

# Audit of qualitative fit testing for FFP3 respirators

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## Key points

Dental team members require fit testing for respirators to deliver aerosol generating procedures during the COVID-19 pandemic.

An audit enabled efficient resolution of problems associated with fit testing and informed learning needs.

A significant proportion of individuals (1 in 5) were unable to wear certain makes/models of respirators, which has important ramifications for the delivery of care during the pandemic.

## Abstract

**Introduction** Dental team members require fit testing for respirators to deliver aerosol generating procedures (AGPs) during the COVID-19 pandemic. Five general dental practitioners (GDPs) in Yorkshire and the Humber were trained to fit test staff at urgent dental care sites (UDCs) with filtering facepiece (FFP3) respirators.

**Aim** To review the quality of fit test records and provide an overview of the outcome of fit testing of UDC staff.

**Method** Audit of fit test records for FFP3 respirators against Health and Safety Executive standards.

**Results** Six percent of records had missing or incomplete data and 6% of fit test records required follow-up. Of 583 people fit tested with an FFP3 respirator, 80.6% (470/583) passed the test and 19.4% (113/583) failed. Of those, 479 individuals were fitted with a 3M 1873V respirator, of which 82.7% (396/479) passed the test and 17.3% (83/479) failed.

**Discussion** The audit enabled efficient resolution of problems associated with fit testing, informed learning needs and highlighted that a significant proportion of individuals are unable to wear certain makes/models of respirators.

**Conclusion** GDPs have been successfully trained to provide fit testing and make accurate fit test records. The high fit test failure rate for FFP3 respirators has important ramifications for delivery of safe dental care during the pandemic.

## Introduction

The COVID-19 pandemic presented global challenges, including delivery of safe and appropriate dental care. In Yorkshire and the Humber (Y&H), a hub and cluster model was used to deliver care during the initial stage of the pandemic. Clusters of around ten dental practices were served by an urgent dental care hub (UDC) to provide treatment. The 47 largest or most geographically important UDCs were prioritised to receive fit testing and supplies of filtering facepiece (FFP3) respirators, to enable staff to be adequately protected to provide aerosol generating procedures (AGPs).

Five NHS general dental practitioners (GDPs) volunteered to be redeployed to support delivery of qualitative fit testing of FFP3 respirators for these priority UDC sites. They underwent a qualitative fit test training course.

Qualitative fit testing is a two-stage process.<sup>1</sup> The person being fit tested (participant) undergoes a 'sensitivity test', whereby a solution containing Bitrex (denatonium benzoate) or sodium saccharin is sprayed through a nebuliser inside a hood to check their ability and sensitivity to taste it. Following donning and fit-checking of the FFP3 respirator, the participant undertakes the fit test procedure which involves performing several exercises while fit test solution (a more concentrated version of the sensitivity test solution) is sprayed inside the hood to see if it is detected. The participant only passes the test if they cannot taste the solution.

The company providing fit test training for FFP3 respirators (the only type permitted for use at that time) were only able to deliver a

basic virtual course to the five GDPs (on 2 April 2020) due to restrictions in movement during 'lockdown'. The GDPs were permitted though to train together at a dental practice in Leeds.

Fit testers formed a peer support group led by a Public Health England (PHE) consultant in dental public health, who also developed resources for fit testers and those undergoing the fit testing procedures to ensure a consistent approach.<sup>2</sup> Fit testers worked in pairs, to support one another during the fit testing procedure.

The peer review group agreed that a database of individuals fit tested would be used to: audit the quality of records; identify issues and enable rapid resolution of problems encountered during the fit testing process; and gain a wider picture of the outcomes of fit tests. Analysis of current data protection regulations in the context of the pandemic revealed that data collected for these purposes would be appropriate providing these were meaningful and were transmitted as securely as reasonably possible.

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The aim of the audit was to review the quality of fit test records and provide an overview of the outcome of fit testing of priority UDC staff in Y&H.

The objectives were: to ensure that there was a consensus on the data collection process and that it was in line with current data protection regulations; to collate fit test results sheets onto a central database; to provide an audit trail and quality assurance to enable discussion of any queries to support the safety of dental professionals and patients; and to inform the future planning of fit testing sessions and personal protective equipment (PPE) requirements.

The quality standard used for assessing fit test records was the Health and Safety Executive Guidance on respiratory protective equipment (RPE) fit testing (annex 1),<sup>3</sup> upon which the fit test results sheet was based.

## Materials and methods

Fit testing of type 3M 1873V FFP3 respirators (provided by PHE) and/or those FFP3 respirators sourced separately by priority UDCs was undertaken by the five fit testers between 9 April and 21 May 2020. A fit test results record form and training to complete the form were provided by the fit test company. A form was completed for each participant.

