

## **Project Title**

“Time to Take the Pressure Off”: Reducing Facial Pressure Injuries From Non-Invasive Ventilation (NIV)

## **Project Lead and Members**

- Lim Voon Ping
- Joel Quek WeeTeck
- Tneh Yu Xuan
- Vincy Mathew
- Lee Wan Lih
- Lucius Tan Ren Jie
- Chan Cui Peng
- Rommel Jude Tambot De Guzman
- GaculaLevi Leopoldo Jr Conguis
- Respiratory Therapy
- Muhamed Maliki Bin Mohamed Nasir
- Helen Hii Shiu Sing

## **Organisation(s) Involved**

Tan Tock Seng Hospital, National Centre for Infectious Diseases

## **Healthcare Family Group Involved in this Project**

Medical, Nursing

## **Applicable Specialty or Discipline**

Respiratory Therapy

## **Project Period**

Start date: Mar 2021

Completed date: Mar 2022

## **Aims**

To reduce the prevalence for facial pressure injuries related to Non-Invasive Ventilation (NIV) in ICU/HDU patients from 5% to 2.5% (50%reduction) in 6months

## **Background**

See poster appended/ below

## **Methods**

See poster appended/ below

## **Results**

See poster appended/ below

## **Conclusion**

See poster appended/ below

## **Additional Information**

Accorded the NHG Quality Day 2022 (Category E: Innovation in Healthcare) Best Award

## **Project Category**

Care & Process Redesign

Quality Improvements, Design Thinking, Productivity, Time Saving, Cost Saving

## **Keywords**

Dressing, Dressing Application, NIV, Non-invasive Ventilation, Pressure Injury

## **Name and Email of Project Contact Person(s)**

Name: Lim Voon Ping

Email: [voon\\_ping\\_lim@ncid.sg](mailto:voon_ping_lim@ncid.sg)

# "Time to Take the Pressure Off" : Reducing Facial Pressure Injuries From Non-Invasive Ventilation (NIV)

**Ms Lim Voon Ping & Mr Joel Quek**  
**NCID ICU**

## Mission Statement

To reduce the prevalence for facial pressure injuries related to Non-Invasive Ventilation (NIV) in ICU/HDU patients from 5% to 2.5% (50% reduction) in 6 months

## Team Members

	Name	Designation	Department
Team Leader	Lim Voon Ping	Senior Nurse Clinician	NCID ICU
	Joel Quek Wee Teck	Senior Staff Nurse	NCID ICU
Team Members	Tneh Yu Xuan	Senior Staff Nurse	NCID ICU
	Vincy Mathew	Senior Staff Nurse	NCID ICU
	Lee Wan Lih	Senior Staff Nurse	NCID ICU
	Lucius Tan Ren Jie	Senior Staff Nurse	NCID ICU
	Chan Cui Peng	Staff Nurse	NCID ICU
	Rommel Jude Tambot De Guzman	Senior Respiratory Therapist	Respiratory Therapy
	Gacula Levi Leopoldo Jr Conguis	Senior Respiratory Therapist	Respiratory Therapy
	Muhammed Maliki Bin Mohamed Nasir	Senior Staff Nurse	Nurse Clinician Specialty
	Helen Hii Shiu Sing	Senior Patient Service Associate	NCID ICU

