

# Improving Prone Positioning Process for Acute Respiratory Distress Syndrome (ARDS)



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## Introduction

Widespread inflammation in the lungs may result in a life-threatening condition called acute respiratory distress syndrome (ARDS). Large randomized studies and meta-analysis have shown that prone positioning (PP) improved oxygenation and survival rates in mechanically ventilated patients with ARDS. Despite the evidences, the use of prone positioning in the intensive care units (ICUs) has often been limited or delayed by the physical challenges and associated risks such as inadvertent endotracheal extubation, hemodynamic instability, pressure injuries, and arterial and catheter dislodgements.



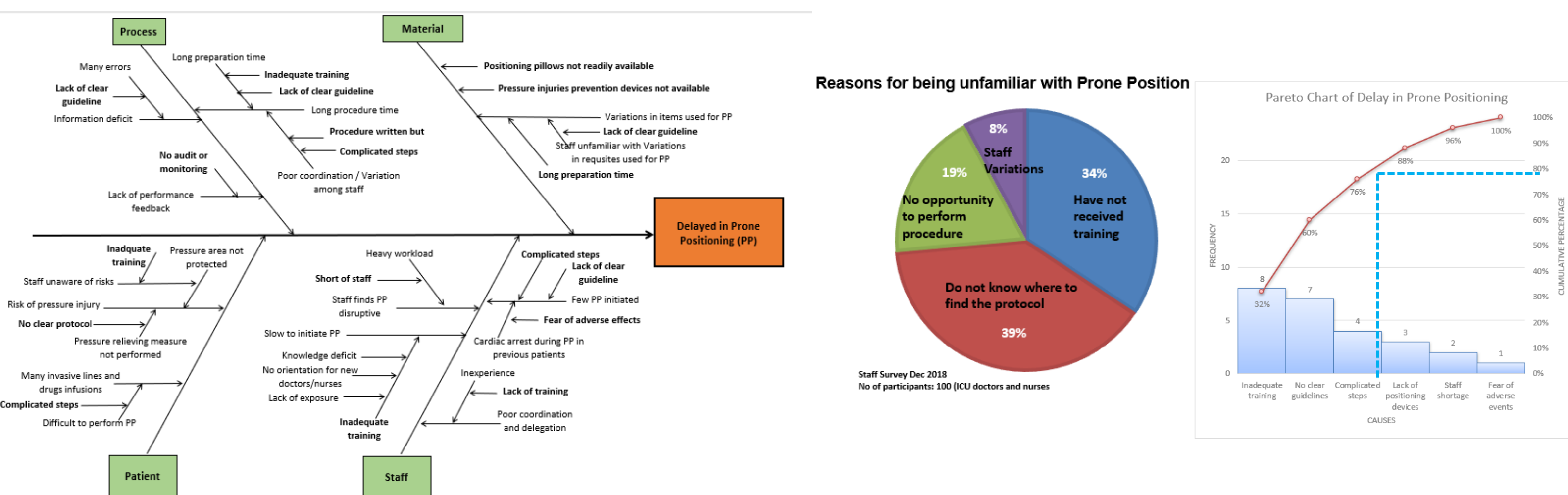
## Aim

To reduce the time taken to implement PP by 50% within 12 months  
 To reduce the incidence of pressure injuries by 90% within 12 months