The original fit test record was retained by the fit tester. Participants were asked to keep a hard/digital copy of it for personal and practice records. A digital copy was also transmitted electronically by the fit tester to enable collation of the data into a Microsoft Excel spreadsheet by a specialist registrar in dental public health. Only the following details from the forms were collated:

- Name of participant
- Site of participant's normal workplace
- Date of fit test
- Date of re-test (if applicable)
- Name of fit tester(s)
- FFP3 make
- FFP3 model
- PPE worn
- Pass/fail
- Comments.

The spreadsheet was analysed to ascertain whether there were any omissions or any issues requiring clarification, which was then discussed with individual fit testers by telephone/email. The database was also used to find out the proportions of participants who passed/failed their fit test.

**Table 1 Numbers of forms affected by data entry issue**

Data entry issues	Number of forms affected	Percentage of forms affected by issue
Name of participant (unclear name of participant)	16	2.7%
Site of normal workplace omitted	5	0.8%
Date of initial fit test error	7	1.2%
FFP3 model unclear	6	1.0%
Incomplete form (other reasons)	2	0.3%
Duplicate form	1	0.2%
<b>Total</b>	<b>37</b>	<b>6.2%</b>

**Table 2 Incidents where follow-up was required**

Query which required investigation with fit tester and clarification/action	Number of forms affected	Percentage of forms affected by issue
Operator/equipment error requiring follow-up and re-test of participants	16	2.7%
Clarification of anomalies on forms	19	3.2%
<b>Total</b>	<b>35</b>	<b>5.8%</b>

## Results

There were 600 submitted fit test result records. This equated to 583 fit test individuals as some people had multiple fit tests.

Over the six-week period, the majority of the fit test results sheets were well recorded. However, there was either data missing or incomplete information on 6% of the forms. This was mostly where the name of the participant was unclear due to handwriting (Table 1).

Furthermore, around 6% of fit test records required some follow-up discussions between the fit testers and dental public health (Table 2). This was when there was found to be operator/equipment error requiring follow-up and re-test of participants, or clarification of anomalies on the form.

Two main operator/equipment errors were found. One related to failure to remove the two bungs from nebuliser A (delivering sensitivity test solution) and the two bungs from nebuliser B (delivering fit test solution), which affected the metred dose of the solutions. The database enabled identification of participants where this occurred, so a re-test could be performed.

Another issue related to full-face visors, which should be worn in front of respirators during dental treatment. Fit tests should only be carried out with the headband/frame part of the visor in place if it could interfere with the

fit of the respirator, but not the Perspex front part. If the Perspex front of the visor cannot be detached from the headband (frame), the fit test should be carried out without it. This is because it would be impossible to conduct a proper fit test with the full visor in place as it would act as a barrier between the nebulised aerosol and the wearer, increasing the likelihood of false passes. It became apparent that the front Perspex part of the visor had been inadvertently worn during some of the fit tests. Where this had happened, participants were identified through the database and recalled for a repeat fit test without the front part of the visor *in situ*. On some fit test results sheets, it was unclear what PPE had been worn on the head in addition to the FFP3 respirator during the fit test; for example, goggles, safety specs, headband of visor. Clarification needed to be sought where it was unclear whether the Perspex part of the visor had been worn. Clarification was also sought where the make/model of respirator recorded was incorrect/incomplete.

The overall data showed that, of the 583 people fit tested, 80.6% (470/583) passed either on initial test or re-test and 19.4% (113/583) failed. Five could not taste the test solution and therefore did not undergo the next stage of the test with the respirator. One of these had a possible allergic reaction to the sensitivity test solution. Seven individuals reported incidents of poor fit of the respirator, visible gaps or discomfort.

With specific reference to the 3M 1873V models which were supplied by PHE, 479 individuals were fitted with this type of respirator, of which 82.7% (396/479) passed the test and 17.3% (83/479) failed the test.

## Discussion

The COVID-19 pandemic has presented many challenges to the provision of dental care, but also presented opportunities for individuals to work outside their normal professional activities by utilising transferable knowledge and skills in conjunction with additional training to support patient care. The redeployment and training of dentists as fit testers for FFP3 respirators is one such example.<sup>4</sup>

### Fit test records

The audit showed that fit tests were generally well recorded. It is understandable that clarification of records would be needed, and in some cases re-testing, as this was a new procedure being undertaken by only five volunteers during a pandemic for the whole of Y&H. Some participants were asked to complete their personal details on the form, which introduced errors related to handwriting. Fit testers were primarily contacted by email and telephone when there were queries and were always very supportive.

Following some early initial queries, a completed 'model answer' record form was provided to aid the fit testers. The number of queries that subsequently required clarification decreased. The database facilitated identification of a very small number of individuals where a re-test procedure was necessary due to operator/equipment error. It also provided an important record where an allergic reaction was reported.<sup>5,6</sup> The audit enabled this process to be performed efficiently and safely, benefiting both dental professionals and patients.

