

Project Title

Reducing Turnover Time of Splint Application in The Operating Theatre

Project Lead and Members

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Project members: Dr. Gera Sumanth Kumar, Joyce Ong Poh Geok , ThwinHtoo, Li

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Organisation(s) Involved

Ng Teng Fong General Hospital

Healthcare Family Group Involved in this Project

Medical, Nursing, Quality Innovation & Improvement

Aims

We aim to make the process of orthopaedic splint application more lean in the operating room and reduce the turnover time for orthopaedic splint application from 10 minutes to 8 minutes by July 2023.

Background

See poster appended/ below

Methods

See poster appended/ below

Results

See poster appended/ below

Lessons Learnt

The experience of using this new splint improved turnover time by making the process a simple and lean one. The process is now simplified to allow faster and more consistent quality of splints applied. OT attendants time is spent on other duties which can further improve overall operating room turnover time (not measured by this project). This can potentially increase further cost avoidance.

Conclusion

See poster appended/ below

Project Category

Care & Process Redesign

Quality Improvement (Workflow Redesign)

Keywords

Turnover Time, Splint, Operating Theatre, OT, Orthopaedic

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REDUCING TURNOVER TIME OF SPLINT APPLICATION IN THE OPERATING THEATRE

- SAFETY
- PRODUCTIVITY
- QUALITY
- COST
- PATIENT EXPERIENCE

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Define Problem, Set Aim

Problem/Opportunity for Improvement

Operating room time is costly. The current process of orthopaedic splint application is laborious, time consuming and inconsistent.

The current turnover time for splint application is 10 minutes. This is comparable to another published study analyzing splint application time.¹

Every minute of reduction in splint application time can potentially result in a SGD 4875 theatre facility cost avoidance per year.

Aim

We aim to make the process of orthopaedic splint application more lean in the operating room and reduce the turnover time for orthopaedic splint application from 10 minutes to 8 minutes by July 2023.

Reference: 1. Gonzalez TA, Bluman EM, Palms D et al. Operating Room Time Savings with the Use of Splint Packs: A Randomized Controlled Trial Arch Bone Jt Surg. 2016;4(1): 10-15