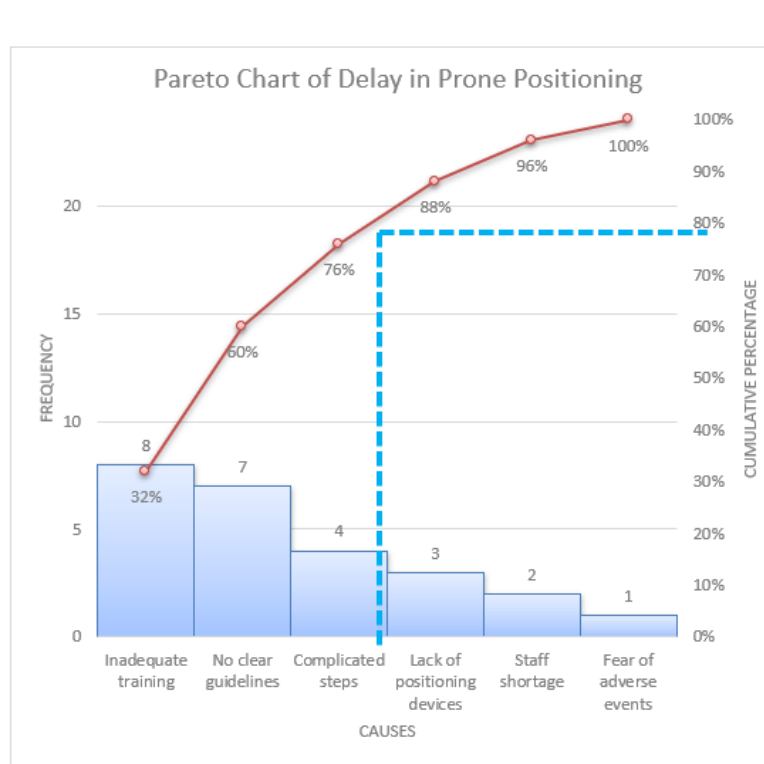
## Methodology

A multi-disciplinary workgroup was formed. Support was obtained from senior administrators. The project was registered under SGH QIP and scoped to cover all ICUs.

**Root cause analysis:** Utilising cause-effect analysis, observing PP process, and obtaining feedback and survey from ICUs staff, potential root causes of delay in initiation, safety gaps, procedure time, complications and pressure injuries were identified.



Reasons for being unfamiliar with Prone Position



**Final solutions:** Tree diagram and Prioritization matrix to develop the final solutions

Aim of project	Root causes	Specific Solutions	Column #1	Column #2	Column #3	Column #4	Total Score
Staff training	Inadequate training	Online didactic lecture	4	2	5	5	17
		Training video	4	2	5	5	17
		Simulation drills	3	3	4	4	14
Standardize	Lack of clear guideline	Clear protocols	5	5	5	5	20
		Flowchart algorithm to guide initiation and termination of PP	5	5	5	5	20
		Videoconference manual make available to staff	5	5	5	5	20
Positioning steps	Inadequate training	Collate available positioning products to make it	3	1	3	3	10
		Standardized the steps for PP	5	3	5	5	18

## 3 Plan-Do-Check-Act (PDCA) cycles implemented

**PDCA 1 :** Guidelines, protocol, checklist and algorithm to guide and standardize practice

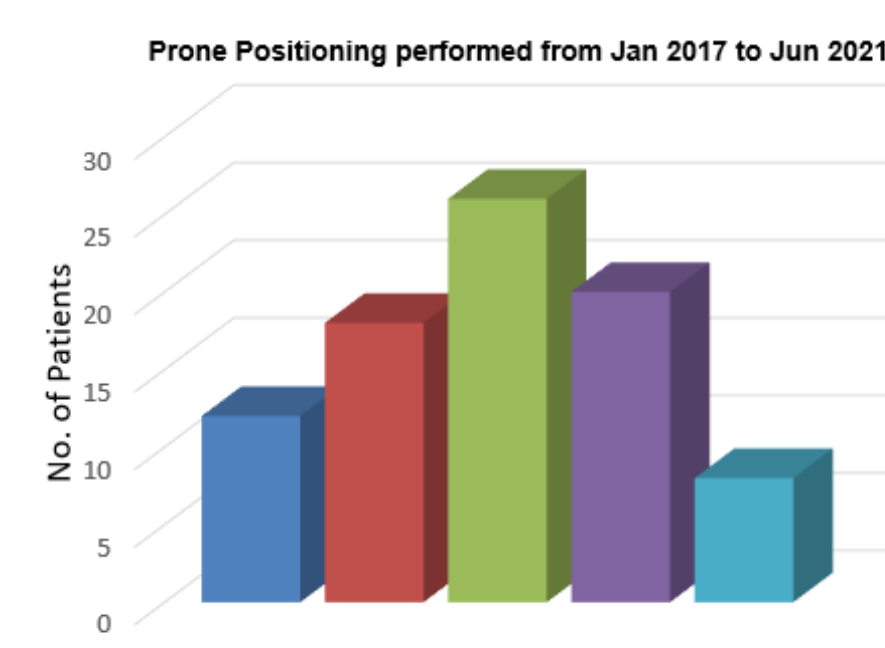
**PDCA 2 :** Simplifying the PP steps, online learning, videos and simulation training