Participants who failed the fit test subsequently had a re-test. Where the two tests were combined on the same form, it was not always clear that both the sensitivity test and the fit test had been performed during the re-test. Although it was ascertained that fit testers had been completing the whole process during re-testing, to avoid doubt, testers were asked to complete separate forms including dates and times of the test and re-test to demonstrate all stages had been performed.

### Failure rates

With just under 600 people tested in Y&H, 1 in 5 people (19.4%) failed fit testing of FFP3 respirators, with 1 in 6 people (17.3%) failing specifically for the 3M 1873V models. Reasons for failure included inability to taste the sensitivity test solution, so the fit test process could not be completed, or due to respirators not fitting due to small facial features. Where fit was the issue, people who failed may have gone on to be successfully fit tested on a different make, model or size of respirator. Where individuals were unable to complete their fit test due to inability to taste the Bitrex during the sensitivity test, there was the option of trying an alternative fit testing solution (containing sodium saccharin). Alternatively, they would have to move to a non-AGP role. In addition, as fit testing requires the participant to be clean-shaven in the region of the face seal, there may have been a number of people who could not be fit tested at all, due to inability to remove their facial hair for religious, cultural or personal reasons. For these people, a loose-fitting powered respirator with hood/helmet which does not require fit testing may be an option.<sup>7</sup>

The Y&H results were comparable with available data from one similarly trained fit tester based in the North East of England, where a smaller sample of 48 individuals were fit tested with 3M 1873V and results revealed 83.3% individuals (40/48) passed the test and 16.7% (8/48) failed the test.

This failure rate has the potential to impact upon the dental workforce being able to provide AGPs during the pandemic.

### Fit test training

The basic virtual fit testing course taught the fit testers the essentials for fit testing FFP3 respirators and was delivered by Fit2Fit accredited fit testers. However, fit testing initially proved to be a steep learning curve for the fit testers and they required support from the training company. Working as a peer support group and sharing experiences via digital platforms enabled them to share learning and resolve issues efficiently, including alerts sent by the Health and Safety Executive regarding counterfeit respirators. It was recognised that GDPs had no prior knowledge/skills in respiratory protective equipment and little or no mentoring support from experienced fit testers within the dental community.

Following initial training, PHE and Office of the Chief Dental Officer guidance at that time permitted the use of disposable FFP2 and N95 respirators in addition to FFP3

respirators. More recent guidance<sup>8,9</sup> states that FFP3 respirators should be used given their higher level of protection. Reusable half-mask respirators (with replaceable P3 particle filters) are also permitted; for example, for those who are unable to fit a disposable FFP3 respirator due to facial anatomy. The fit testers subsequently attended a Fit2Fit-approved<sup>10</sup> full day 'face-to-face' training course, which covered the wider Fit2Fit syllabus to develop knowledge and upskill to fit test a wider variety of respirators. This became the standard course offered through NHS England and NHS Improvement and Health Education England.

### Reflection of the fit testers

The fit testers enjoyed providing a vital service to enable provision of urgent dental care at a time of crisis. They found the fit testing process relatively simple to learn, given their clinical skills, but found the process labour-intensive. In addition, working in pairs was beneficial in managing participants. For example, fit testers were able to support one another in explaining the reasons to individuals why it would be inappropriate to perform a fit test on someone who was not clean-shaven in the region of the face seal. There were also some challenges around social distancing, with participants having to be reminded to maintain two-metre separation as far as possible, with chairs spaced appropriately, and to wear fluid-resistant (type IIR) surgical masks while waiting to be fit tested.

The fit testers were valued by dental colleagues who they were fit testing and they developed good relationships with their local colleagues, the local dental networks and local dental committees, with increased communication and partnership working. There was a real sense of the profession pulling together to maintain an urgent dental service for the population.

Challenges did exist at the time though in relation to adequate indemnity for those involved in fit testing, and a shortage of fit test kits and FFP3 respirators. There were also challenges in the transmission of digital data between fit testers and the specialist registrar in dental public health, as there was no centralised IT system to support the database. Following the six-week data collection period, it became impossible to continue to administratively maintain it as more people started providing fit testing; and numerous supplies of different types of respirators were being sourced. Consequently, a local decision was taken that individual practices should take ownership for organising and following up the fit testing of their staff with respirators.

## Conclusion

Dentists have been successfully trained to provide fit testing for dental colleagues in primary care, with proven ability to make accurate fit test records and deal with any issues which arise. Around a fifth of dental staff will fail their fit test for a disposable FFP3 respirator, which needs to be factored into future pandemic workforce and PPE supply planning. This needs to be considered within the context of the widespread usage of reusable half-mask respirators by dental teams, which commenced when stocks of disposable FFP3 respirators were low in the initial stages of the pandemic. They provide an alternative for those who cannot fit disposable FFP3 respirators, are perceived to be cost-effective and generate less waste.

### Conflict of interest

*There are no declarations of interest.*

### Acknowledgements

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