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Fit Testing Disposable P2/N95 Respirators during COVID-19 in Victoria, Australia: Fit Check Evaluation, Failure Rates, and a Survey of Healthcare Workers

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Abstract: Quantitative fit testing was utilised to evaluate the Department of Health and Human Services in Victoria (DHHS) recommended fit check and determine pass/fail rates for self-selected P2/N95 respirators. Survey experience and training related to P2/N95 respirators were also obtained. This was an observational study at a specialist tertiary referral centre, Melbourne, Australia, between 29 May 2020 and 5 June 2020. The primary outcome was quantitative fit test pass/fail results, with fit check reported against fit test as a 2 × 2 contingency table. The secondary outcomes were the number of adjustments needed to pass, as well as the pass rates for available sizes and types of self-selected respirators, survey data for attitudes, experience and training for P2/N95 respirators. The fit check predicts respirator seal poorly (PPV 34.1%, 95% CI 25.0–40.5). In total, 69% (40/58) of respirators failed quantitative fit testing after initial respirator application and is a clinically relevant finding (first-up failure rate for P2/N95 respirators). Only one person failed the fit test for all three respirator fit tests. There was significant variability between each of the seven types of self-selected P2/N95 respirators, although sample sizes were small. Few participants were trained in the use of P2/N95 respirators or the fit check prior to COVID-19, with a high number of participants confident in achieving a P2/95 respirator seal following a fit test. The fit check alone was not a validated method in confirming an adequate seal for P2/N95 respirators. Quantitative fit testing can facilitate education, improve the seal of P2/N95 respirators, and needs to be integrated into a comprehensive Respiratory Protection Program (RPP).

Keywords: respiratory protection; fit test; fit check; P2/N95 respirator; masks; COVID-19

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1. Introduction

During the COVID-19 pandemic, healthcare workers (HCWs) have been over-represented globally in the number of infections [1]. As of 19 August 2020, there were 2497 HCWs diagnosed with COVID-19 infection in Victoria. In the second wave, 69% or more were likely to have been workplace acquired, with a number still under investigation [2].

SARS-CoV-2 is highly transmissible [3], and there is growing evidence for its airborne transmission [3,4]. Filtering facepiece respirators, including disposable P2/N95 respirators (masks), is used to reduce the wearer's respiratory exposure to airborne pathogens. The use of P2/N95 respirators are required with airborne infectious diseases or when an aerosol-generating procedure (AGP) is undertaken in a patient with a droplet-spread disease [5,6]. For a P2/N95 respirator to provide its designed protection, an adequate face seal must be achieved and maintained for the entire period of time that the worker may be exposed.

Australian Standard 1715:2009 states that a suitable fit test should be conducted on all users of respiratory protection equipment with a close-fitting facepiece such as a P2/N95 respirator [7].

Despite the Australian Standards recommendation, fit testing is not mandated in the state of Victoria. Other states in Australia, for example, South Australia, require fit testing of P2/N95 respirators for high-risk workers or those working in high-risk areas as well as those performing or assisting with AGPs [8]. Whilst the Department of Health and Ageing in Australia has previously acknowledged fit testing as the gold standard for the use of P2/N95 respirators, it does acknowledge that fit testing of all HCWs who need to use a P2/N95 respirator will be difficult to accomplish due to limited supplies and range of types/sizes available [9].

The Department of Health and Human Services in Victoria (DHHS) is the regulatory body for public health in the state. The DHHS guidelines require only a fit check (or user seal check) to be performed each time a P2/N95 respirator is worn (donned) [10].

The fit check describes the procedure that the wearer performs to determine an adequate facial seal. The fit check can either be a positive pressure or a negative pressure check. In contrast, the fit test is a standardised technique to assess the seal of a P2/N95 respirator to the wearer. This is performed by a trained fit tester. The fit test can be qualitative or quantitative. In general, passing a fit test results in a higher level of protection when compared with no fit testing for P2/N95 respirators [11].

A quantitative fit test (QNFT) objectively reports a numerical value known as a fit factor. This is derived from measurements of the particle concentration in ambient air relative to the concentration inside the respirator when worn. A value of 100 or greater is the criterion for achieving a pass for a disposable P2/N95 respirator [12].

