

## Covid-19: Planning return to Open Plan Clinics: Guiding Principles to mitigate risk

This document has been jointly developed by Dental Schools Council and the Association of Dental Hospitals and represents the consensus view of all Dental Schools and Dental Hospitals.

### Executive summary

The two key COVID-19 related risks within open plan clinics that are specific to the practice of dentistry/dental therapy are aerosol and splatter. Aerosol is likely to be highly dilute given recent data and the mitigating factors that can be introduced both at the operative site and within the clinical environment. In dental procedures combinations of aerosol and splatter are generated by a range of operative dental procedures such as the use of high speed air rotors. True aerosols comprise particles less than 5 µm. Splatter has a greater viral load than aerosols and is of concern both in terms of direct cross-contamination and fomite formation. Again, however, this too can be mitigated by appropriate operative site and clinical environmental measures. The guiding principles in this document are based on the best available knowledge and expert opinion available in the professional and scientific literature at the time of writing. It must, however, be noted that due to substantial variation in local infrastructure and environment in UK and Irish Dental Hospitals and Schools, the information within this document would need to be used and interpreted within the context of the relevant School/Hospital's local clinical environment and local expert opinion. All of the guidance is within the context of a level 3 COVID-19 risk in the UK and/or infection rates local to the institute. Above this level bespoke local solutions will be required and below this level pre-COVID-19 standard infection prevention controls will suffice.

## Purpose

The purpose of this document is to outline a set of guiding principles to support all UK/Irish dental hospitals/schools and their key stakeholders towards the safe return to educational placement provision within open plan clinics.

## Terms of reference

To draw upon existing and emerging research evidence and guidance in order to provide a consensus view on:

1. The principal steps institutes should undertake to assess the open clinic environment (air change and ventilation).
2. The underpinning fallow times in open plan clinics for non-AGPs and AGPs.
3. Mitigating steps to reduce risks arising from AGPs (dental suction with wide bore aspirator, rubber dam, no working without a chairside assistant).
4. Safe distances between chairs where AGPs are undertaken using mitigating steps.
5. The potential role of structural changes to clinic designs, under different air replacement rates and chair configurations.
6. The patient journey to the hospital, and procedures for the safe entry of patients into and out of AGP zones.
7. Future measures to improve confidence in safe AGP provision and facilitate a ramping up of student placement activity (e.g. testing).

The group respects national policies and guidance from national governments and regulatory authorities appropriate to the UK COVID-19 alert level in each locality e.g. Public Health England, Health Protection Scotland / National Services Scotland, Public Health Wales, Public Health Agency (PHA) Northern Ireland and the Health Protection Surveillance Centre in the Republic of Ireland. The current guidance as written relates to level 3 (of 5) COVID-19 alert level. Above this level or any local/regional variations will require bespoke consideration and solutions.

When level 2 national alert is reached, all care will be provided under level 2 PPE.<sup>1</sup>

## Overview

The SARS CoV-2 (COVID-19) pandemic brought with it specific challenges to the dental profession, not least related to the provision of oral care using procedures that involved the generation of dental aerosols. The use of dental handpieces and powered scalers generates splatter and droplets as well as aerosols. The WHO defines procedures that generate aerosol (“Aerosol generating procedures or AGPs”) as any medical, dental and patient care procedure that results in the production of airborne particles  $<5\ \mu\text{m}$  in size (aerosols), which can remain suspended in the air, travel over a distance and may cause infection if they are inhaled (WHO, 2014).<sup>2</sup>

The term ‘aerosol’ is used in this document to refer to airborne particles  $<5\ \mu\text{m}$  in size, as defined by the WHO.<sup>2</sup>