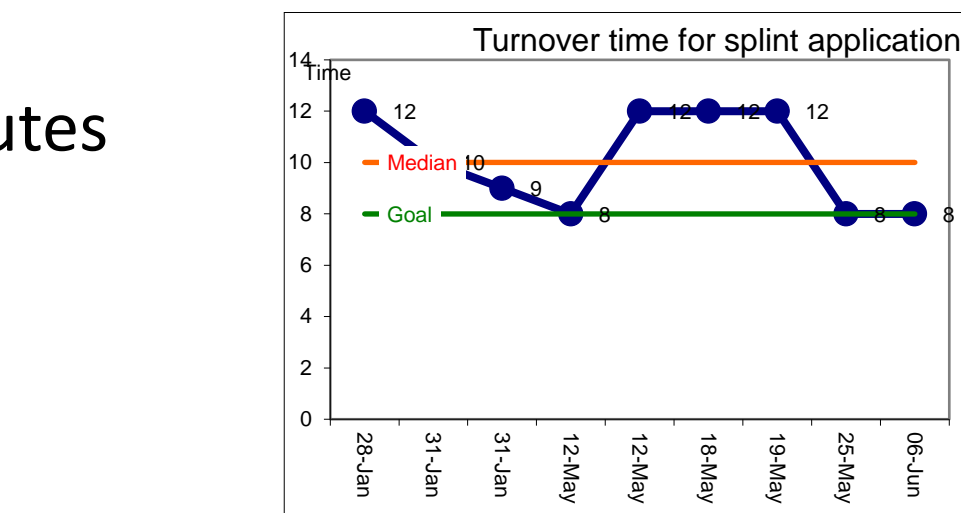
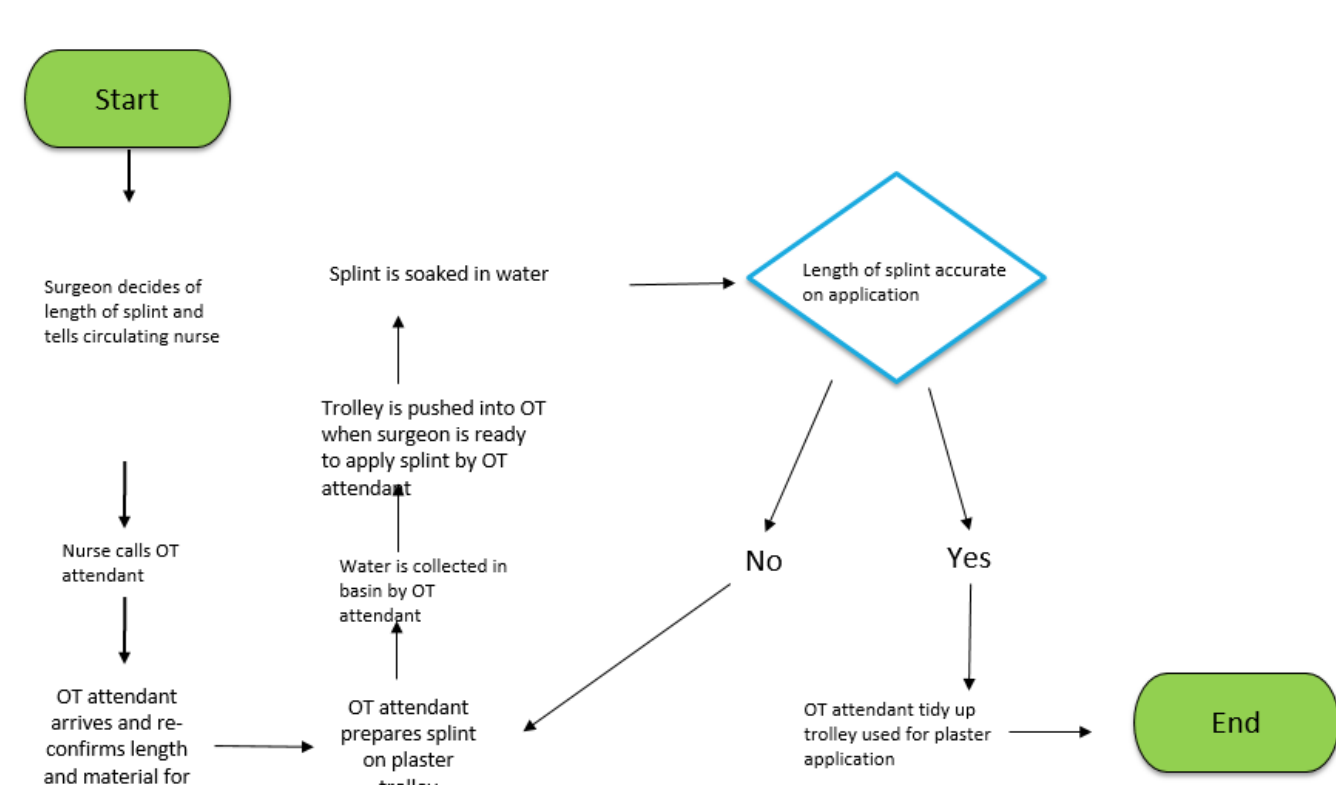
Establish Measures

Baseline data

1. Turnaround time for splint application: 10 minutes

2. Process map for splints application: 9 steps

Process Map (Flowchart) – Current splint application process



current plaster trolley and preparation of splint –takes up space, laborious and messy.