There is a broad range of reported fit test failure rates for the first choice of P2/N95 respirator, from 5 to 82% [13–15]. Evidence suggests that fit checking alone is limited in predicting respirator fit [16–18]. Factors identified that might alter fit test outcomes include ethnicity, facial characteristics, occupation, and training in fit checking [19,20]. A number of studies have included interviews or surveys of participants to assess these factors [19,21].

There are no previous studies that examine the real-world selection, application, and seal of these P2/N95 respirators during the current pandemic, hence the reason for executing our study.

The objectives of this study were to:

Evaluate the DHHS guideline fit check with a quantitative fit test for the range of currently available P2/N95 respirators.

Determine the pass/fail rates with quantitative fit testing for the first choice of respirator (first-up failure rates).

Evaluate attitudes, experience, and training related to P2/N95 respirators, the fit check, fit testing, and identify factors related to successful P2/N95 respirator facial seal.

2. Materials and Methods

This observational study of perioperative HCWs comprised of three components:

- An online (entry) survey;
- Fit testing of a P2/N95 self-selected respirator after a self-assessed fit check;
- A subsequent online (exit) survey.

The study was conducted from 29 May 2020 to 5 June 2020 at the Royal Victorian Eye and Ear Hospital, a tertiary referral centre in Melbourne, Australia. Ethics approval was obtained as Quality Assurance Research from RVEEH # Reference No. 20/1465HQ.

2.1. Participants

Inclusion criteria: participants were recruited from the theatre complex and Emergency department, including surgical, anaesthetic, and emergency nursing and medical personnel. Staff were selected from rosters using an online generator (https://www.randomizer.org/ accessed on 23 May 2021).

Exclusion criteria: personnel who refused consent, failed a COVID-19 screening tool (hospital screening tool to assess risk of COVID-19), were furloughed, or unavailable for fit testing.

2.2. Study Protocol

Survey questions (See Appendices A and B) were co-developed from topics generated by a group of anaesthetists interested in perioperative safety, prepared by an engaged survey writer after brief analysis, then tested on perioperative staff. A consensus meeting of 9 anaesthetists selected the final questions. Surveys were collated using QualtricsTM Experience Management (XM) software platform (Qualtrics, Provo, UT, USA). Surveys included demographics, education and training, respirator usage, as well as opinions and satisfaction.

In total, 50 participants were allocated based on time slots created for the fit testing sessions over 2 days. These allocations were divided equally between medical and nursing staff. Within the medical group, this was further subdivided into 4 equal groups representing ophthalmology, ENT, anaesthesia, and emergency departments. A total of 58 people completed the fit testing, which was 8 more than originally planned due to additional slots being available on the fit testing days.

Informed written consent was obtained from participants.

Participants read definitions of fit check, fit test, and were shown a visual guide for DHHS fit check (See Appendices C and D). Participants chose P2/N95 respirators from 7 possible types. (see Appendix E). A sample of each mask, together with the model name, was placed on a table for the participants to see prior to selection.

Participants donned the P2/N95 respirator, performed a fit-check, and then reported a pass or fail. The participant then underwent fit testing utilising dynamic manoeuvres according to Occupational Safety and Health Administration (OSHA) protocol [13]. This was performed by a professional fit tester (organised through Kinnect, with the fit tester having completed a Respirator Fit Test course) using a PortaCountTM Model 8048 machine (TSI Inc., Shoreview, MN, USA). Failure to obtain a pass led to a series of adjustments (pinching nose bridge clip, adjusting straps, reseating mask to cover chin), as instructed by the fit tester, and then re-tested. Failing this, the process was repeated for up to a maximum of three respirators.

2.3. Data Collection

Demographics were recorded prior to fit testing, including weight and height. The fit check outcome, the fit test results, and the associated numerical fit factors were recorded.

2.4. Outcomes

The first choice respirator fit test result, of pass or fail, was the primary outcome. The fit check validity in predicting the first fit test result was reported in a 2×2 contingency table. Other outcomes included: number of adjustments needed for a fit test pass, and sub-analysis of respirators. Survey data were recorded and summarised.

