

Supplementary Appendix

Personal Protective Equipment Preparedness in Asia-Pacific Intensive Care
Units during the COVID-19 Pandemic: A Multinational Survey

*On Behalf of the SPARTAN Collaborative (Small Projects, Audits, Research Trials – Australia/New
Zealand)*

sFigure 1: Respiratory PPE practices reported by intensivists in the six countries

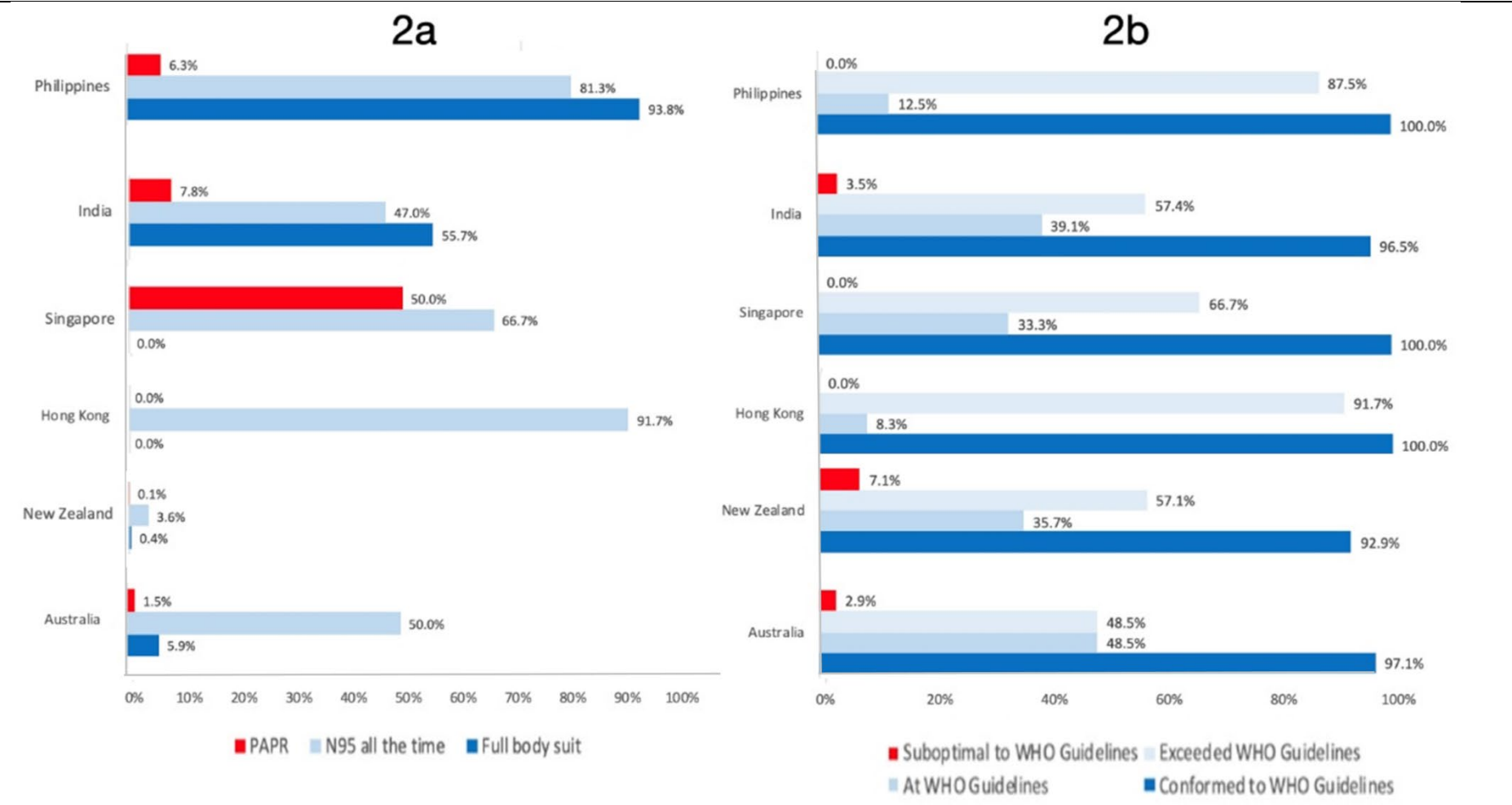


Figure 2a shows respiratory PPE practices reported by intensivists in the different countries.