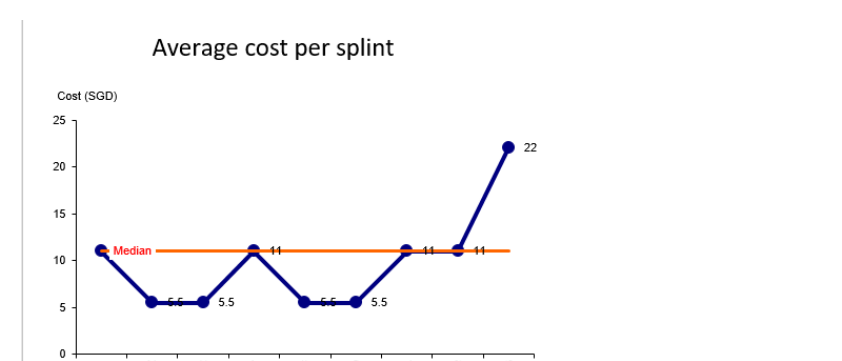
3. Average number of splints applied /week: 9.375

4. Median cost of splint application SGD 11 each

5. Error in splint application 22%

6. OT facility cost: SGD 169/15 minutes

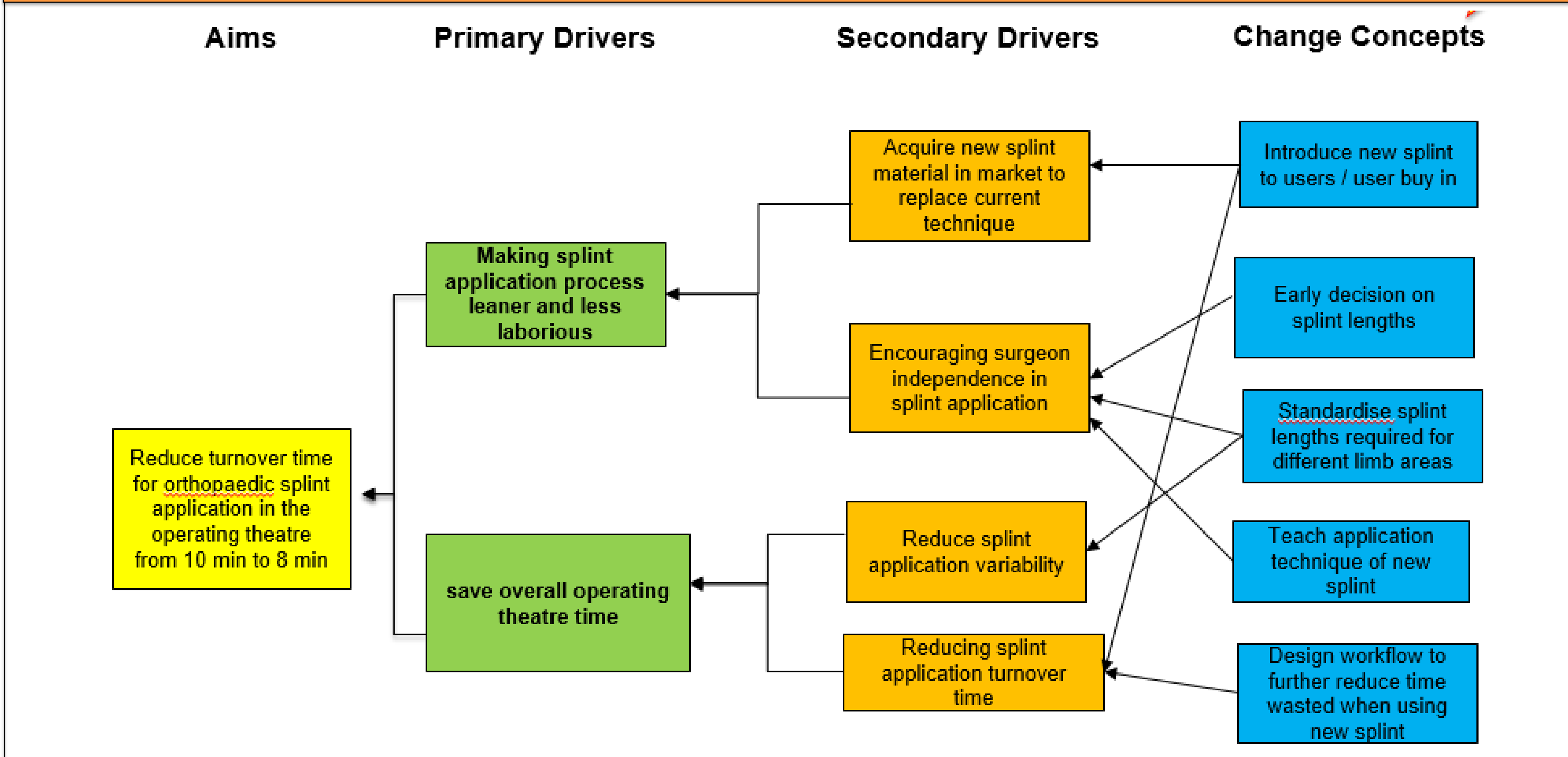
Week	1-7 Jan	8-14 Jan	15-21 Jan	22-28 Jan	29-5 Feb	6-12 Feb	13-19 Feb	20-26 Feb
Number of splints performed	15	15	6	9	12	8	7	7