Sponsors: Dr Benjamin Ho & Ms Lorraine Tan

## Evidence for a Problem Worth Solving

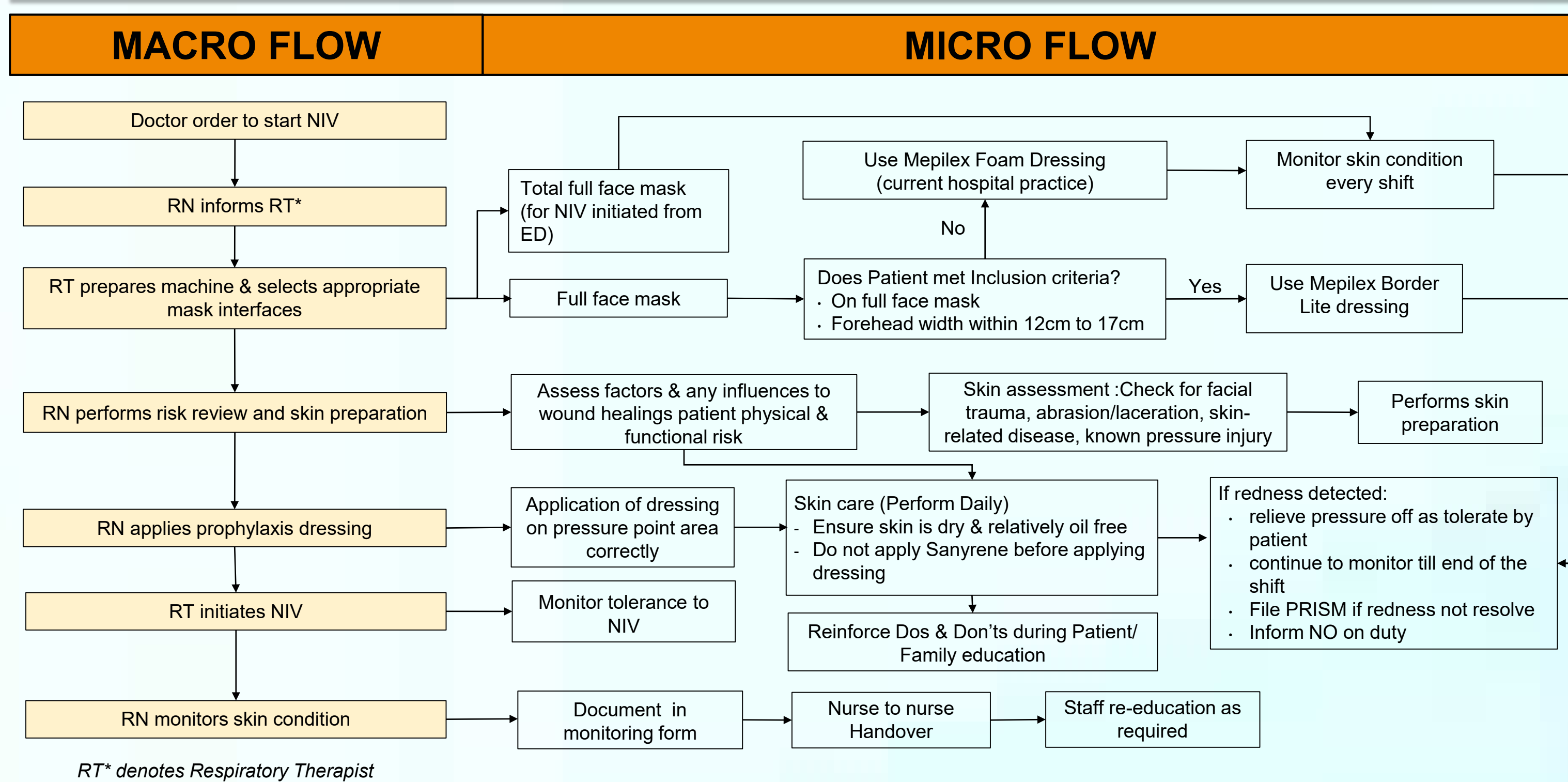
- The current foam dressing (Mepilex foam) is the standard prophylaxis dressing for NIV interfaces
- With new innovations, other protective dressings have been made available in the market incorporating less-pain contact layer with silicone adhesion technology and at a cost-effective price
- Feedback from staff on current prophylaxis dressing used with NIV interface :
  - Ineffective in preventing PIs due to the dressing less adhesiveness to skin
  - With repeated NIV mask adjustments, it causes a lot of friction and shear
- The need to consider using other prophylactic measures to reduce pressure injuries from face mask interfaces

