

PPE and Decontamination for Aerosol Generating Procedures in Orthodontics (**AGPs**)

This guidance is in line with NHS England and Public Health England guidance in performing AGPs at the time of publishing.

Advice should be sought from local infection prevention/control teams where applicable.

During periods of widespread community transmission of COVID-19 dentists should use PPE to treat patients based on the type of urgent care they are providing. In effect, there is currently an assumption that all patients present a risk of transmission of the virus.¹

Key points for **AGP** PPE and Clinic management¹⁻³

- Hand hygiene – bare below the elbows.
- Uniform – clinical clothing only under PPE
- **AGP** PPE during treatment
 - Donning
 - Fluid resistant long sleeved gown
 - Respirator mask, FFP3
 - Visor/eye protection.
 - gloves
 - Change after EACH patient
 - Doffing technique essential to adhere to minimise risk of transmission
- Aerosol settle time post AGP, up to 60 minutes in neutral pressure air flow room
- Terminal clean of room according to PHE guidance⁴ and UDC SOPs¹⁻³ with appropriate viricidal agent
- Waste management according to HTM 01 07⁷
- Management of transfer of impressions and appliances to lab – according to HTM 01 05⁶

Quick links

Government recommended PPE and decontamination for clinical scenarios in the dental setting are discussed in the Urgent dental centre SOP for [England](#)¹, and for [Scotland](#)² and [Wales](#)³

[PHE](#) Reducing the risk of transmission of COVID-19 in the hospital setting⁴

[Cross Nations](#) Covid-19: infection prevention and control⁵

HTM [01-05](#) for decontamination⁶

HTM [01-07](#) for waste management⁷

Summary for AGP clinical scenarios

PPE

- The use of aerosol generating procedure specific PPE is required. (see appendix A for mask Type)
- Staff should be formally trained in donning and doffing PPE.
- Ensure donning/doffing procedures highlighted in surgeries and adhered to.

Decontamination of clinical rooms

- Aerosol settle time post procedure. Vacate room, door closed, window open. 60 minutes in neutral pressure air flow room, which can be reduced down to 20-30 minutes in a negative air pressure room with 10-12 air changes per hour¹
- Followed by terminal clean in line with PHE guidance should be observed.⁴
- Ensure disinfectant used is appropriately virucidal. (0.1% hypochlorite)⁴
- Management of waste according to HTM 01-07.⁷
- PPE must be worn for cleaning down of rooms.
- Consider use of appropriate air filtration / HEPA filter units.

Decontamination of non-Clinical rooms

- Standard HTM 01-05 guidance should be observed.⁶
- Ensure social distancing can be maintained.
- All environments should be clutter free and ensure all surfaces can be wiped-down.
- Increase the frequency of cleaning/decontamination.
- Consider use of appropriate air filtration/HEPA filter unit.

PPE advice in the Health care setting

“Bare below the elbows” is an attempt to ensure adequate **hand and wrist hygiene** and reduce the spread of hospital acquired infections. It emphasises the need for

- short sleeves,
- no wristwatch,
- no jewellery or nail polish/acrylics
- avoidance of neck ties
- No white coats

when carrying out clinical activity in addition to adequate hand hygiene practice. This remains an important part in the cross infection control and PPE recommendations.

[links for posters on hand hygiene here](#) and [hand rub here](#)

Best Practice: how to hand rub

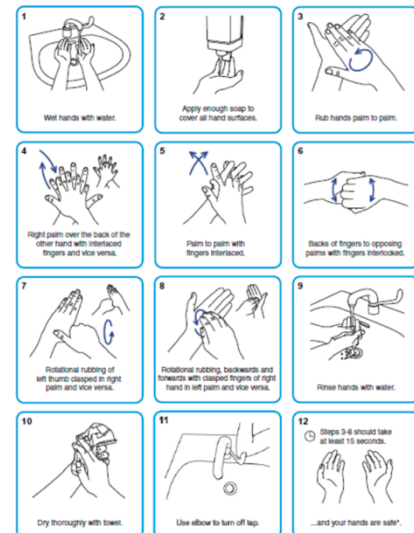
Duration of the process: 20-30 seconds.



From: COVID-19. Guidance for infection prevention and control in healthcare settings

Best Practice: how to hand wash

Steps 3-8 should take at least 15 seconds.



*Any skin complaints should be referred to local occupational health or GP.