Measures

Type of Measures	Aim	Measure	Operational Definition (Formula, if applicable)	Data Collection Plan
Outcome	Operating room time savings	Time for splint application	Average operating theatre Time cost taken per splint Numerator : total time Denominator : total number of splints applied	-Measure total time for each splint application (current) vs pre cut splint -Obtain operating room costs / min - Measure average number of splints applied each week for 2 months
	Operating room facility cost avoidance	OT facility cost saved/year	Minutes saved per splint X estimated total number of splints applied each year	
Process	Reducing inefficient steps required for splint application	Number of steps	numerator: number of steps to apply splint denominator: Total number of splints applied	Number of step for each splint application
	Errors in splint application	% of times splint reapplied		Measure number of time splint was re applied
Balancing	Cost	Cost/splint		Cost

Analyse Problem



Test & Implement Changes

CYCLE	PLAN	DO	STUDY	ACT
1	Design a workflow for splint application - Predetermine length of splint required - Using water spray instead of basin of water to wet pre-cut splint Prediction : Having a specific workflow will save operating theatre time when applying pre-cut splint.	- we were surprised that the setting time was longer than expected using the water spray to wet the splint - In addition there was some uncertainty with regards to appropriate splint lengths that were available resulting in delays in splint selection	- Providing recommendations for splint lengths for various indications so that surgeons know which splints to use - Soaking the splint in a water basin instead of using the spray	- Providing recommendations for splint lengths for various indications so that surgeons know which splints to use - Soaking the splint in a water basin instead of using the spray
2	- Using new experience, we can further reduce time for splint application by standardizing use of 4X15/4X30 splint lengths for below knee splint - Using water basin to soak splint instead of water spray Prediction : These steps will improve efficiency in splint application	- Using the water basin to soak the splint reduced the splint setting time from 11 to 7 mins - In addition, we found that we did not require the water basin to soak the splint as we could just fill the packet containing the splint further reducing one step in this splint application process	- Having the splint in OT allowed immediate application of the splint on the patient without need for the runner to pick up the splint at the end of the case - To further reduce one more step in splint application, we found that there was no need to use a basin for soaking the splint, but can soak the splint within the packet which the splint is stored. This reduced time to splint application to 6 instead of 7 minutes	A workflow for splint application is devised and can be disseminated to all splint users in OT
3	- Having a consistent method of application and standard lengths for various splints - Showing splint users how to apply use the splint	Measuring the turnover time and evaluating if there is consistent time savings.	To see if we can have a consistently low turnover time following a streamlined process	A workflow for splint application is devised and can be disseminated to all splint users in OT