Baseline Data Of Facial Pressure Injuries

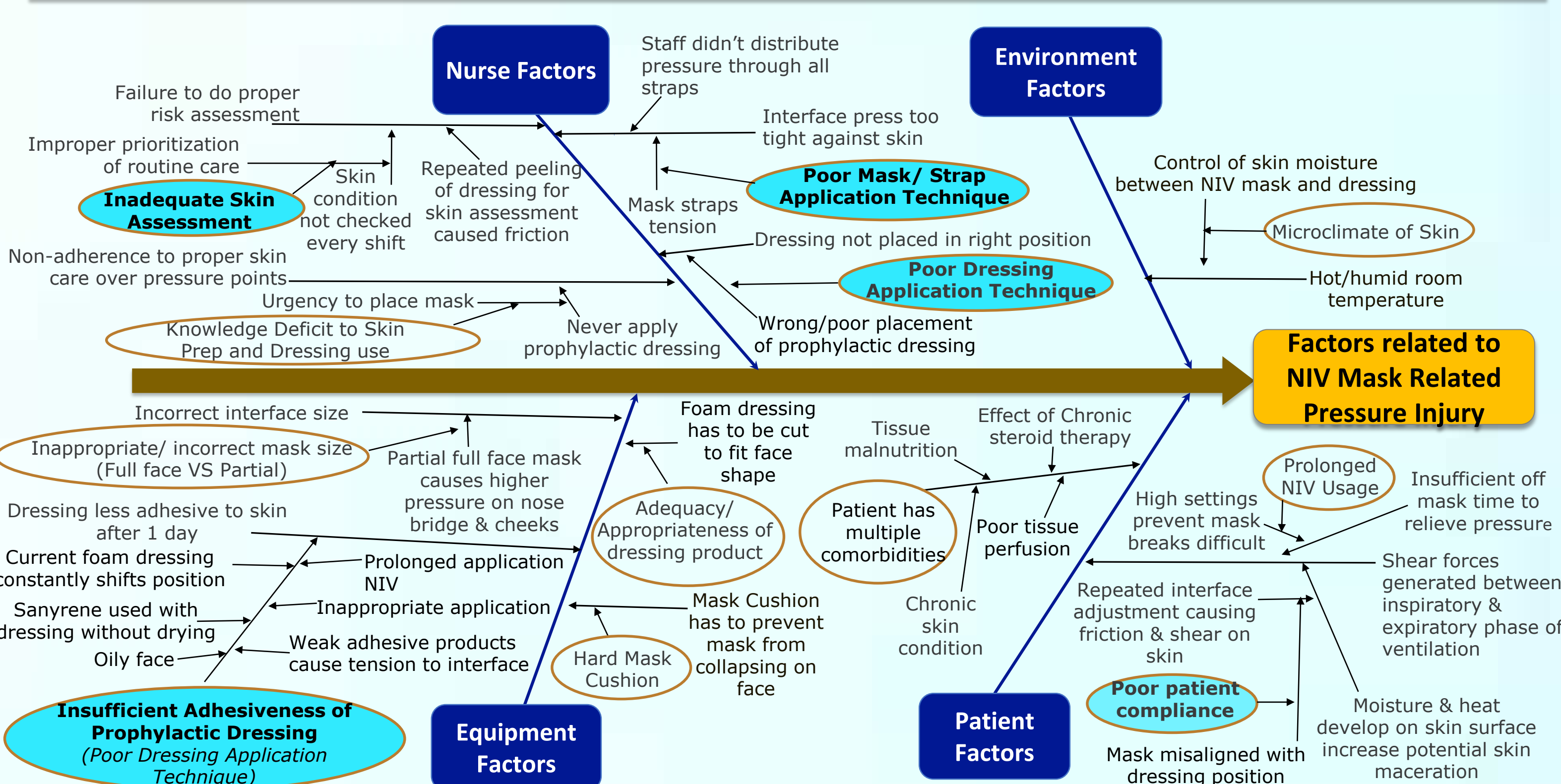
Pre-Intervention Median = 5%

Year	Pts on NIV	Staging	Total	%	Location
Jun 2020 (1st COVID Surge)	11	Stage 1	2	36.4%	Right Ear (N=1)
		Stage 2	1		Nose Bridge (N=1)
		Deep Tissue Injury	1		Cheeks with forehead (N=1)
Sep 2020	27	Stage 1	2	11.1%	Nose Bridge (N=1)
		Stage 2	1		Cheeks (N=1)
Jan - Mar 2021	28	Stage 1	5	17.9%	Nose bridge (N=4) Nose bridge & Ear (N=1)

