



**RESONANCE**  
THE MICROSYSTEM FESTIVAL CELEBRATING 20 YEARS  
Feb 28-March 2 Jönköping Sweden



National Centre for  
**Infectious Diseases**  
National Healthcare Group



**Tan Tock Seng**  
**HOSPITAL**  
National Healthcare Group



Managing Outbreaks.  
Protecting Singapore

## Retrieval Process for Intubated Patients

**VoonPing LIM**

Senior Nurse Clinician,  
National Centre for Infectious Diseases  
**SINGAPORE**

# Background

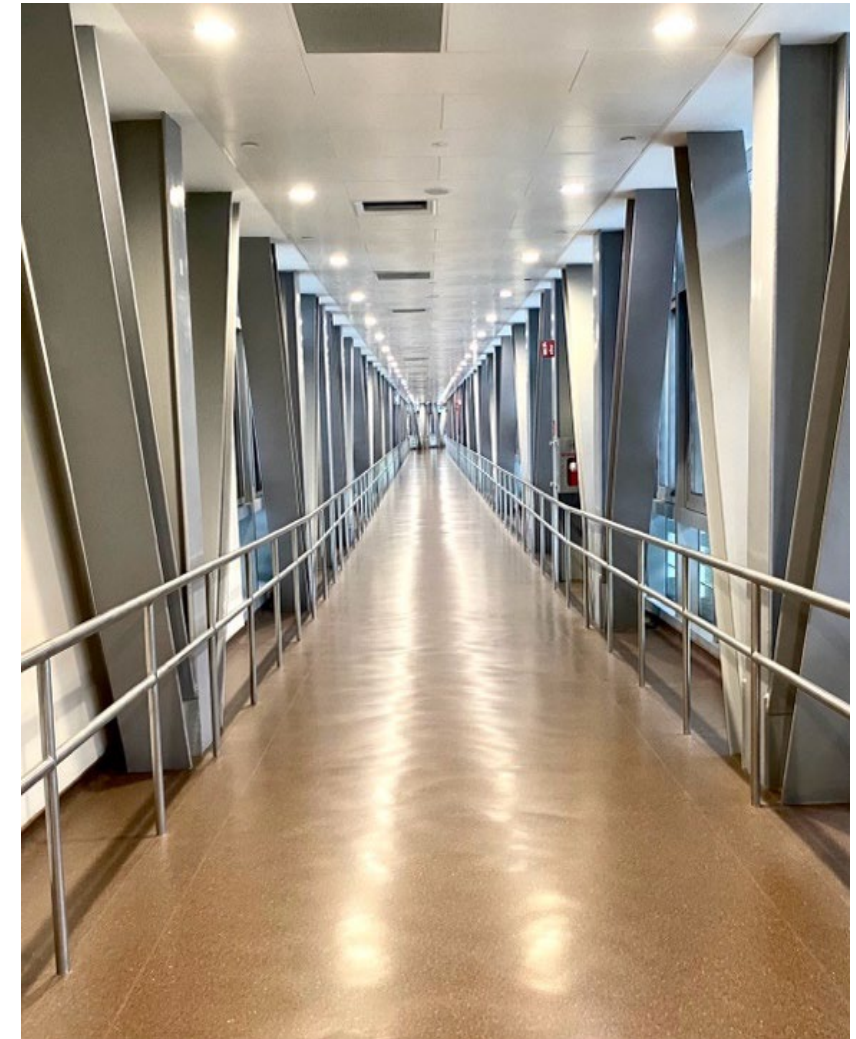


- 330-beds (560 during outbreak) purpose-built facility designed to strengthen Singapore's capabilities in infectious disease management and prevention
- TTSH – sister campus adjacent to NCID with 1700 beds
- ICU Retrieval Protocol established in 2019 when NCID opens
- Protocol includes response time of within 15 minutes on site by ICU Nurse with essential ICU equipment for transfer