New workflow for splint application after PDSA cycle 2

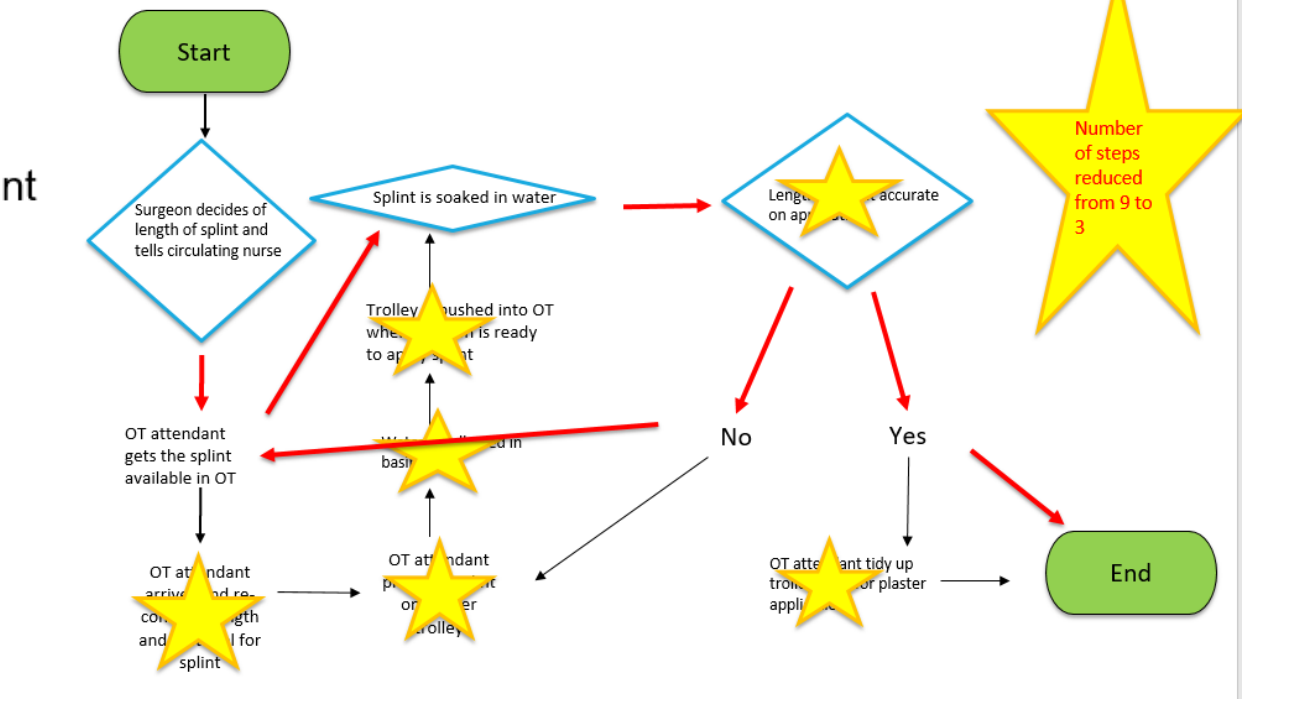
1. Surgeon decides what splint is required before case is completed and splint is made available

- Recommended splint lengths
- Below elbow splint 3X 12 inches
 - Above elbow splint 4X 30 inches
 - Muenster splint 4X 30 inches
 - Below knee splint 4X15 or 4X30 inches
 - Above knee/cylinder splint 4X30 inches

