



#### **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 6 months

#### 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)

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



Ms Lim Voon Ping & Mr Joel Quek NCID ICU

Adding years of healthy life

## **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	Tneh Yu Xuan	Senior Staff Nurse	NCID ICU		
Members	Vincy Mathew	Mathew Senior Staff Nurse			
	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		
	Muhamed 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	Year	Pts on NIV	Staging	Total	%	Location
Facial Pressure Injuries	Jun 2020 (1st COVID Surge)	11	Stage 1	2	36.4%	Right Ear (N=1) Nose Bridge (N=1)
			Stage 2	1		Cheeks with forehead (N=1)
			Deep Tissue Injury	1		Nose Bridge (N=1)
Pre-Intervention Median = <b>5%</b>	Sep 2020	27	Stage 1	2	11.1%	Nose Bridge (N=1) Cheeks (N=1)
			Stage 2	1		Nose Bridge (N=1)
	Jan – Mar 2021	28	Stage 1	5	17.9%	Nose bridge (N=4) Nose bridge & Far (N=1)

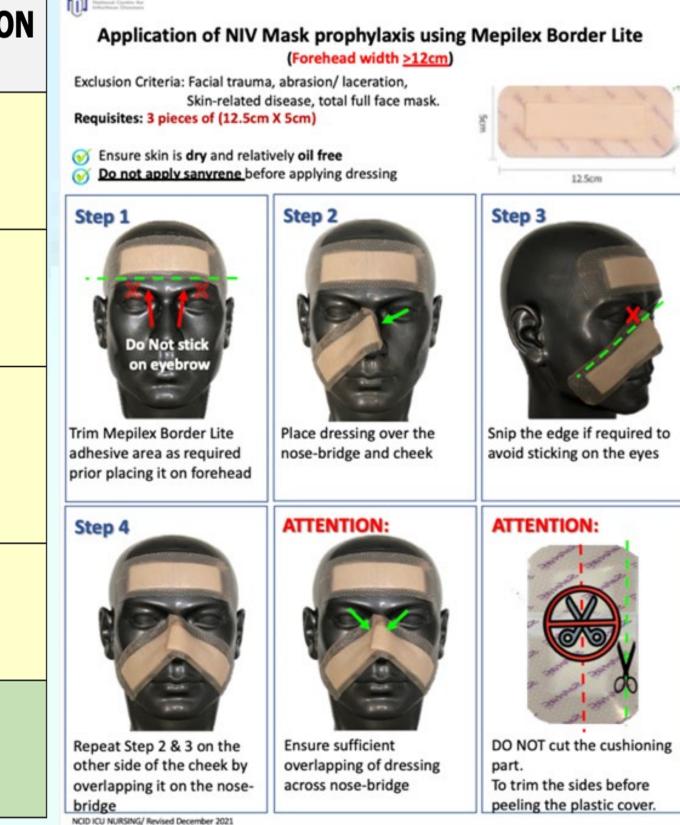
#### **Flow Chart of Process MACRO FLOW** MICRO FLOW Doctor order to start NIV **Use Mepilex Foam Dressing** Monitor skin condition (current hospital practice) Total full face mask RN informs RT\* (for NIV initiated from Does Patient met Inclusion criteria? Use Mepilex Border RT prepares machine & selects appropriate Full face mask On full face mask mask interfaces Forehead width within 12cm to 17cm Skin assessment: Check for facial Assess factors & any influences to Performs skin RN performs risk review and skin preparation trauma, abrasion/laceration, skinwound healings patient physical & preparation functional risk related disease, known pressure injury Skin care (Perform Daily) relieve pressure off as tolerate by Ensure skin is dry & relatively oil free RN applies prophylaxis dressing on pressure point area Do not apply Sanyrene before applying correctly continue to monitor till end of the Monitor tolerance to File PRISM if redness not resolve RT initiates NIV Reinforce Dos & Don'ts during Patient/ Inform NO on duty Family education Staff re-education as Document in Nurse to nurse RN monitors skin condition required monitoring form Handover RT\* denotes Respiratory Therapist