## Transportation of intubated patients:

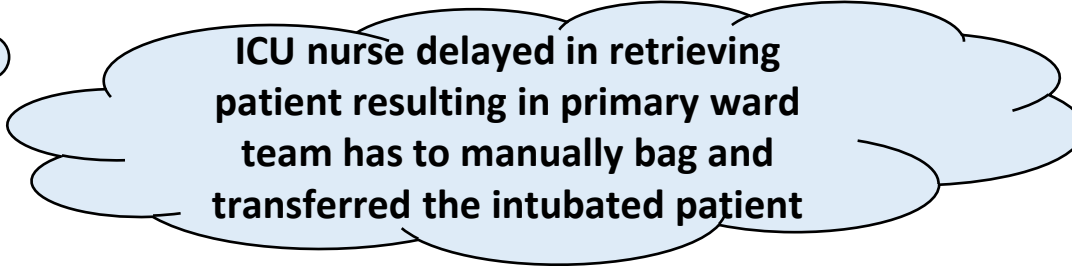
- NCID wards → NCID ICU
- NCID wards → TTSH Main campus ICUs



Link-bridge connecting 2 campus for patient transfer

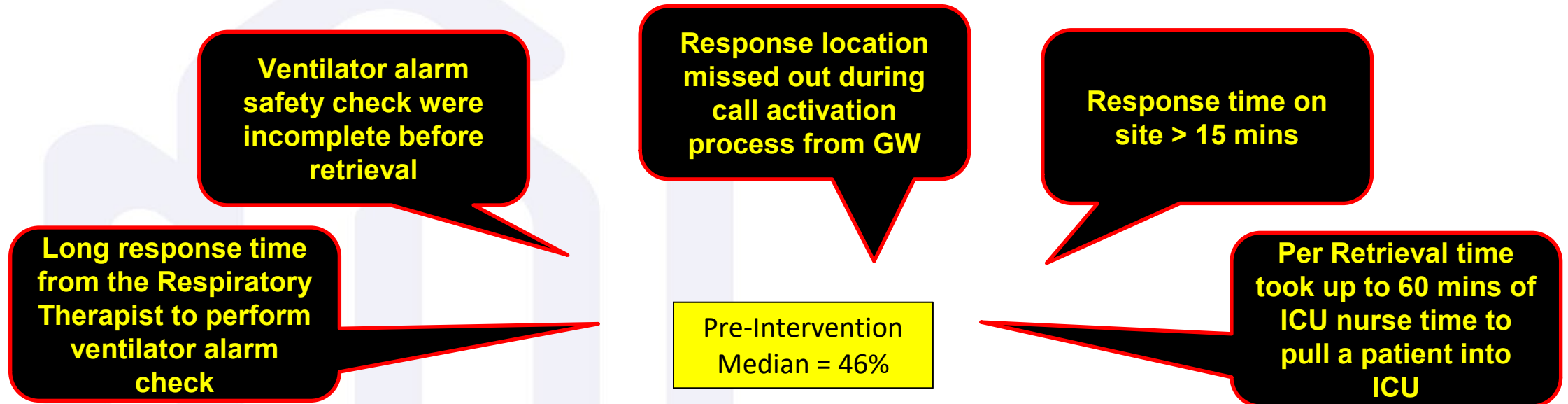
# Evidence of Problem Solving

1. After initiating the protocol, verbal feedback from physician:



ICU nurse delayed in retrieving patient resulting in primary ward team has to manually bag and transferred the intubated patient

1. Collected Baseline Data on Compliance to Retrieval Protocol



# Clinical Microsystem

## Macrosystem

17 wards, 3 outpatient services

## Mesosystem

6 units (5 in TTSH, 1 in NCID)