**PDCA 2 :** Trial of commercial prone devices, multidisciplinary procedure and crisis simulation training



**PDCA 3 :** Communications, roadshows, audits and yearly competency to sustain improved PP care

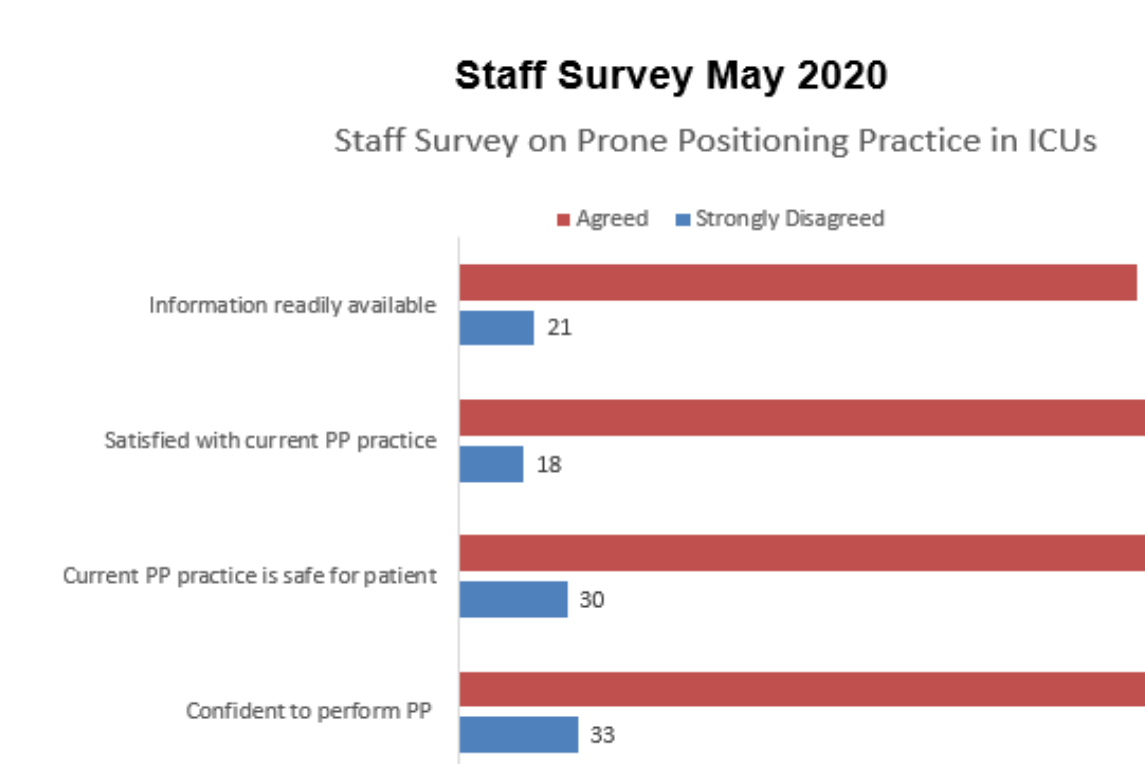
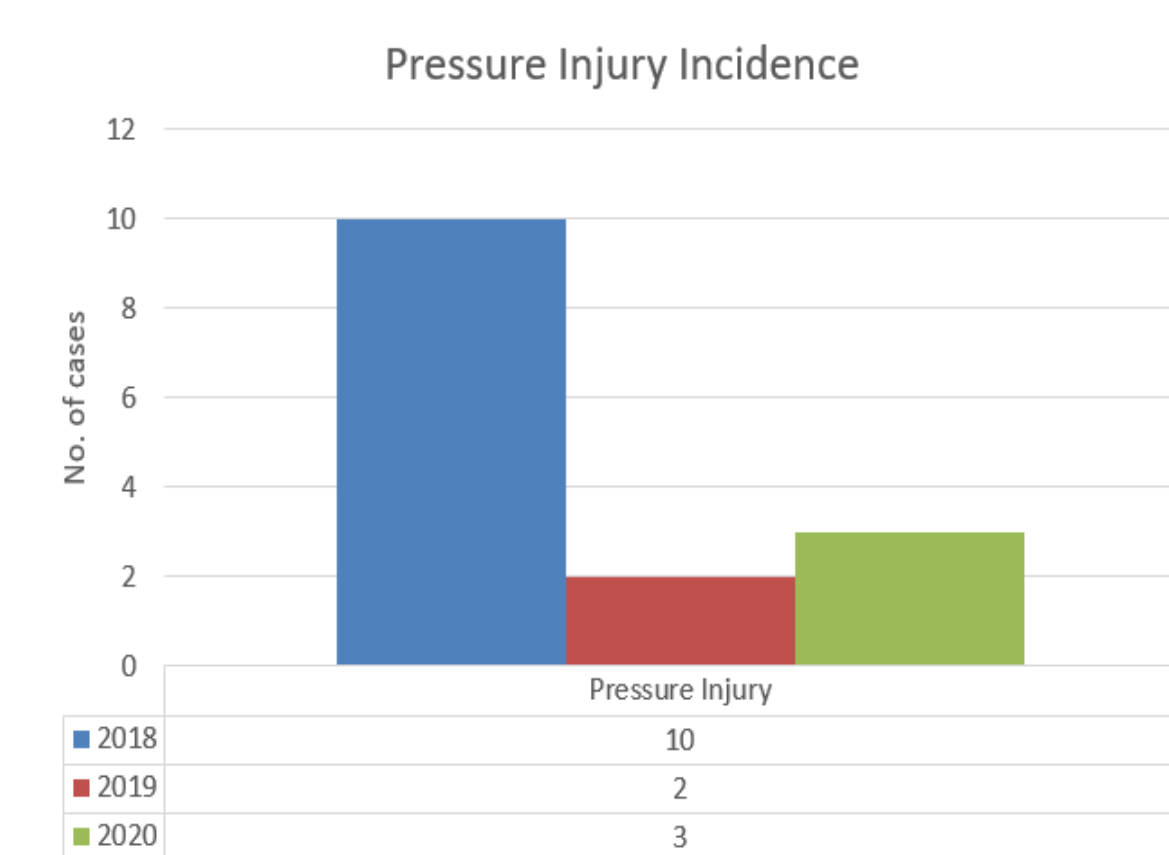
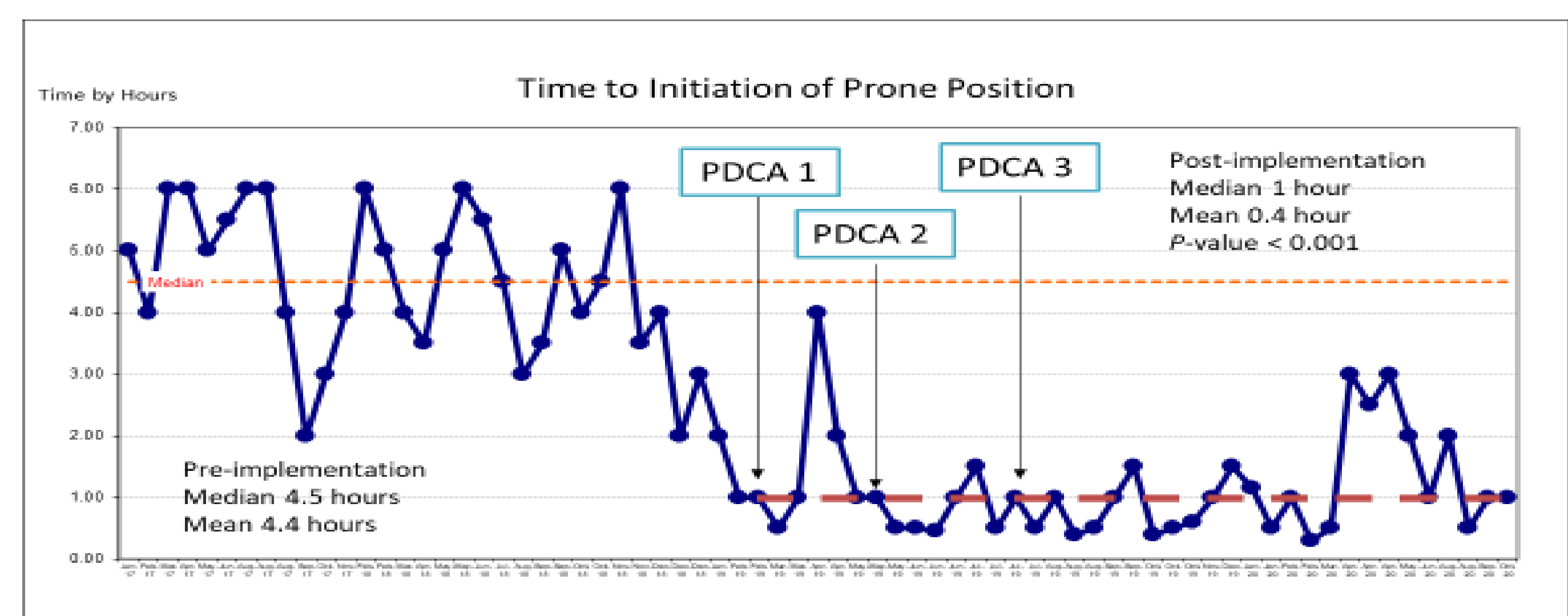
## Results