From: COVID-19. Guidance for infection prevention and control in healthcare settings

Clothing in the clinical environment

There is an expectation that only specific clothing/uniform should be worn within the clinical setting such as clinical scrubs, dental tunics and trousers under PPE, and that this is not worn outside of the clinical environment. Clinicians should change to go home, and uniform should be placed in washable or disposable laundry bags for separate cleaning, at least at 60°C ideally, if not being laundered on site⁶.

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In summary for treatment in the Orthodontic setting in AGP situations

The *minimum* PPE recommended is (the single use of)

Setting	Context	Disposable gloves	Disposable plastic apron	Disposable fluid repellent long sleeved gown	Fluid resistant surgical mask (type IIR)	Filtering Respirator FFP3 mask	Eye/face protection
Dental Surgery	AGP procedure	✓	X	✓	X	✓	✓

This is in line with Guidance from PHE and HPS, for PPE in the [Urgent Dental Care settings](#).¹⁻³

	Waiting room/reception No clinical treatment	Dental surgery Non AGP treatment	Dental surgery Treatments involving AGPs
Good hand hygiene	Yes	Yes	Yes
Disposable gloves	No	Yes	Yes
Disposable plastic apron	No	Yes	No
Disposable gown*	No	No	Yes*
Fluid-resistant surgical mask	Yes**	Yes	No
Filtering face piece (FFP3) respirator***	No	No	Yes
Face / Eye protection****	No	Yes	Yes

* Fluid-resistant gowns must be worn during aerosol generating procedures (AGPs). If non-fluid-resistant gowns are used, a disposable plastic apron should be worn underneath.

**Where working in reception/communal area with possible or confirmed case(s) and unable to maintain 2 metres social distance

***If wearing a 'valved respirator' that is not fluid resistant, a full-face shield/ visor must be worn

****Face / Eye protection ideally should be disposable. If non-disposable safety glasses/goggles or face visors are used they should be disinfected in line with manufacturers guidance.

Surgical Masks and Respirator masks

A surgical mask or **Fluid resistant (Type II R) mask**, is a loose-fitting mask that creates a **physical barrier** between the mouth and nose of the wearer, as we are used to wearing in the clinical setting.

Worn correctly a surgical mask will help block large-particle droplets, splashes, sprays, or splatter that may contain viruses and bacteria, keeping it from reaching the wearer's mouth and nose. Surgical masks may also help reduce exposure of the wearer's saliva and respiratory secretions to others.



Surgical masks are not designed to protect the wearer from *inhaling* airborne bacteria or virus particles – as respirators are.

An **FFP** (filtering facepiece or respirator) mask is a type of protective mask that serves to protect against particulates and various viruses in the air. The (certified by the European Union) EN 149 standard defines three classes of filter efficiency for these masks, namely FFP1, FFP2 and FFP3. In the US the classification is N95 (FFP2) and N99 (FFP3)

This type of mask, unlike the surgical mouth mask, protects the wearer from *inhaling* infectious agents or pollutants in the form of aerosols, droplets, or small solid particles. FFP1 mask is the least filtering mask of the three.

- Aerosol filtration percentage: 80% minimum.

FFP2 masks

- Aerosol filtration percentage: Not less than 94%.
- Internal leak rate: Maximum 8%

FFP3 mask with exhalation valve

- Aerosol filtration percentage: Not less than 99%.
- Internal leak rate: Maximum 2%



Current UDC guidance states the use of FFP3 masks as part of the PPE for AGP procedures¹⁻³

The mask should be correctly adjusted to the face and tested for leakage - known as fit testing. This is carried out by trained personnel using specific equipment and is not the same as fit checking which is carried out every time a mask is donned to check correct seal

In practice facial types also impact on the fit of respirator masks and one style/make does not fit all. Indeed for some clinicians no disposable respirator mask will fit sufficiently well to be clinically acceptable and pass the fit testing, and a full face respirator with filters, or a hood may be required.

Facial hair can also impede the seal for FFP masks. Guidance on this is available [here](#)

FAQ summary points about the FFP3 masks is available [here](#)

Clickable link for PHE poster [here](#)



COVID-19 Safe ways of working
A visual guide to safe PPE

General contact with confirmed or possible COVID-19 cases

- Eye protection to be worn on risk assessment
- Fluid resistant surgical mask
- Disposable apron
- Gloves

Aerosol Generating Procedures or High Risk Areas

- Eye protection eye shield, goggles or visor
- Filtering facepiece respirator
- Long sleeved fluid repellent gown
- Gloves

Hand Hygiene and PPE Use:

- Clean your hands before and after patient contact and after removing some or all of your PPE
- Clean all the equipment that you are using according to local policies
- Use the appropriate PPE for the situation you are working in (General / AGPs or High Risk Areas)
- Take off your PPE safely
- Take breaks and hydrate yourself regularly

For more information on infection prevention and control of COVID-19 please visit:
www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control

Suspected/confirmed COVID-19 PPE General Area

General contact with COVID-19 case | **Aerosol Generating Procedures**

FOR ALL HEALTH & SOCIAL CARE SETTINGS

- Full Face Shield / Eye Protection can be single or sessional use**
- Fluid Resistant Surgical Mask can be single or sessional use**
- Gloves - single use**
- Disposable Apron - single use**
- Full Face Shield / Eye Protection can be single or sessional use***
- FFP Face Mask can be single or sessional use**
- use single use disposable apron on top of gown between patients**
- Gloves - single use**
- Long Sleeved Fluid Repellent Gown can be single or sessional use**

* If wearing valved FFP mask full face shield/visor should be worn.

Please refer to the full UK COVID-19 guidance for Infection Prevention and Control on the HPS COVID-19 web page

Illustration by James Fox Creative
www.jamesfoxcreative.co.uk/
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clickable link for Scottish poster [here](#)

Donning and Doffing of AGP PPE

Correct technique donning and especially doffing of PPE is essential to maintain efficacy and prevent self/cross-contamination. Space and time for donning and particularly doffing of PPE must be considered as part of dental surgery management.

A recent study⁸, all be it in a health care environment not dental setting, observed that ‘90% of observed doffing was incorrect. Common errors were; doffing gown from the front, removing face shield of the mask, and touching potentially contaminated surfaces and PPE during doffing’.

A recent commentary by Johnson et al⁹, in light of the covid crisis, on the Cochrane review on PPE for preventing highly infectious diseases states “*Whilst members of the dental team are very experienced in the use of standard PPE, most work within primary care settings and may be less familiar with more extensive forms of PPE. The review suggests that covering more parts of the body (e.g. using a long gown rather than merely an apron) provides better protection against contamination. However, the authors highlight the difficulty in donning and doffing such PPE which could potentially increase self-contamination.*

Safe doffing of PPE requires knowledge, skills and attitudes. In the dental setting, attention to cross infection and knowledge is high, but the addition of specific PPE in this covid environment is new, and likely to need time to be perfected.

For AGP PPE doffing, there is need for a second area to be designated outside of the AGP environment. The initial Doffing of gloves, gown and visor takes place in the AGP setting, with appropriate hand hygiene, but the **final doffing of the FFP3 mask** with final hand hygiene **takes place outside of the AGP area.**

Consideration of the location of clinics and their access (waiting rooms/corridors) as well as staff access to Hand hygiene measures (hand gel and/or hand washing) should be planned as part of the PPE and decontamination protocol.

A **PHE video** on [donning](#) and [doffing AGP](#) PPE is available to aid technique.

A clickable link is available here for [donning](#), and [doffing](#) posters for the **AGP** clinical setting



Quick guide – gown version
Putting on (donning) personal protective equipment (PPE) for aerosol generating procedures (AGPs)

COVID-19

This is undertaken outside the patient's room.

Pre-donning instructions

- ensure healthcare worker hydrated
- tie hair back
- remove jewellery
- check PPE in the correct size is available

Perform hand hygiene before putting on PPE

1 Put on the long-sleeved fluid repellent disposable gown

2 Respirator
Perform a fit check.

3 Eye protection

4 Gloves



Quick guide – gown version
Removal of (doffing) personal protective equipment (PPE) for aerosol generating procedures (AGPs)

COVID-19

PPE should be removed in an order that minimises the potential for cross contamination.

The order of removal of PPE is as follows:

1 Gloves –
the outsides of the gloves are contaminated

Clean hands with alcohol gel

2 Gown –
the front of the gown and sleeves will be contaminated

3 Eye protection –
the outside will be contaminated

4 Respirator
Clean hands with alcohol hand rub. Do not touch the front of the respirator as it will be contaminated

5 Wash hands with soap and water

Decontamination in **AGP** rooms

Following an AGP, the room must be vacated to allow for aerosol settle prior to any terminal clean. In neutral air pressure rooms the door must be kept closed but any windows open, and left for 60 minutes before decontamination may be undertaken. In negative air pressure rooms with an air flow of at least 10-12 changes per hour this may be reduced to 20-30 mins.¹⁻⁴

Surfaces

In line with the recommendations for current Urgent Dental Centres, decontamination following treatment should follow HTM01-05⁶ and PHE guidance.⁴

Clinical staff should also consider disinfecting inert surfaces using chemicals confirmed against COVID-19 and keep a dry atmosphere to mitigate the 2019-nCoV spread. Such surface sanitizers include 62–71% ethanol, 0.5% hydrogen peroxide, and 0.1% (1 g/L) sodium hypochlorite¹⁰.