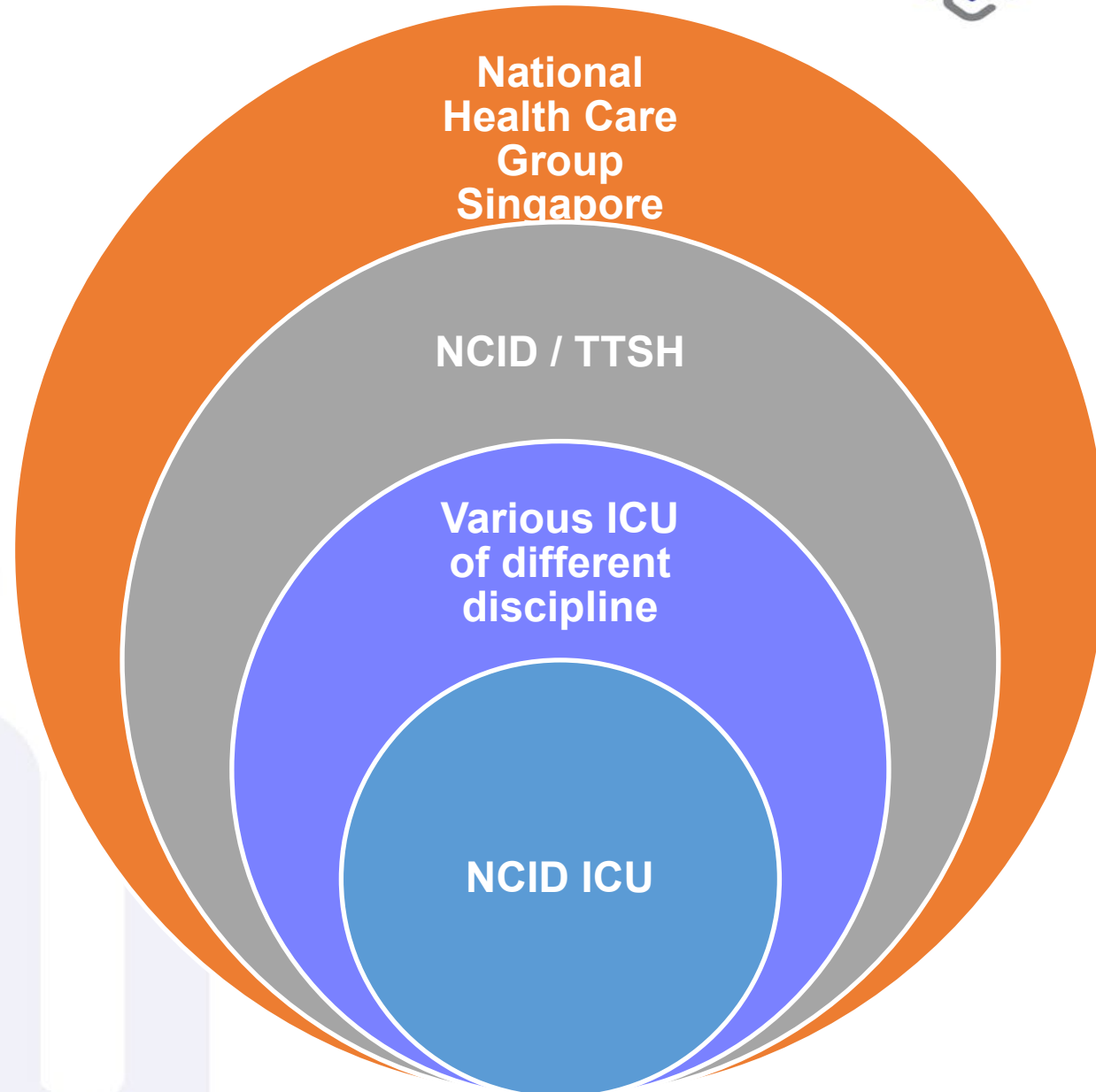
## Microsystem

2 Respiratory Care Nurse

36 ICU Trained Nurses

27 General Nurses

1 Rotating Respiratory Therapist



## Purpose

- Increase compliance to safe transportation of intubated patients from general wards to ICU
- Improve response time to Retrieval service when activated

## Process

- Frequent Simulated retrieval drill
- Competency training on alarm safety check and standardization of ventilatory setting
- Tracking of ICU nurse response time through retrieval log through observer checklist

## Pattern

- Audit of retrieval log to monitor nurse response time on-site upon activation
- Feedback from general ward and primary medical team to bridge gap if any

## People

- ICU Nurses
- Rotating Respiratory Therapist
- General Ward Nurses

## Patient

- Timely transportation
- Safe care

# Interventions

**MONNAL T60 QUICK GUIDE FOR PRE-SET VENTILATOR SETTINGS**

**STEP 1:** On the Ventilator, Ensure Auto-Tests : SUCCESS done daily Run Auto-Test every time ventilator circuit is changed