2.5. Study Size and Bias

Participants were enrolled to fill 2 days of fit testing in order to minimise the impact on the limited stocks of respirators. Any HCW on leave of absence was excluded. A total of 67 people were screened and sent an anonymous online survey, with 58 participants fit tested. The discrepancy between the entry survey sample size of 67 and the fit tested sample size of 58 was due to non-attendance. Sample size could not be determined as there was no accepted fit test pass or fail rate in the literature.

2.6. Statistical Analysis

Demographic and survey data were reported as simple descriptive statistics. Group comparisons were performed using chi-square tests for equal proportion (or Fisher's exact tests where numbers were small), Student *t*-tests for normally distributed data and Wilcoxon rank-sum tests otherwise, with results reported as percentages (n), mean (standard deviation) or median (interquartile range), respectively. Agreement between fit check and fit testing results was assessed with marginal homogeneity between paired

proportions determined using McNemar's test. To test for normality of data, histograms were generated for each variable and this distribution visually assessed for symmetry. All analysis was performed using SAS® version 9.4 (SAS Institute Inc., Cary, NC, USA), and a two-sided p-value of 0.05 was used to indicate statistical significance.

3. Results

Demographic data were compiled into a baseline characteristics table (see Table 1).

Table 1. Baseline characteristics.

Variable	Values
Age in years mean (std)	45.7 (11.9)
Height mean cm mean (std)	170 (10.6)
Weight mean kg mean (std)	76.6 (18.9)
BMI derived mean (std)	26.3 (5.3)
Gender (n = 59) n (%)	36 (61.0)
Female	36 (61.0)
Male	23 (39.0)
Facial hair (n = 59) n (%)	7 (11.9)
Ethnicity (n = 51) n (%)	
Asian	15 (29.4)
Oceanian	14 (27.5)
Southeast Asian	14 (27.5)
European	11 (21.6)
African	2 (4.0)
Years in healthcare mean (std)	21.6 (2.8)
First infectious diseases (first ID) work exposure	
Years since first ID median no. years median (IQR)	13.5 (11–25)
Role of healthcare worker (HCW) (n = 59) n (%)	
Nurse	28 (47.5)
Doctor	31 (52.5)
Head/neck/face variant (n = 54) n (%)	
Nil previous head, neck or face change/anomaly	52 (96.3)
Previous surgery	0 (0)
Congenital anomaly	1 (1.8)
Dental implants	1 (1.8)
Weight change >10 kg past 3 years (n = 54) n (%)	
'No' weight change	46 (85.2)
'Yes' to weight change	8 (14.8)

Data are number (no.) and percentage (%) of participants unless otherwise specified. Ethnicity/ethnic identity allowed for multiple responses for each participant, n = number of participants, std = Standard Deviation, and IQR = Interquartile Range.

After the first respirator fit check, 71% (41/58) of participants reported a pass.

The first selected P2/N95 respirator failure rate for the OSHA protocol quantitative fit test was 69% (40/58 failed and 18/58 passed). The first-up testing results are reported as a contingency table (see Tables 2 and 3). The test characteristics are reported in Table 3.

Table 2. Fit check vs. formal fit test contingency table (n = 58).

Fit Check vs. Fit Test	Fit Test Seal	Fit Test Leak	Total
Fit Check Seal	14	27	41
Fit Check Leak	4	13	17
Total	18	40	58

Values are reported as % with 95% confidence intervals (CI).

Table 3. Fit check pass rate for initial mask application.

Sensitivity	77.8% (CI 23.2–92.2)
Specificity	32.5% (CI 23.2–39.0)
Positive predictive value	34.1% (CI 25.0–40.5)
Negative predictive value	76.5% (CI 54.5–91.7)

Sensitivity = true seal/true seal + false seal. Specificity = true leak/true leak + false leak. PPV = true seal/true seal + false leak. NPV = true leak/false seal + true leak.

