.