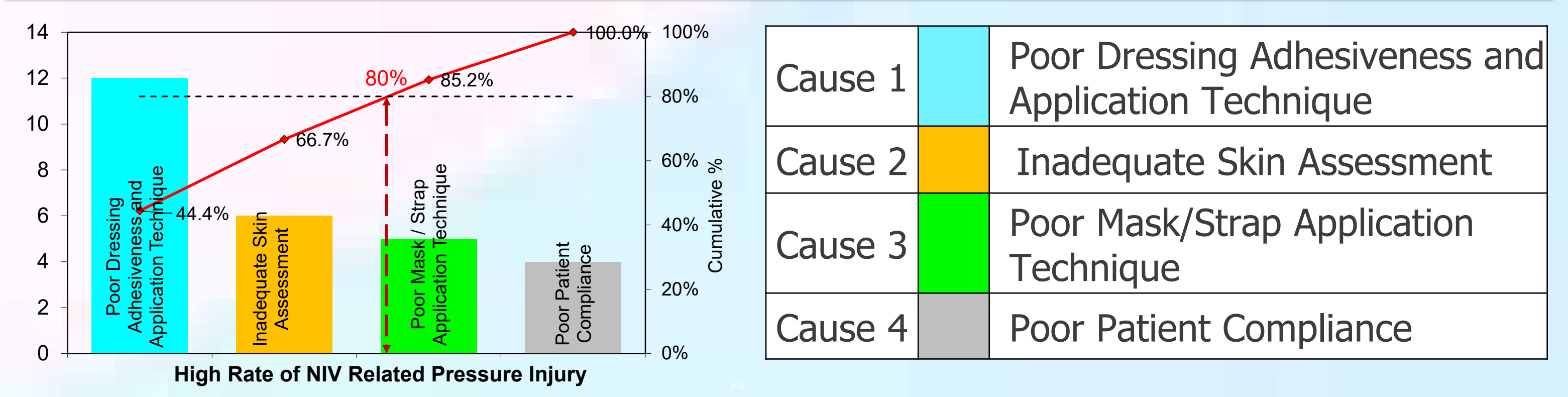
## Flow Chart of Process



## Cause and Effect Diagram

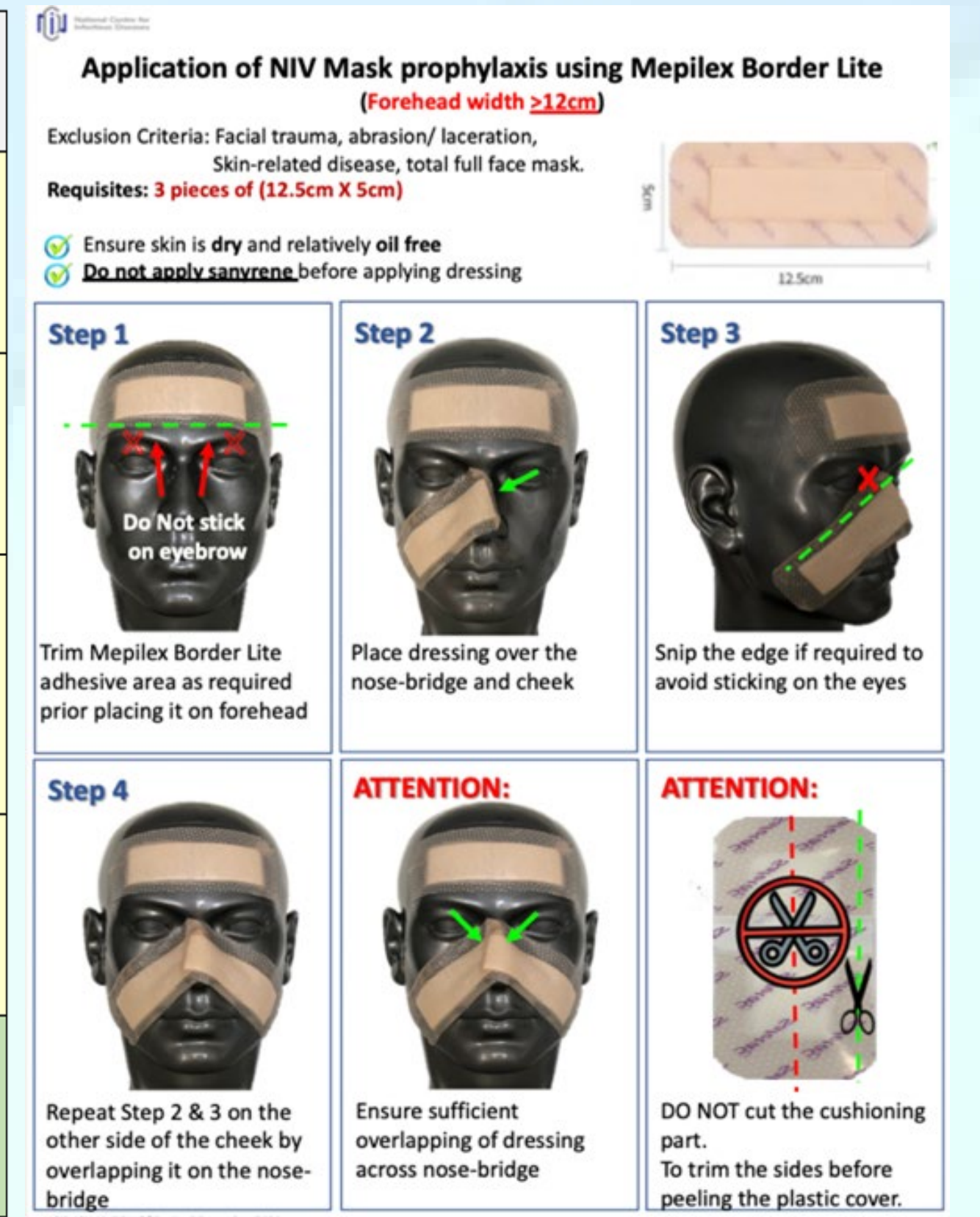


## Pareto Chart



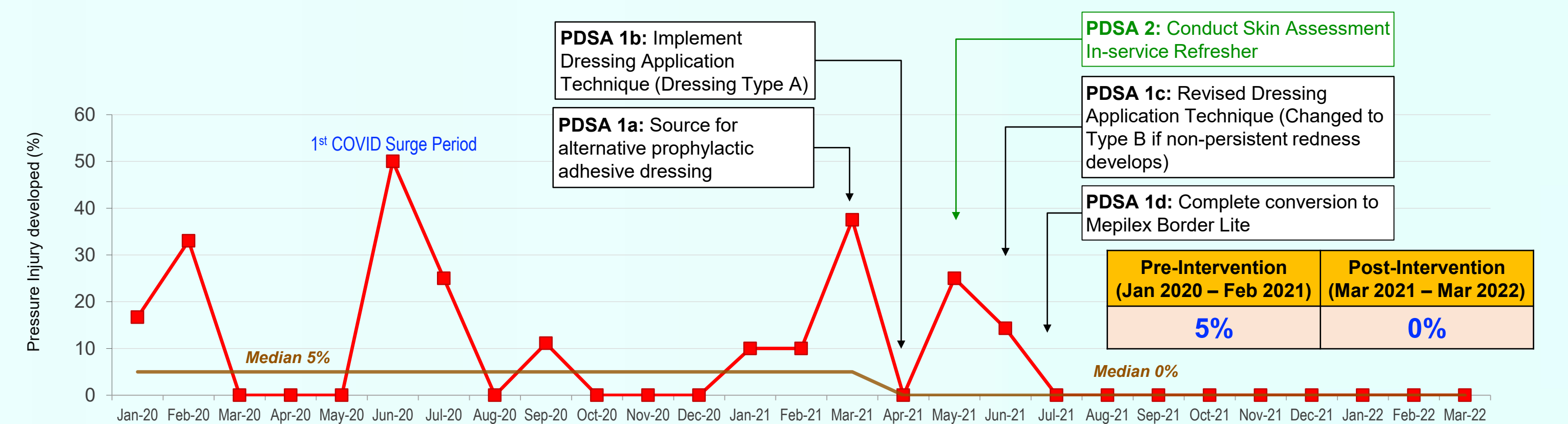
## Implementation

CAUSES	INTERVENTIONS	IMPLEMENTATION DATE
Cause 1: Poor Dressing Adhesiveness and Application Technique	<b>PDSA 1a:</b> Source for alternative prophylactic adhesive dressing	25 Mar 2021
	<b>PDSA 1b:</b> Implement Dressing Application Technique (Dressing Type A)	18 Apr 2021
	<b>PDSA 1c:</b> Revised Dressing Application Technique (Change to Type B if non-persistent redness develops)	10 Jun 2021
	<b>PDSA 1d:</b> Complete conversion to Mepilex Border Lite Dressing	16 Jul 2021
Cause 2: Inadequate Skin Assessment	<b>PDSA 2a:</b> Conduct skin assessment in-service refresher	16 May 2021



## Results

Percentage of Facial Pressure Injuries related to NIV



Date	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
No Pts on NIV	6	3	7	6	3	8	8	8	27	11	4	11	10	10	8	4	8	8	6	11	8	12	2	7	6	6	13
Total No of NIV Pt	1	1	0	0	0	4	2	0	3	0	0	0	1	1	3	0	2	0	1	0	0	0	0	0	0	0	0