Figure 2b shows how this reported use conformed to the WHO guidelines.

Key: PAPR - personal air-purifying respirators; N95 - N9 mask; WHO - World Health Organization

sTable 1: Details of Key management strategies for Suspected/Confirmed COVID-19 patient

	Australia	Hong Kong	India	New Zealand	Philippines	Singapore
PPE safety measures of Asia-Pacific ICUs who conformed to WHO recommendations (also refer to Figure 1)						
Compliance with WHO recommendations	66 (97.1%)	12 (100%)	111 (96.5%)	13 (92.9%)	16 (100%)	6 (100%)
At the level of WHO recommendations	33 (48.5%)	1 (8.3%)	45 (39.1%)	5 (35.7%)	2 (12.5%)	2 (33.3%)
Beyond WHO recommendations	33 (48.5%)	11 (91.7%)	66 (57.4%)	8 (57.1%)	14 (87.5%)	4 (66.7%)
Suboptimal to WHO recommendations	2 (2.9%)	0 (0)	4 (3.5%)	1 (7.1%)	0 (0)	0 (0)
Proposed location to treat confirmed COVID patients requiring ICU Admission						
Negative pressure rooms only	8 (11.8%)	11 (91.7%)	55 (47.8%)	2 (14.3%)	13 (81.3%)	5 (83.3%)
Negative pressure rooms where possible	48 (70.6%)	1 (8.3%)	21 (18.3%)	12 (85.7%)	1 (6.3%)	1 (16.7%)
Neutral pressure rooms where possible	7 (10.3%)	0 (0.0%)	8 (7.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Cohorted in a COVID ICU	5 (7.4%)	0 (0.0%)	31 (27.0%)	0 (0.0%)	2 (12.5%)	0 (0.0%)
Regular training for aerosol-generating activities in COVID-19 patients						
Tracheal intubation	40 (58.8)	4 (33.3)	21 (18.3)	11 (78.6)	4 (25.0)	3 (50.0)
Intra-hospital transport	15 (22.1)	1 (8.3)	19 (16.5)	7 (50.0)	4 (25.0)	1 (16.7)
PPE donning and doffing	54 (79.4)	9 (75.0)	48 (41.7)	14 (100.0)	10 (62.5)	4 (66.7)
PPE waste disposal for cleaners	25 (36.8)	4 (33.3)	43 (37.4)	6 (42.9)	9 (56.3)	2 (33.3)
Specialized a "COVID Intubation Team" to intubate suspected/confirmed COVID patients						
Anesthetists & Intensivists	43 (63.2%)	0 (0)	53 (46.1%)	11 (78.6%)	11 (68.8%)	2 (33.3%)
Senior Anesthetists	7 (10.3%)	2 (16.7%)	0 (0)	0 (0)	0 (0)	0 (0)
Senior Intensivist	2 (2.9%)	3 (25.0%)	16 (13.9%)	2 (14.3%)	0 (0)	0 (0)
No Specialised COVID Team	16 (23.5%)	7 (58.3%)	46 (40.0%)	1 (7.1%)	5 (31.2%)	4 (66.7%)
Low-Cost Measures to Ensure PPE Safety						
N95/P2 mask fit-testing	16 (23.5%)	12 (100.0%)	13 (11.3%)	9 (64.3%)	7 (43.8%)	6 (100.0%)
"Buddy-system" to check PPE practice						