**STEP 2:** Attach Test lung and O2 Select PRVC. Press the rotating knob to accept PRVC mode

**STEP 3:** Check Pre-Set Ventilator Settings FIO2 100, VT target 400, RR 15, PEEP 5, I:E 1:3 Select ▶ to next page: PI max 25, I.Trig 3, Slope 60

**STEP 4:** Check Alarm Settings Ppeak 4-40, Vte 200-1000, RR 10-45, Mve 4-25. Select ▶ to next page: VTI 200-1000

**MONNAL T60 QUICK GUIDE FOR SAFETY ALARM CHECK**

**STEP 1:** Check O2 Disconnection Alarm Disconnect oxygen hose to trigger Loss of O2 supply pressure alarm

**STEP 2:** Check Low Pressure / Patient Disconnection Alarm Disconnect test lung from vent circuit to trigger Pt disconnection!

**STEP 3:** Check High Pressure / Low Mve Alarm Occlude vent circuit at the wye with cap to trigger High Pressure alarm

**STEP 4:** Tidal Volume check Attach test lung to circuit and ensure VTe value set at 360-440mls Standby machine after alarm checking passed. Then Screen Lock

Pictorial Guide for Ventilator and Alarm Check



Retrieval Training with scenario driven



Training on Ventilator Alarm Safety Check



Pre-prepared Retrieval Trolley

**ICU Retrieval of Intubated Patients PREPARATION DURING RETRIEVAL**

**AIRWAY**

1. Assess airway stability - ETT secure and position confirmed
2. Attach ETCO2 to continuous monitoring
3. Sedation and/ or paralysis adequate (as required)

**BREATHING**

1. Check respiratory rate and SpO2
2. Attach to transport ventilator
3. Ensure ventilation settings appropriate
4. Observe ventilator for leak or alarm
5. ETT Clamp available (as required)

**CIRCULATION**

1. Check IV access is secure and patent
2. ECG & NIBP monitoring on and check baseline parameter prior transportation
3. Infusions (inotropes if any) sufficient for transport

**DOCUMENTS & DEPARTURE**

1. Perform SBAR handover
2. Set transport monitor to 5mins interval for parameters recording prior departure
3. Ensure patient's belongings are managed by GW and NOK are informed

**EQUIPMENT CHECK**

1. Double check Oxygen tank turn on and check no loosen connection
2. BVM resuscitator and peep valve available
3. AED hooked on patient (for code-blue event)

**NCID 3E Retrieval Requisites Checklist**

Name/Signature: \_\_\_\_\_  
Date/Time: \_\_\_\_\_

- Monnal ventilator X1
- Ventilator Cleaned
- Existing Breathing Circuit + Auto Test
- New Breathing Circuit + Auto Test
- HMEF X1
- Test Lung X1
- Red Cap X1
- Charger X1
- Full O2 Tank @ O2 Trolley Bay X1
- Oxygen Head Regulator X1
- X3 holder X1
- Transport Kit X1
- Laerdal Silicone Resuscitator X1
- X3 monitor+cables, ETCO2 cable+adapter (BEDSIDE)