Staff performing Decontamination should be in the appropriate PPE and follow the doffing procedure at the end of the process.

Non clinical areas

The environment should also be kept clean and clutter free. All non-essential items including toys, books and magazines should be removed from reception and waiting areas.

WHO continues to recommend droplet and contact precautions for those people caring for COVID-19 patients¹¹. In line with this, an increased frequency of decontamination should be incorporated into the environmental decontamination schedules for areas where there may be higher environmental contamination rates⁴:

- toilets and toilet facilities
- 'frequently touched' surfaces such as medical equipment, door/toilet handles and locker tops, reception areas, etc should be cleaned at least twice daily and particularly when known to be contaminated with body fluids

Equipment

Decontamination following treatment should follow HTM01-05⁶.

Consideration should be given where external companies are used for sterilisation of instruments. Special requirements have been reported for the wrapping of kits during the COVID-19 pandemic

HEPA filters

High-efficiency particulate air (HEPA) is an efficiency standard of air filter. European standards¹² dictate that a HEPA filter must remove at least 99.95% of particles whose

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diameter is equal to 0.3 µm. The diameter of droplet (>5 µm) and aerosol (<5 µm) thought to be important in the spread of COVID-19¹ fall within the diameter of that captured by a HEPA filter.

The evidence behind the use of HEPA filters in a healthcare setting is inconclusive, but it is thought to help prevent infection in a hospital setting where they are employed in theatres and isolation rooms.^{13,14}

It has been hypothesised that air filtration could be employed to reduce the severity and spread of COVID-19¹⁵. There is no evidence to support or refute their use to prevent transmission of COVID-19 in a dental setting. As such, they may play a role in the decontamination of Clinical and non-Clinical areas during the current pandemic.

If air filtration with a HEPA filter is being considered for use in a non-clinical environment, the size and efficiency of any unit should be tailored to the size of the room it is used in.

Dental impressions/lab work

No specific guidance currently exists with respect to covid - 19. As such, decontamination would follow HTM01-05⁶.

The use of disinfecting agent that is appropriately virucidal for Covid-19 is recommended.

All disinfecting agents should be used strictly in accordance with manufacturer's instructions. Preference should be given to immersion of impressions in disinfectant as this is less technique sensitive than spray disinfectant.

Writing lab prescriptions and packaging of impressions should take place in a clean environment.

Consider the use of digital impressions where possible.

Orthodontic Laboratories

Impressions should be disinfected prior to being sent to an orthodontic laboratory as per HTM 01-05⁶ and as such, normal management in transfer would be appropriate.

Where local or individual concerns exist, consideration should be given do

- Disinfection of packaging/lab bags on arrival as a 2nd procedure
- Handling the lab work with gloves
- Use of high volume suction for all trimming
- The use of masks/face shields when trimming acrylic * this is an AGP in the clinical setting
- Disinfection of burs/equipment, in particular the slurry for polishing acrylic should be changed regularly
- Disinfection of benches once jobs completed