	Australia	Hong Kong	India	New Zealand	Philippines	Singapore
Mandatory use of a “buddy”	35 (51.5%)	2 (16.7%)	32 (27.8%)	9 (64.3%)	5 (31.3%)	3 (50.0%)
Ad Hoc use of a “buddy”	31 (45.6%)	10 (83.3%)	79 (68.7%)	5 (35.7%)	11 (68.8%)	3 (50.0%)
No “buddy-system” adopted	2 (2.9%)	0 (0)	4 (3.5%)	0 (0)	0 (0)	0 (0)
Showering / Shampooing after caring for a COVID-19 patient						
End of shift	16 (23.5%)	1 (8.3%)	59 (51.3%)	9 (64.3%)	10 (62.4%)	2 (33.3%)
If PPE Breach	10 (14.7%)	2 (16.7%)	3 (2.6%)	1 (7.1%)	0 (0)	0 (0)
Immediate (if PPE breach or AGP)	2 (2.9%)	5 (41.7%)	12 (10.4%)	1 (7.1%)	3 (18.6%)	2 (33.3%)
Limited bathrooms	3 (4.4%)	0 (0)	3 (2.6%)	1 (7.1%)	0 (0)	0 (33.3%)
No advice given	37 (54.4%)	4 (33.3%)	37 (32.2%)	2 (14.3%)	3 (18.8%)	2 (33.3%)
Awareness of adequacy of current stock of essential PPE equipment to manage 3 confirmed COVID patients in your ICU for at least 1 week						
Aware of PPE stock, available to care of 3 COVID patients for 1 week	36 (52.9%)	11 (91.7%)	49 (42.6%)	12 (85.7%)	7 (43.8%)	5 (83.3%)
Aware of PPE stock, not available to care of 3 COVID patients for 1 week	12 (17.6%)	1 (8.3%)	34 (29.6%)	1 (7.1%)	3 (18.8%)	1 (16.7%)
Not aware of stock	20 (29.4%)	0 (0)	32 (27.8%)	1 (7.1%)	6 (37.5%)	0 (0)
Family / NOK Visitation rights						
Limited, in person	21 (30.9%)	0 (0.0%)	9 (7.8%)	1 (7.1%)	0 (0.0%)	0 (0.0%)
Remotely with no exceptions	36 (52.9%)	11 (91.7%)	74 (64.3%)	13 (92.9%)	13 (81.3%)	5 (83.3%)
Remotely, except at end of life	3 (4.4%)	1 (8.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Unchanged	8 (11.8%)	0 (0.0%)	32 (27.8%)	0 (0.0%)	3 (18.8%)	1 (16.7%)
COVID-19 – Coronavirus disease of 2019, ICU – intensive care unit, AGP – aerosol generating procedure, WHO – World Health Organisation, PPE – personal protective equipment, NOK – next of kin						

sTable 2. Perceptions of safety reported by the intensivists			
	Highly agree	Neutral	Highly disagree
I feel very safe n (%)			
Australia	20 (29.4)	35 (51.5)	13 (19.1)
Hong Kong	6 (50.0)	6 (50.0)	0 (0.0)
India	26 (22.6)	49 (42.6)	40 (34.8)
New Zealand (only 12 out of 14 completed this question)	8 (57.1)	5 (35.7)	1 (7.1)
Philippines	1 (6.3)	3 (18.8)	12 (75.0)
Singapore	4 (66.7)	2 (33.3)	0 (0.0)
PPE practice is suboptimal to prevent healthcare worker infection			
Australia	21 (30.9)	29 (42.6)	18 (26.5)
Hong Kong	0 (0.0)	3 (25.0)	9 (75.0)
India	65 (56.5)	29 (25.2)	21 (18.3)
New Zealand (only 12 out of 14 completed this question)	2 (14.3)	3 (21.4)	9 (64.3)
Philippines	3 (18.8)	7 (43.8)	6 (37.5)
Singapore	0 (0.0)	1 (16.7)	5 (83.3)
I wish PPE stock building started 2 months ago			
Australia	47 (69.1)	18 (26.5)	3 (4.4)
Hong Kong	9 (75.0)	3 (25.0)	0 (0.0)
India	68 (59.1)	26 (22.6)	21 (18.3)
New Zealand (only 12 out of 14 completed this question)	5 (35.7)	5 (35.7)	4 (28.6)
Philippines	10 (62.5)	4 (25.0)	2 (12.5)
Singapore	1 (16.7)	2 (33.3)	3 (50.0)

ICU Survey on COVID-19 PPE and Preparation

Information for Participants:

Personal Protective Equipment (PPE) are fundamental to protecting healthcare workers against COVID-19. A pilot survey revealed variable PPE practices in Australasian ICUs, particularly when compared to videos on social media on PPE from other parts of the world. This survey seeks to inform the Australasian Intensive Care Community about PPE practices available in various hospitals. The results will be compared to published Australasian PPE guidelines, and may potentially be used to change practice.

You are invited to participate in this survey because you are an Australasian Intensivist. Participation is voluntary. By participating, you are providing consent for the study results to be used for publication. You will not receive any monetary benefits. There may be benefits to the larger Australasian ICU community if PPE practices become more streamlined.

It is expected that the de-identified results of this survey will be submitted to a peer-reviewed publication in a scientific journal. No personal details of yourself or your hospital will be provided.