2. Splint is opened and soaked using the packaging that contains it

3. Splint is applied and wait to set.

Process Map (Flowchart) – after change

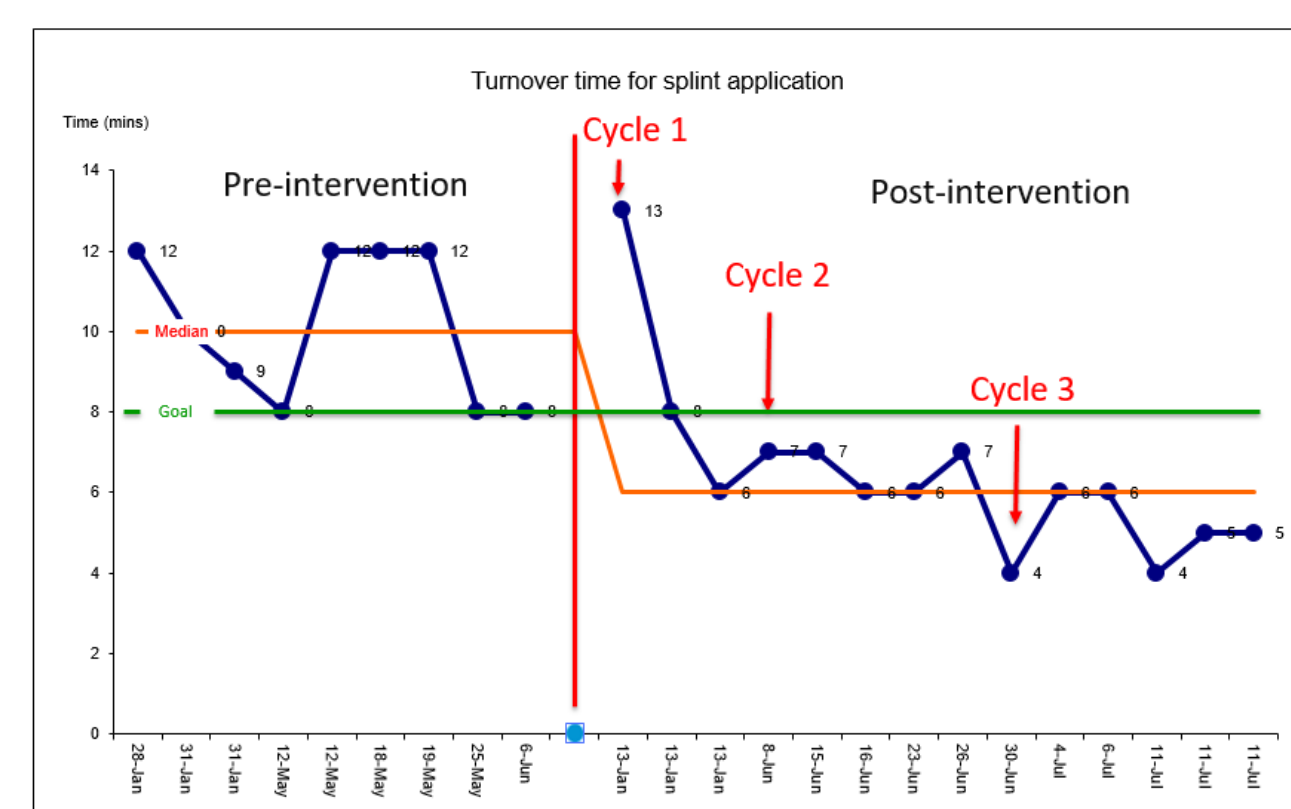


Steps in splint application from 9 to 3 making it a leaner and neater process.