PI Developed (%)	16.7	33	0	0	0	50	25	0	11.1	0	0	0	10	10	37.5	0	25	0	16.7	0	0	0	0	0	0	0	0

## Cost Savings

	BEFORE	AFTER
<b>Product Description</b>	Mepilex Foam (10 x 10 cm)	Mepilex Border Lite (12.5 X 5 cm)
<b>Cost (per piece)</b>	\$4.80	\$3.78
<b>Total Cost Per Patient (Average 3 days application)</b>	\$4.80 x 3 = \$14.40	\$3.78 x 3 = \$11.34 (3pcs upon initiation, dressing keep up to 7 days)
<b>Man-hour Cost^</b>	\$0.97 x 10 x 3 = \$29.10	\$0.97 x 10 = \$9.70
<b>Man-hour Required</b>	10 mins x 3 = 30 minutes	10 minutes
<b>Time Savings (Per patient)</b>		30 - 10 = - 20 minutes (20 X \$0.97 = - \$19.40)
<b>Total Cost (Per Patient)</b>	<b>\$43.50</b>	<b>\$21.04</b>
<b>Difference in Cost</b>		\$21.04 - \$43.50 = - \$22.46
<b>Average Patient on NIV (Per Month)</b>	121 patients on NIV over last 12 months : 121 ÷ 12 = 10.08 (10 patients)	
<b>Based on average 10 patients per month</b>		
<b>Cost Savings (Monthly)</b>	- (\$19.40 + \$22.46) x 10 = - \$418.60	
<b>Cost Savings (Annualized)</b>	- \$418.60 x 12 = - \$5023.29	
<b>Potential Time Savings</b>	20 minutes X 10 x 12 = 2400 minutes (40 hours)	

^ Number of minutes required to apply dressing by nurse = 10mins; Weighted Ave Cost per min = \$0.97

## Lessons Learnt

- Challenges of doing quality improvement during pandemic
  - Resilience - Large augmentation with staff dilution from other care areas making dissemination of practice changes challenging
  - Adaptability - We Improve as We Do
- Importance of frequent auditing and immediate correction
- Working as a team
- Staff commitment to a changed behaviour ("its just a dressing")
- Change in best practice is most satisfying as it anchors the success of improving patient care

## Strategies to Sustain

- PU champion to continue frequent and regular audit
- Inclusion of dressing application/ skin assessment briefing in ward induction for new hires/ transferred in staff
- Continue to provide reinforcement on proper Skin-Prep and assessment prior to dressing application
- Continue to gather feedback from patient to better improve the application process and compliance