We expect that it will take you 10 minutes to complete the survey.

The study protocol and survey has been approved by the Nepean Blue Mountains Local Health District Human Research Ethics Committee (NBMLHD HREC) (approval number 2020/ETH00705).

If you have any questions about the study then you may seek clarifications from the

Principal Investigator Dr Arvind Rajamani on rrarvind@hotmail.com or

Co-Investigators

Dr Ashwin Subramaniam Frankston Hospital (ashwin.subramaniam@monash.edu)

and

Dr Kollengode Ramanathan on ram_ramanathan@nuhs.edu.sg.

If you have any complaints about the study or the way it is being conducted, please contact the NBMLHD HREC Officer on (02) 47343441 or via Email: NBMLHD-Ethics@health.nsw.gov.au

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* Required

1. Your state/territory *

Mark only one oval.

- ACT
- NSW
- Northern Territory
- QLD
- South Australia
- TAS
- VIC
- WA
- Singapore
- Hong Kong
- United Kingdom
- Other: _____

2. Your hospital *

3. What is the proposed location to treat confirmed COVID patients requiring ICU admission? *

More than one answer may be chosen

Check all that apply.

- Negative pressure-room
- Negative flow room
- Neutral pressure single room in a general pod with other non-COVID patients
- Cohorted with other COVID patients in a dedicated COVID pod

Other: _____

4. A young well-functioning patient has confirmed COVID. His resp rate is 30/min with Sats ~80-85% on room air. Other systems are normal. What O2 therapy is considered appropriate in your hospital? *

More than one answer may be chosen

Check all that apply.

	Not an option in COVID	In negative pressure room	Neutral-pressure single room	Ward or Dedicated ICU pod of cohorted COVID patients
Low flow nasal prongs (<6 L/min)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High-flow nasal prongs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CPAP/BiPAP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. As of today, what is your current ICU policy for PPE when you are in the same room as a confirmed COVID patient? *

More than one answer may be chosen

Check all that apply.

- Hospital scrubs
 - Cap
 - Neck cover (hood / surgical gown from theatres)
 - Protective goggles
 - Visor to cover face
 - Impervious plastic gown with loose neck-fitting
 - Always 2 pairs of gloves ("double-glove")
 - Only 1 pair of gloves
 - N95 (or P2) mask only for aerosol-generating procedures and Simple surgical mask for non-aerosol-generating cares
 - N95 (or P2) mask at all times
 - Full body suit
 - PAPR
 - Shoe covers
- Other: _____

6. Do you have a "buddy-system" to check PPE practice? *

More than one answer may be chosen

Mark only one oval.

- Not mandatory (ad hoc)
- "Buddy-system" mandatory EVERY time to check donning and doffing
- "Buddy-system" to check donning and doffing, but not always
- Other: _____

7. Showering / shampooing after caring for a COVID patient *

More than one answer may be chosen

Check all that apply.

- Immediately shower and shampoo after every single patient-contact episode
- Only shower and shampoo if PPE was breached
- Only shower /shampoo at the end of your shift
- No advice/guideline given
- Limited bathrooms available

Other: _____

8. For the N95 or P2 mask, does your hospital provide a fit-testing using either quantitative or qualitative (odour-detection) methods? *

Mark only one oval.

- Yes
- No
- Other: _____

9. What training has been instituted to prepare for COVID-19? *

Mark only one oval per row.

	Daily	Frequently	Occasional / Sporadic	Not done so far	Not aware of this
Simulation sessions on intubating a COVID patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Simulation sessions on transporting COVID patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Donning and Doffing PPE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Specific training for cleaners on PPE and waste disposal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. What family visitation / communication strategies have you decided for COVID patients? *

Mark only one oval.

- Nothing decided yet
- No changes to current visiting rights
- No family visits allowed. Phone communications only
- Brief visits allowed in full PPE
- Video conferencing for family
- Not aware of this
- Other: _____

11. Have you set up specialized a "COVID Intubation Team" to intubate suspected/confirmed COVID patients? *

Mark only one oval.

- Yes, with anesthetists and intensivists
- Yes, with senior intensivists only
- No
- Other: _____

12. Is the current stock of essential PPE equipment adequate to manage 3 confirmed COVID patients in your ICU for at least 1 week? *

Mark only one oval.