- Yearly increment in numbers of patients on prone position
- 46 patients from Jan 19 to Dec 20 vs 30 patients from Jan 17 to Dec 18

Preparation and Procedure Time for PP

	Pre-implementation (Hour)	Post-implementation (Hour)	P-value
Preparation Time (Mean)	0.91	0.28	p-value <0.05
Procedure Time (Mean)	0.5	0.2	p-value >0.05



- Median initiation time reduced from 4.5 hrs to 1 hr
- Mean preparation time reduced from 0.91 hrs to 0.28 hrs
- Incidence of pressure injuries reduced by 50%
- Potential cost-saving of \$27,280 or \$5,456 for each pressure injury prevented
- Overall, staff were satisfied with current PP practice and felt confident and safe to PP

## Conclusion

Prone positioning helps improve oxygenation and lung recruitment in patients with ARDS. During COVID-19 pandemic, prone positioning was widely used as a low-cost effective way of saving patients' lives. Our project came in time to prepare the ICU teams and train the deployed staff assigned to ramp up ICU capabilities. Combining forces with all intensive care units at SGH, our team developed a systematic approach to perform prone positioning in a safe manner. Together as a big team, we were able to overcome the challenges and associated risks with it. ICU teams' knowledge, skills and confidences to perform prone positioning were greatly enhanced. Early initiation of therapy was achieved.

### References:

- Fan E, Del Sorbo L, Goligher EC, Hodgson CL, Munshi L, Walkey AJ, et al. An official ATS/ESICM/SCCM clinical practice guideline: mechanical ventilation in adult patients with acute respiratory distress syndrome. *Am J Respir Crit Care Med* 2017; 195(9): 1253-1263.
- Munshi L, Del Sorbo L, Adhikari NKJ, Hodgson CL, Wunsch H, Meade MO, et al. Prone position for acute respiratory distress syndrome. A systematic review and meta-analysis. *Ann Am Thorac Soc* 2017; 14(4)(Suppl.): S280-S288.
- Lim, Mei Ling & Yuh, Ang. (2017). Impact of hospital-acquired pressure injuries on hospital costs – experience of a tertiary hospital in Singapore. *Wound Practice and Research*. 25. 42-47.