All lab work should be disinfected before leaving the laboratory

References

1. SOP England: NHS England and NHS Improvement - COVID-19 guidance and standard operating procedure. Urgent dental care systems in the context of coronavirus -Delay phase - Version 1, 15 April 2020. Accessed 10 May 2020
<https://www.england.nhs.uk/coronavirus/publication/covid-19-guidance-and-standard-operating-procedure-urgent-dental-care-systems-in-the-context-of-coronavirus/>
2. SOP Scotland Annex 1: Infection Prevention and Control in Urgent Dental Care Settings during the period of COVID-19 Version 1.0 Publication date: 11April2020. Accessed 10 May 2020
<https://www.scottishdental.org/wp-content/uploads/2020/04/HPS-Urgent-Dental-Care-COVID-19-April-11.pdf>
3. SOP wales Red Alert Phase Escalation. Final v1.01 03.04.2020 All Wales Clinical Dental Leads COVID-19 Group Accessed 10 May 2020
<https://www.fgdp.org.uk/sites/fgdp.org.uk/files/editors/2020.04.03%20Wales%20Red%20Alert%20Phase%20Escalation%20letter.pdf>
4. NHS England and NHS Improvement - COVID-19 guidance and standard operating procedure. Urgent dental care systems in the context of coronavirus -Delay phase - Version 1, 15 April 2020. Accessed 29/4/20
<https://www.england.nhs.uk/coronavirus/publication/covid-19-guidance-and-standard-operating-procedure-urgent-dental-care-systems-in-the-context-of-coronavirus/>
5. Cross Nations, PHE Covid 19; infection prevention and control Updated 27 4 2020 Accessed 10 May 2020
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881489/COVID-19_Infection_prevention_and_control_guidance_complete.pdf
6. HTM 01 05: Health Technical Memorandum 01-05: decontamination in primary care dental practices – 2013 Edition. Accessed 10 may 2020
<https://www.gov.uk/government/publications/decontamination-in-primary-care-dental-practices>
7. HTM 01 07 Environment and sustainability Health Technical Memorandum 07-01: Safe management of healthcare waste – 2013 edition. Accessed 10 may 2020
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/167976/HTM_07-01_Final.pdf
8. Phan LT, Maita D, Mortiz DC, Weber R, Fritzen-Pedicini C, Bleasdare SC, Jones RM . Personal Poretctive equipment doffing practices of healthcare workers. J of Occupations and Environmental Hygiene. 2019 216 575-581
<https://doi.org/10.1080/15459624.2019.1628350>
9. Personal protective equipment: a commentary for the dental and oral health care team. On Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff Cochrane Database

of Systematic Reviews 2020, Issue 4. Art. No.: CD011621. DOI:
10.1002/14651858.CD011621.pub4.




Johnson I, Gallagher JE, Verbee JH, Innes N. 2020

<https://oralhealth.cochrane.org/news/personal-protective-equipment-commentary-dental-and-oral-health-care-team>

10. Fini MB. What dentists need to know about COVID-19. Oral Oncology. 2020 Volume 105, June. In press.
<https://reader.elsevier.com/reader/sd/pii/S1368837520301779?token=88F89349BA2F08C18AA3BA9FE3898F7DCD48ED5170946F370EB7166F9A1E78C9D219DFC24F9802FE3BFAD8F9D470E092>
11. WHO continues to recommend droplet and contact precautions for those people caring for COVID-19 patients, 29th March 2020, Accessed 10 May 2020
<https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations>
12. European Standard EN 1822-1:2009, "High efficiency air filters (EPA, HEPA and ULPA)", 2009
13. Eckmanns T, Rüden H, Gastmeier P. The influence of high-efficiency particulate air filtration on mortality and fungal infection among highly immunosuppressed patients: a systematic review, J Infect Dis, 2006, vol. 193 (pg. 1408-18) <https://doi.org/10.1086/503435>
14. Curtis LT. Prevention of hospital-acquired infections: review of non-pharmacological interventions. J Hosp Infect. 2008 Jul; 69(3): 204–219.
<https://doi.org/10.1016/j.jhin.2008.03.018>
15. Elias B, Bar-Yam Y. Could air filtration reduce COVID-19 severity and spread?, New England Complex Systems Institute, 2020, March
<https://necsi.edu/could-air-filtration-reduce-covid19-severity-and-spread>

Appendix A

Understanding Mask Types

	Surgical mask type IIR 	FFP2 respirator N95 	FFP3 respirator N99 
Sizing /fit type	No	Yes	yes
Intended use and purpose	Fluid resistant Protects against large droplets, splashes or sprays of bodily fluids. Protects patient from wearers exhalation emissions	Reduces wearers exposure to particles including small particle aerosols and large droplets @ >94% filtration rate Protects patient from wearers exhalation emissions	Reduces wearers exposure to particles including small particle aerosols and large droplets @ >99% filtration rate Protects patient from wearers exhalation emissions
Face seal fit	Loose	Tight fitting *	Tight fitting *
Fit testing requirement	no	yes	yes
User seal check requirement	No	Yes each time donned	Yes each time donned
Use limitations	Discard after each patient use	Ideally discard after each aerosol generated procedure. If using for a session** (with additional protective measures) discard if becomes damaged or contaminated, seal is broken or breathing becomes difficult.	Ideally discard after each aerosol generated procedure. If using for a session** (with additional protective measures) discard if becomes damaged or contaminated, seal is broken or breathing becomes difficult

*Correct Respirator mask fit must be fit tested and depends on facial type as to which manufactured mask provides safe cover for healthcare workers.

In some instances all masks cannot achieve a good seal, and a hood or full face respirator must then be worn.