There was an improvement in fit factor and pass rate with manoeuvres implemented by a fit tester for the first respirator selected (median number of manoeuvres = 2, interquartile range 0–3). This led to a 76% pass rate for the first respirator.

Of the 14 participants (24%) who failed to achieve a pass with the first respirator, a second P2/N95 respirator led to 51 participants achieving a pass (88% after two respirators). A third respirator passed a further six people (98% overall pass rate). Only one person (2%) did not achieve a fit test pass with three respirators.

Of the seven types of respirator available, the duckbill varieties were the most common respirator chosen (see Table 4). Fit test success rates differed significantly between the seven different respirators (p = 0.03) with chi-squared analysis. The 3M^{TM} 1860 was the respirator type that most often achieved a successful fit (67% (10/15)) while the Halyard small duckbill was the least likely successful fit (8% (1/13))

Table 4. P2/N95 respirators by type used in first formal fit test.

Respirator Type	Pass Fit Test 1 *n* (%)	Pass Fit Test 1 *n* (%)	Mask 1 Selection *n* (%)	Fit Factor Median [IQR]
1860	7/18 (38.9)	2/40 (5.0)	9/58 (15.6)	148 (50–200)
1860s	1/18 (5.6)	3/40 (7.5)	4/58 (6.9)	69.5 (10–86)
8210	1/18 (5.6)	3/40 (7.5)	4/58 (6.9)	89 (46–200)
8110s	3/18 (16.7)	3/40 (7.5)	6/58 (10.3)	61.5 (50–80)
Halyard (Regular)	1/18 (5.6)	10/40 (25.0)	11/58 (19)	17 (7–36)
Halyard (Small)	3/18 (16.7)	9/40 (22.5)	12/58 (20.7)	29 (18–124)
Proshield	2/18 (11.1)	10/40 (25.0)	12/58 (20.7)	21 (10–50)

Number of participants from the total n = 58 participants reported as 'n' and (%) with median and interquartile range (IQR) for fit factors reported.

Response rates for the entry and exit surveys were 80.6% (54/67) and 75.8% (44/58), respectively, and are summarised in Table 5.

Table 5. Survey Results by Category.

Category	Entry Survey Response	Result *n*	Exit Survey Response	Result *n* (%)
Experience and Exposure	Respondents who had cared for patients with confirmed or suspected tuberculosis (TB) during their career	35/49 (71.4)		
	No previous fit test experience	49/53 (92.5)		
Respirator Usage	Respondents who had rarely or never worn a P2/N95 respirator during routine work prior to COVID-19 pandemic	48/53 (90.6)		
Training	Respondents who reported minimal or no training, or not enough training, for fit check of P2/N95 respirators prior to COVID-19 pandemic	43/52 (82.7)		
Importance	Respondents who rated fit testing as absolutely essential or very important prior to being surveyed.	34/52 (65.4)	Respondents who rated fit testing as absolutely essential or very important on exit survey	42/44 (95.5)
Opinions	Respondents who felt completely safe or somewhat safe with the PPE in the hospital prior to COVID-19 pandemic	12/53 (22.6)	Respondents who felt completely safe or somewhat safe with the PPE in the hospital on exit survey	29/44 (65.9)
User Seal	Respondents who received fit check training of P2/N95 respirators during COVID-19 pandemic	39/44 (88.6)	Respondents who believed they could achieve a user seal with an available P2/N95 respirator after fit testing	36/44 (81.8)
	Respondents who believed they could achieve a user seal with an available P2/N95 respirator prior to fit testing	20/51 (39.2)		
Satisfaction	Respondents who were satisfied with the fit testing that was conducted on the study day	44/44 (100)		

Fit testing was considered absolutely essential or very important by 65.4% (34/52) of respondents, which increased to 95.5% (42/44) on the exit survey. Only 7.5% (4/53) of respondents had a previous fit test prior to this study. Notably, 71.8% (35/49) of respondents had encountered patients with tuberculosis at work, yet only 37% (13/35) had previous fit check training prior to COVID-19. The participant perception of being able to achieve a fit or seal on the face with a P2/N95 respirator improved from 39.2% (20/51) before fit testing to 81.8% (36/44) after fit testing.