- Yes
- No
- Not aware of stock
- Other: _____

13. Please describe what constitutes a "breach in PPE" in your hospital.
What measures do you take when a breach is identified?

If unaware, state "not aware"

14. Do you feel safe/secure and adequately protected with the PPE methods offered by your hospital/ICU? *

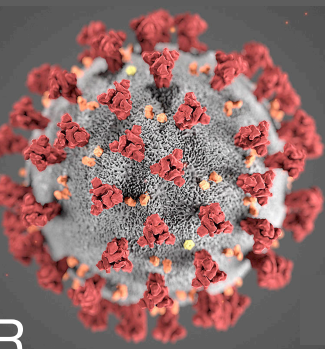
Mark only one oval per row.

	Highly agree	Highly disagree	Neutral
I feel highly safe/secure and well-protected	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel highly unsafe/insecure and not at all protected	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish the hospital had started procuring PPE 2 months ago	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Current PPE practice is suboptimal. Therefore, I think many healthcare workers are going to get infected	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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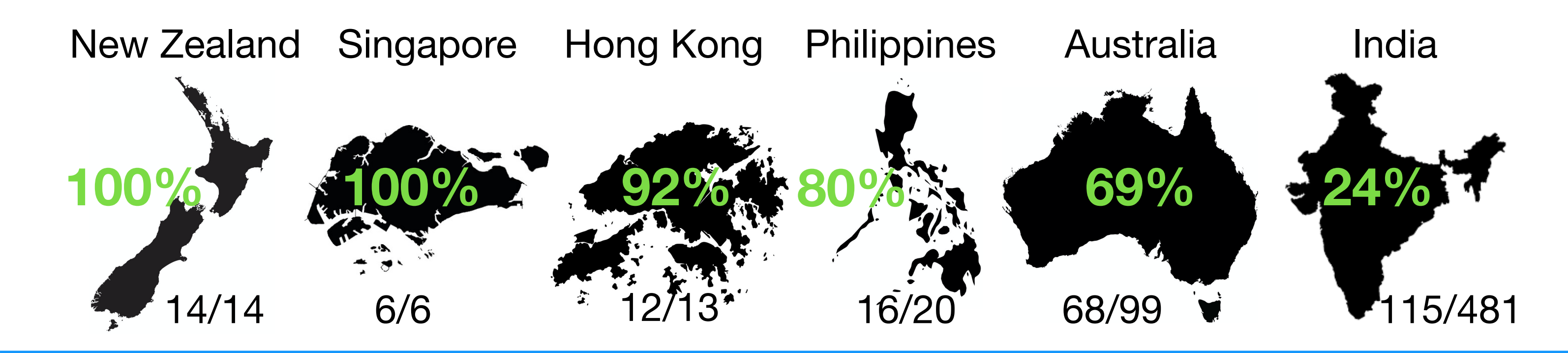
Personal Protective Equipment Use in Asia-Pacific Intensive Care Units during the COVID-19 Pandemic



Rajamani A, Subramaniam A, Shekar K, Alcancia C, Bihari S, Gullapalli N, Haji J, Luo J, Renner M, Wong WT, Ramanathan KR

Objective To evaluate **Preparedness Use Training** vs.  **World Health Organization**

633 Intensivists surveyed from 6 countries
Overall responses rate **42%** (263/633)

97% Conformed to  **World Health Organization**

Australia India New Zealand	Preferred	Only for AGP	Singapore Hong Kong Philippines	Preferred	All the time
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Disposition of patient needing HFNO / NIV

- 37%** Negative-pressure room (highest in HK & Singapore)
- 58%** Non-negative pressure room If necessary
- 5%** Negative-flow room

Reluctance expressed by countries with past pandemic experience (Hong Kong & Singapore)

Not to use in patients

HFNO **58%**
NIV **81%**

TRAINING	PPE Stock	Perception
<ul style="list-style-type: none"> ✔ Donning / Doffing PPE ⚠ COVID Intubation ✘ "Buddy-System" ✘ Showering end of shift ✘ Transporting COVIDs ✘ Waste disposal 	<ul style="list-style-type: none"> ✔ 83-92% aware From NZ, HK & Singaporean ICU ⚠ 41-56% unaware From Australian, Indian & Philippine ICU 	<ul style="list-style-type: none"> ⚠ 28% Felt Safe ✘ 29% Felt Unsafe Australia, India & Philippines felt PPE practice was suboptimal