

2021 Best Research Poster Award

Title: Respiratory protection during the covid-19 pandemic: preliminary fit testing findings from a major regional health service.

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INTRODUCTION

Prompted by the evolving COVID-19 Pandemic, Barwon Health commenced a formal respiratory protection program aimed at reducing risk to staff. A total of 1041 quantitative fit tests were conducted between December and June 2021. Despite concerns around worldwide PPE shortages, Barwon Health was in the fortunate position of procuring multiple types of filtering facepiece respirators for testing. We hope the sharing of our data will aid organisations less well resourced in providing effective and affordable PPE to healthcare workers on the COVID-19 frontline.

OBJECTIVES

- To improve the protection of healthcare workers responding to the COVID-19 pandemic by evaluating the performance of eight types of filtering facepiece respirators.
- To evaluate the effectiveness of a large-scale respiratory protection program and identify potential area for improvement.

METHOD

Utilising PortaCount 8048 fit testing technology, eight models of P2/N92 masks, with three offering small sizing options (total 11) underwent quantitative fit testing. Quantitative fit testing relies on machine measurement of mask seal which is quantified as a numerical value called a 'fit factor'. A fit factor of at least 100 is required for P2/N92 masks. Fasted participants underwent assessment using the 'fast-full' fit test protocol involving a series of speaking and movement exercises. When three successful masks fits were achieved per subject, testing was ceased in an aim to reduce waste. Participants with obviously obstructive facial hair were asked to re-present with hair removed. Fit testers underwent formal training with an external provider. Two full time and six casual staff were part of our team.

REFERENCES & ACKNOWLEDGEMENTS

The authors express gratitude to the Department of Health and Human Services, Health Services Victoria and the Barwon Health Public Health Unit for the provision of resources for our program. We acknowledge the fortunate position our health service was in during the height of the pandemic and hope that our data assists global healthcare services in the procurement of effective PPE.

RESULTS

'Flat fold' mask designs (3M Aura and Industree Trident) far outperformed rivals. Fit test pass rates were high (98.4%). 33% of staff achieved a fit with 3 masks, 38% with two masks and 37% with one. Fit test failure was mainly related to facial hair and small facial sizes.

FFR Model / type	Mask tests (n)	FFR Model / type	Mask tests (n)
	Pass number (p)		Pass number
	Pass rate (%)		Pass rate (%)
3M 1860 / N95	n = 968 p = 438 45.25%	3M 1860S / N95	n = 208 p = 95 45.67%
Honeywell H910 Plus / N95	n = 227 p = 27 11.89%	Alphapro tech 695 / N95	n = 210 p = 10 4.76%
BYD DE2322 / N95	n = 1138 p = 200 17.57%	3M Aura 9320A+ / P2	n = 1237 p = 961 77.69%
BSN 72509-10 / N95	n = 364 p = 76 20.88%	BSN 72509-9 / N95	n = 208 p = 25 12.02%
Halyard 46727 / N95	n = 827 p = 181 21.89%	Halyard 46787	n = 46 p = 4 8.70%
Industree Trident / P2	n = 667 p = 635 95.20%		

Participation rates varied markedly between clinical and departmental areas..

DISCUSSION

The total number of tests (n) for each mask varied significantly and could be viewed as a limitation of this study. This occurred as fit testers were extended autonomy in mask testing order for the purposes of waste reduction. Fit testers developed a subjective ability to predict mask fit to facial shapes and were more likely to offer specific masks certain facial shapes. Regardless, the data gives a reasonable estimation of mask performance.

CONCLUSION

Fit testing programs are integral to effective protection against respiratory pathogens and should remain relevant post the COVID-19 era. Mask performance is highly variable. Provision of a smaller selection of masks for fit testing programs may provide similar protection at a reduced price, with less wastage. Potential areas of improvement include analysis of departmental participation rates and further evaluation of facial shape impact on fit test failure.