4. Discussion

This study found the fit check, as described by the DHHS, was poorly predictive of respirator seal when assessed by a quantitative fit test (PPV 34.1%, 95% CI 25.0–40.5). This is similar to previous studies [16–18]. A failed fit check, however, was more likely to be associated with a failed fit test (NPV 76.5%, 95% CI 54.5–91.7), which is marginally higher than previously reported [17].

The fit test failure rate (69% (40/58)) for the initial respirator selected is significant, and within the broad range reported in the literature [13–15]. This result has clinical relevance

as it closely resembles the current workplace use of P2/N95 respirators by HCWs. The participant self-selected a respirator from all available types and sizes, and performed a fit check without any additional instruction beyond the DHHS visual aid.

The demographics indicated the cohort were experienced in healthcare, including infectious diseases, yet had relatively low amounts of training and education related to respirators and fit checking. For many decades, Victorian HCWs have cared for patients with airborne infectious diseases, including tuberculosis, without fit testing. This has exposed the knowledge gap in the safe clinical use of these respirators despite their availability. The potential risk of workplace acquired infections is of serious concern, including during the current COVID-19 pandemic.

Perceptions of PPE safety and confidence in the ability to obtain a seal were higher after the fit test, in keeping with a recent international survey [22]. The heterogeneous study cohort would likely be relevant to perioperative Victorian, and Australian, HCWs.

A study by Or et al. supports the role of ongoing education in fit checking [20]. Conversely, Wilkinson in 2010 reported that prior training did not translate to a higher fit test pass rate; however, a fit tester was utilised for respirator selection [19]. In our study, the fit test process improved fit test pass rates. This was in part due to stepwise respirator selection, but also included manoeuvres with a trained fit tester. Further repeat studies with education as a part of fit testing integrated with a Respiratory Protection Program (RPP) are needed to assess retention rates of education over time.

The P2/N95 respirators used for our study were typical of those used at multiple institutions throughout Victoria during that phase of the pandemic. No single P2/N95 respirator provided a universal seal. Nonetheless, each respirator achieved a seal on at least one participant. A broad selection of respirator types and sizes must therefore be available to HCWs. The duckbill respirator was the most popular choice; however, it also had the highest failure rate. Sub-analysis of respirators was not adequately powered for determining respirator design as a factor, and further empirical studies are needed to make correct inferences. Anthropometrics and comparison with respirator design to population data and respiratory panels would also be required [23–25].

In the wider HCW population without a regular fit testing program, there would be an unidentified proportion of HCWs who would not have an adequate seal for respiratory protection. Fit testing further identified the one person that failed all fit tests with three respirators despite instruction from a fit tester. Alternative respiratory protection equipment or alternative duties need to be offered to those that fail fit testing, as part of a Respiratory Protection Program (RPP).

It is also notable that alternative forms of respiratory protection have also been successfully fit tested to levels comparable to P2/N95 and P3/N99 standards. The study by Germonpre et al. [26] uses a modified commercial snorkel mask as effective respiratory protection. Even though the rapid development of this pandemic has led to different approaches to mask selection between countries, the key message is that fit testing plays a crucial role in determining the efficacy of respiratory protection.

Limitations

Having no applicable respirator fit failure rate from the scientific literature prevented any sample size calculation to look for a comparative effect.

This study was conducted during the COVID-19 pandemic and imposed limitations on the ability to fit test a larger number of participants. These limitations, however, are applicable to the current pandemic conditions more broadly.

We made a wide range of respirators available to reflect the choices within our institution, although understanding it would reduce the sample sizes for each respirator and the interpretation of the results. Prior exposure to a particular type of respirator may have influenced the selection made.

The DHHS fit check as described at the time of the study did not include a mirror nor a trained spotter. Seven participants had facial hair despite receiving prior instructions to

remove it for the study day. They were included for pragmatic reasons to reflect real-world behaviours, where we find clinicians donning their respirators even with 2-day-old facial hair growth.