#### **Cause and Effect Diagram** Staff didn't distribute **Environment** pressure through all **Nurse Factors Factors** Failure to do proper risk assessment Interface press too tight against skin Improper prioritization Control of skin moisture Repeated peelin Poor Mask/ Strap between NIV mask and dressing of dressing for **Application Technique** Inadequate Skin Mask straps Microclimate of Skin caused friction Dressing not placed in right position Non-adherence to proper skin Hot/humid room care over pressure points Urgency to place masktemperature `Wrong/poor placement Knowledge Deficit to Skir **Factors related to** of prophylactic dressing prophylactic dressing Prep and Dressing use **NIV Mask Related Pressure Injury** Foam dressind Incorrect interface size Effect of Chronic Tissue has to be cut steroid therapy Inappropriate/ incorrect mask size malnutrition to fit face Partial full face mask (Full face VS Partial) Insufficient off causes higher NIV Usage High settings mask time to pressure on nose Adequacy/ Patient has Dressing less adhesive to skin prevent mask < relieve pressure bridge & cheeks Poor tissue Appropriateness of multiple breaks difficult perfusion dressing product comorbidities Current foam dressing Prolonged application Shear forces constantly shifts position generated between Repeated interface Mask Cushion Chronic inspiratory & Inappropriate application, Sanyrene used with adjustment causing has to prevent skin expiratory phase of dressing without drying friction & shear on Weak adhesive products mask from condition ventilation Oily face cause tension to interface collapsing on Poor patient Moisture & heat insufficient Adhesiveness of compliance **Patient** develop on skin surface **Equipment Prophylactic Dressing Factors** (Poor Dressing Application Mask misaligned with **Factors** dressing position

### 

# Implementation

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



PDSA 2: Conduct Skin Assessmen

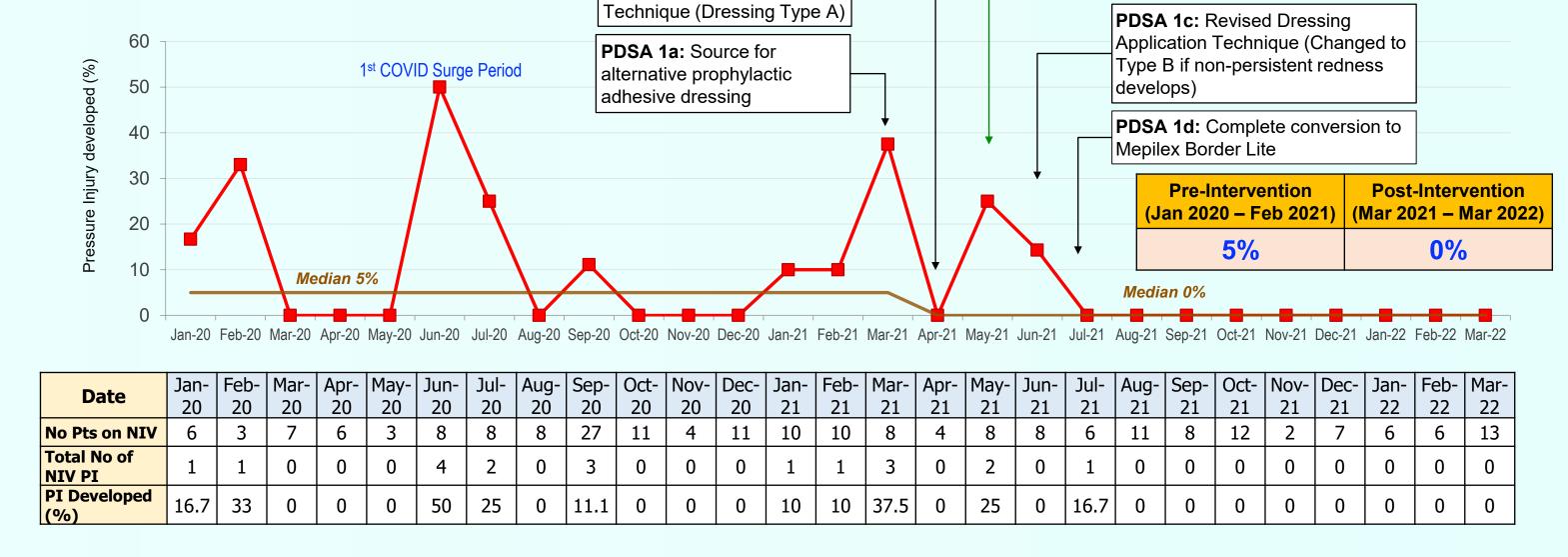
In-service Refresher

## Results

## Percentage of Facial Pressure Injuries related to NIV

PDSA 1b: Implement

Dressing Application



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

## **Lessons Learnt**

- 1. 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
- 2. Importance of frequent auditing and immediate correction
- 3. Working as a team
- 4. Staff commitment to a changed behaviour ("its just a dressing")
- 5. Change in best practice is most satisfying as it anchors the success of improving patient care

# Strategies to Sustain

- 1. PU champion to continue frequent and regular audit
- 2. 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
- 4. Continue to gather feedback from patient to better improve the application process and compliance