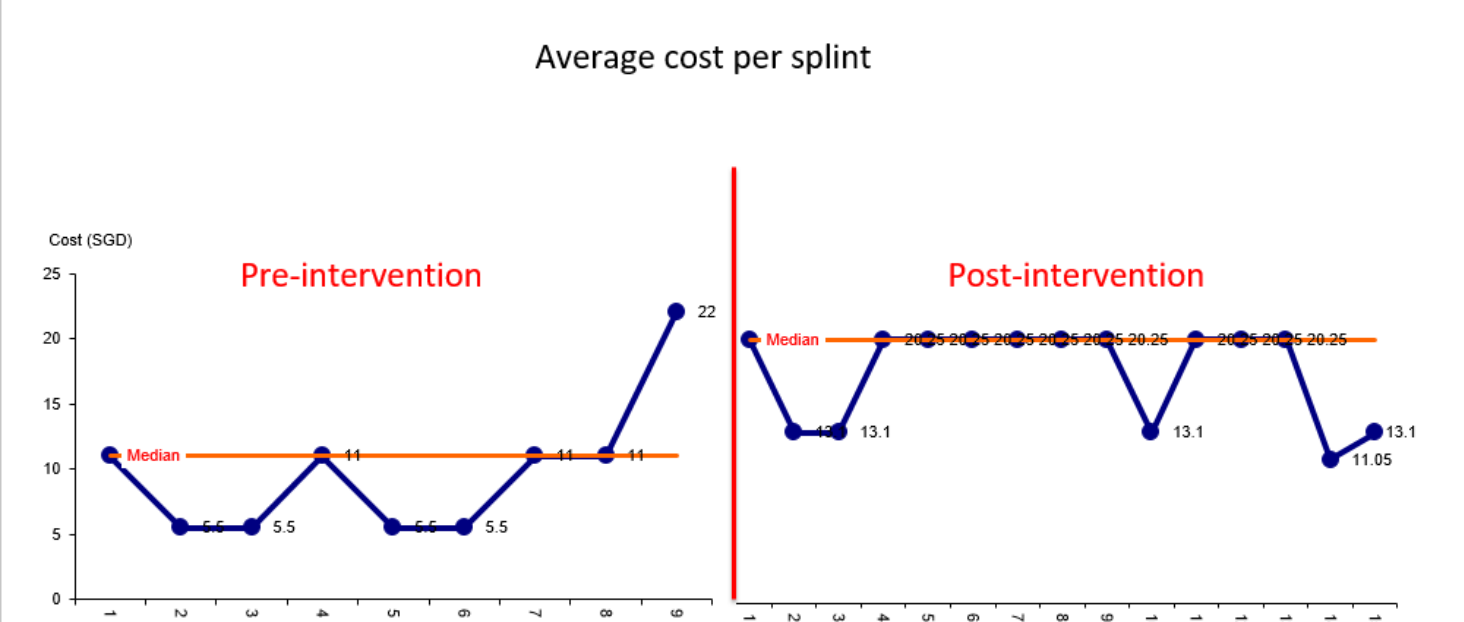
No need for a plaster trolley anymore, individually packed splint is kept in the operating room, QR code demonstrating the new splint application process

Outcome pre and post intervention (Jan-July 2023)



a) Reduction of turnover time for splint application from median of 10 minutes to 6 minutes

Balancing measure pre and post intervention (Material cost)



b) Rise in material cost from median of SGD 11 to SGD 20

Outcome measure (Projected facility cost avoidance)

Week	1-7 Jan	8-14 Jan	15-21 Jan	22-28 Jan	29-5 Feb	6-12 Feb	13-19 Feb	20-26 Feb
Number of splints performed	15	15	6	9	12	8	7	7

Average number of splints per week = 9.375
 Projected number of splints per year = 4875
 Projected turnover time for current splint per year = 48750 minutes
 New splints allow 4 minutes of OT facility cost savings / splint
 Projected OT facility time savings / year = 487.5X 4 mins = 1950 mins/ year
 OT facility cost = SGD676 / 60 minutes = SGD11.26/minute
 Potential cost savings = SGD 21957 / year
 splint cost before = SGD 4777.5
 splint cost after = SGD 8628.75
 splint cost increase = SGD 3851.25
 overall potential cost avoidance = potential cost savings – splint cost increase = SGD 18118.75 / year

Process measure (error in splint application)

Pre intervention (%)	Post intervention (%)
2 of 9 = 22%	0 of 15 = 0%
Case 4 (wrong material used –POP instead of fiberglass)	
Case 9 (length of splint too short)	

c) Reduction in error of splint application to 0%

d) Projected cost avoidance per year

Spread Changes, Learning Points

strategies to spread change after implementation.

We aim for widespread use of the pre-cut orthopaedic splints amongst all splint users in OT – disciplines include plastic surgery, hand surgery services in the initial phase. This is via spread of information (through education and information dissemination). Subsequently, we aim to spread the use of these splints to the emergency department of our hospital by engaging the stakeholders (doctors, nurses, patient feedback) in their department.

key learnings points

The experience of using this new splint improved turnover time by making the process a simple and lean one. The process is now simplified to allow faster and more consistent quality of splints applied. OT attendants time is spent on other duties which can further improve overall operating room turnover time (not measured by this project). This can potentially increase further cost avoidance.