5. Conclusions

The current DHHS fit check alone is not a valid surrogate to fit testing for respirator seal. Quantitative fit testing is required to identify the correct size and type of respirator for each user, and provides an educational opportunity for the user to improve respirator seal. This cohort was experienced in healthcare but had minimal respirator related training prior to COVID-19, and fit testing has improved their confidence in achieving a seal with P2/N95 respirators. Hospitals and policymakers will benefit from integrating education and fit testing into a comprehensive RPP.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee of Royal Victorian Eye and Ear Hospital (Reference No. 20/1465HQ on 13/5/20).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. RVEEH Entry Survey

Q1: What year were you born in?

Q2: How many years have you worked in healthcare?

Q3: What is your gender?

Q4: Which of the following best describes your ethnicity, origin or descent?
(Australian Bureau Statistics number of geographical categories used)

Q5: What is your current position held at work?
(e.g. "**scrub nurse part time**", "**theatre technician full-time**", "**VMO ENT surgeon**")
Please approximate job title and amount of time working in this position

Q6: **PRE COVID-19**: Please indicate the type(s) of PPE you have worn as a precaution at work:

Q7: **PRE COVID-19**: Please indicate the type(s) of infection precautions you have encountered in your work?
Please mark all that apply

Q8: **PRE COVID-19** In your work, have you EVER been in direct contact with, or cared for, patients who were confirmed or suspected of having any of the following infectious diseases?
Please mark all that apply

Q9: **PRE COVID-19** When and where did you first care for a patient with an infectious disease requiring infection precautions? Please estimate the year and city?
(e.g. **"1988 Melbourne**" **"1996 Vancouver**", "**N/A" or "never"**)
Please provide estimated year and city

Q10: **PRE COVID-19** When and where did you first care for a patient with an infectious disease requiring infection precautions? Please estimate the year and city?
(e.g. **"1988 Melbourne**" **"1996 Vancouver**", "**N/A" or "never".**)
Please provide estimated year and city

Q11: Have you lost or gained 10kg of weight in the last three (3) years?

Q12: Are you a current smoker?

Q13: **PRE COVID-19** Prior to COVID-19, how often would you use "any mask" at work, including surgical masks, during routine work procedures/events involving patient care or contact?
(Please provide your best estimate)

Q14: **PRE COVID-19** Prior to Covid-19, how often do you estimate you wore a disposable N95 mask at work during routine work procedures/events involving patient care or contact?

Appendix B. RVEEH Exit Survey

Q1: With respect to the previous survey before fit testing today, what is your satisfaction with the survey?

Q2: **DURING COVID-19** After fit testing today, what is your opinion of the importance of "Fit Testing"?

Q3: **DURING COVID-19** How safe do you feel with the current N95 masks in the hospital?

Q4: **DURING COVID-19**, how safe do you feel with the PPE in the hospital?

Q5: **DURING COVID-19** Going forward, how often will you use "any mask" at work, including surgical masks, during routine work procedures/events involving patient care or contact? (Please provide your best estimate)

Q6: **DURING COVID-19** Going forward, how often do you estimate you will wear a disposable N95 mask at work?

Q7: **DURING COVID-19** What is your overall opinion of the importance of a "fit check" after putting on a mask to achieve a fit or seal?

Q8: **DURING COVID-19** With any disposable N95 MASK training during COVID-19, what type(s) of workplace training had you encountered?
Please mark all that apply

Q9: **DURING COVID-19** With any "fit check" training during COVID-19, what type(s) of workplace training had you encountered?
Please mark all that apply

Q10: **DURING COVID-19** With respect to PPE training during COVID-19, what is your satisfaction with this training?

Q11: **DURING COVID-19** After fit testing, do you believe you can achieve a seal or fit to your face with the current N95 disposable masks used in the hospital?