Retrieval Requisites checklist

**WARD 3E (NCID) -ICU RETRIEVAL PATIENT'S INFORMATION**

Activation Type:  Code Blue  Elective

Source From:  Ward & Bed No: \_\_\_\_\_  
 Other Dept: \_\_\_\_\_

Name of Pt: \_\_\_\_\_  
I/C Number: \_\_\_\_\_  
Gender:  Male  Female

Diagnosis: \_\_\_\_\_  
Precaution: \_\_\_\_\_  
PT's Condition:  Intubated

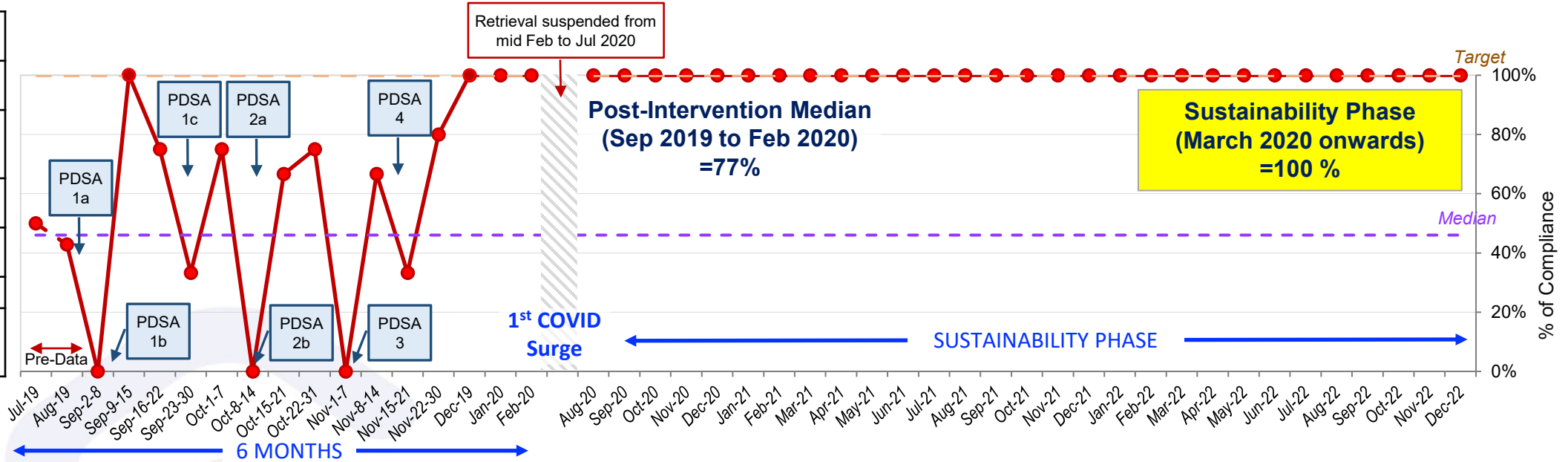
Inotropes: \_\_\_\_\_  
Weight: \_\_\_\_\_  
Drug Allergy: \_\_\_\_\_  
Name of Caller: \_\_\_\_\_  
Contact No: \_\_\_\_\_  
Bed Assigned: \_\_\_\_\_

Retrieval Info slip for NIC

# Results

## % of Compliance to Retrieval Protocol of Intubated Patient by Retrieval Team in NCID

PDSA 1a	Refresher Training on Retrieval Workflow
PDSA 1b	Role expansion of RN to include ventilator alarm safety check
PDSA 1c	Walk through retrieval route and coverage location with all retrieval nurse
PDSA 2a	Implement Pre-set ventilator settings for retrieval
PDSA 2b	Revise ventilator checking pictorial guide
PDSA 3	Use a pre-prepared retrieval trolley
PDSA 4	Create standard retrieval information skip for Nurse-in-charge



Retrieval Process	Jul 2019	Aug 2019	Sept 2-8	Sept 9-15	Sept 16-22	Sept 23-30	Oct 1-7	Oct 8-14	Oct 15-21	Oct 22-31	Nov 1-7	Nov 8-14	Nov 15-21	Nov 22-30	Dec 2019	Jan-20	Feb-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	July-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dev-22
No of Retrieval activated	4	14	2	3	4	3	4	5	3	4	2	3	3	5	12	13	2	2	4	5	3	3	2	3	4	4	3	7	2	5	2	5	2	4	4	2	5	4	5	3	1	2	1	3	3	2
No of Unmet ^	2	8	2	0	1	2	1	5	1	1	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Compliance	50%	43%	0%	100%	75%	33%	75%	0%	67%	75%	0%	67%	33%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

^ Unmet to Retrieval Protocol denotes:

- Response time > 15 mins
- Incomplete ventilator alarm safety check
- Incomplete Equipment set up
- Criteria not met > 1 factor

Year	2021	2022
Total no of Retrieval	43	35
Total Un-met case	0	0



# Lesson Learnt and Strategies for Sustaining

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- Staff Buy-In and working as a team to ensure compliance to the protocol
- Continue to review each retrieval through retrieval log, evaluate and address gaps if any
- Maintain routine of frequent retrieval drill and provide debriefing session after each activation
- Continue engagement with general ward team to provide updates on areas performed well during the retrieval process or share any concerns to improve patient's safety
- Include retrieval drill as part of NCID ICU unit-based competency for new staff and annual core-competency refresher for existing staff



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**THANK  
YOU**



VOON\_PING\_LIM@ncid.sg