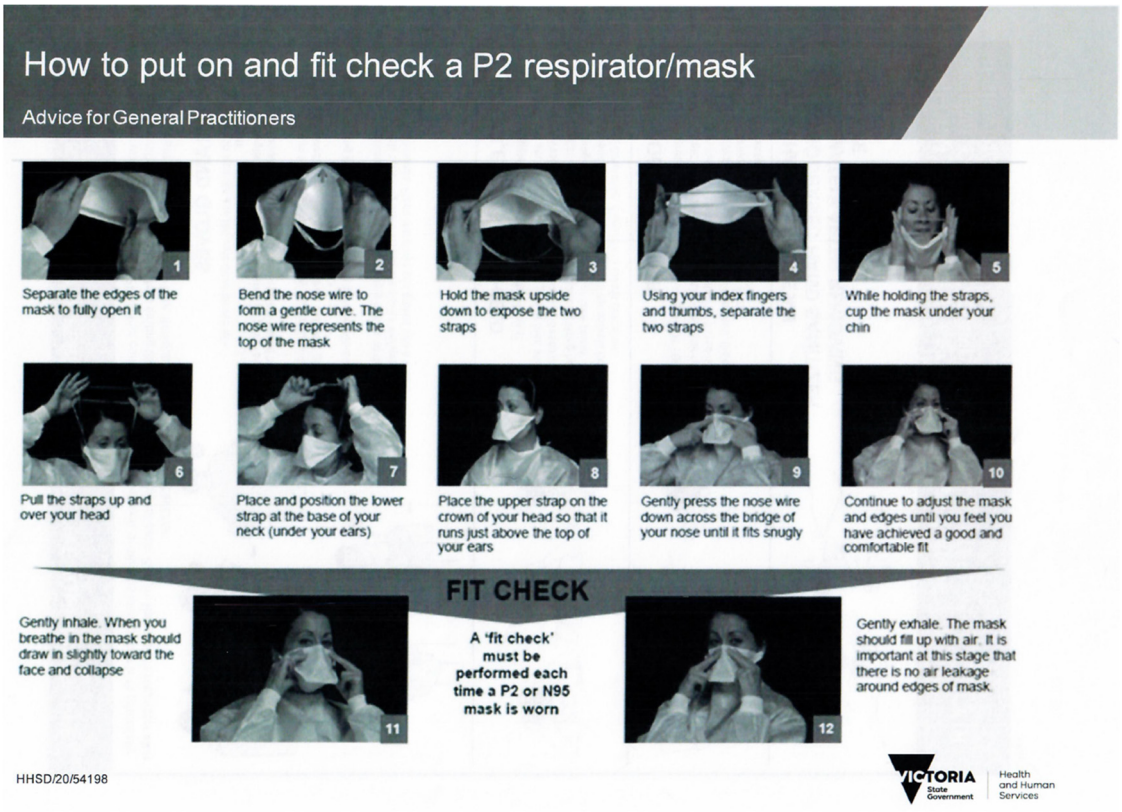
Q12: **DURING COVID-19** With respect to fit testing today, what is your satisfaction with this fit testing?

Q13: With respect to this survey you are about to complete, what is your satisfaction with the survey?
Please note this is the last question for this survey apart from any written feedback.

We thank you for your time and effort taken to complete this survey.

Do you have any feedback, comments, questions, or concerns?

Appendix C. DHHS Fit Check P2 Respirator Mask



Appendix D. Fit Check and Fit Test Information Sheet

Fit check

- Also known as user seal check
- 2 methods
- Some masks can only be checked by the positive pressure method – the 3M masks
- Positive pressure
    - Place hands over mask edges to detect leakage
    - Exhale gently
    - Face fit satisfactory if no evidence of air leakage around seal
- Negative pressure
    - Inhale
    - Mask should collapse on face

Fit test

- 2 types – qualitative and quantitative
- Quantitative test will be used
- Mask will be punctured with sampling device
- Concentration difference measured between ambient environment and inside mask to calculate number which determines pass/fail of fit test
- Several manoeuvres will be performed during the fit test as per the fit test protocol to confirm strength of seal

Appendix E. Mask Information Sheet

N95 mask information sheet

The following 7 types of mask will be available

1.3M 8210
2. 3M 8110S

3. 3M 1860—teal
4. 3M 1860S – teal

5. Proshield N95 'duckbill' respirator – orange, standard

6. Halyard N95 'duckbill' respirator – peach, standard
7. Halyard N95 'duckbill' respirator – peach, small

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