Due to the perceived risks associated with the provision of dental care, where dental clinicians operate within 1 metre of a patient’s respiratory tract and employ significant numbers of AGPs, routine dental care services in the UK were suspended on 15th March 2020. However, aerosols generated during dental treatment procedures differ substantially from respiratory aerosols generated during medical interventions. The dental aerosol is largely produced from a device with clean water, whereas medical aerosols are often generated directly from secretions in the respiratory tract. Risks associated with dental aerosols arise from mixing clean water from dental devices with saliva or blood. Despite likely being highly diluted by the flow rates of water from dental devices, dental aerosols may still carry viral particles from patients’ saliva in suspension, which in patients with laboratory confirmed SARS-CoV-2 infection was shown by To et al (2020)<sup>3</sup> to be as high as  $10^8$  copies/mL (median salivary load  $3.3 \times 10^6$  copies / mL; range  $9.9 \times 10^2$  to  $1.2 \times 10^8$  copies per mL) in early morning saliva from the posterior oropharynx. Conversely, asymptomatic carriers exhibit far lower viral loads in saliva than in nasopharyngeal secretions (Chau et al 2020).<sup>4</sup> Data from before the emergence of SAR-CoV-2 concluded that 90% of the viral load from dental handpiece emissions is contained within the splatter/droplet fraction, and only 10% in the aerosol fraction. Nevertheless, there are a paucity of studies in the literature addressing dental aerosols and associated viral transmission (Zemouri et al 2017).<sup>5</sup>

Government focus has been upon the specific challenges of the lack of access to, and provision of oral and dental care services following cessation of routine care on 25th March 2020. The gradual realisation that there were significant harms associated with service closure led to the development of urgent dental care services across the UK and Ireland and the recognition that dental care should be designated as

an essential healthcare service. This was followed by the gradual restoration and recovery of dental services in the UK from 8th June 2020 (still ongoing), out with the clinical education setting.

Dental education and assessment moved online, but clinical placements were suspended in line with national guidance, resulting in the loss of over 4 months of clinical experience for undergraduate dental and hygiene/therapy students.

Clinical training of the future dental workforce creates specific challenges, in particular due to the nature of large open plan teaching clinics and the challenges of providing AGPs within an environment that must be safe for patients, students and staff. The risks posed by COVID-19 to workforce development were outlined by Dental Schools Council (DSC) and the Association of Dental Hospitals (ADH) and published on July 29th 2020.<sup>6</sup>

## Context

Whilst there is no current evidence for specific proven risks from dental AGP provision within multi-chair clinical teaching areas, by extrapolation from other data, there are presumed tangible risks specific to open plan clinics that need addressing.

The consensus view of the Scottish short life-working group was that the safe zone between chairs to contain splatter/droplets is 2 metres and 10 minutes are required for settling time.<sup>7</sup>

The environment in which current planning is being undertaken is highly dynamic. This document is therefore a live document based upon pragmatic expert opinion and provides the guiding principles for reducing risks to patients, students and staff to the lowest possible levels, whilst restoring AGP provision in open plan teaching clinics. We recognise that dental hospital/school estates vary across the UK and Ireland in terms of age, condition, architecture and environmental management systems. Ultimately, decisions on clinic configurations to enable the safest possible care to student patients will lie with the local infection prevention control (IPC) teams, placement providers and academic partners.

## Overarching Guiding Principles

There are several overarching guiding principles for this document:

1. Patient, student and staff safety and well-being is a priority.
2. Appropriate social distancing and associated risk mitigation measures should be in place. These should include movements of patients, staff and students.
3. To mitigate the spread of splatter and AGPs students must not work without a chairside assistant.
4. No vulnerable patients will be exposed to AGPs on an open plan clinic.
5. There should be adherence to government guidelines at all times.
6. This document should be considered a “live” document and will be updated as new evidence becomes available.

This document considers the risk mitigation for returning to Open Plan Clinics as follows:

1. Before entering the clinical environment
  - a. Staff and Students
  - b. Patients
2. The Open plan clinical environment
  - a. Non-aerosol generating procedures
  - b. Aerosol generating procedures
3. Clinical Supervision in the open plan clinical environment

## Before entering the clinical environment

### *Staff and students*

- Risk assessment of staff and students returning to clinical and non-clinical environments to safeguard health and minimise the risk of infection and complications associated with Covid-19.
- Staff and students with symptoms of Covid-19, or living in a household where somebody has symptoms, should self-isolate, obtain a Covid-19 test and follow government guidelines.
- Staff and students returning from a 'lockdown area' (either UK or international) should consider self-isolating for a two week period or follow local guidance and advice issued from appropriate bodies.
- Maintain social distancing in staff/student areas and facilities. Consider staggering lunch breaks and limiting use of changing facilities.
- All staff and students should be familiar with local guidance to keep them safe, including use of PPE and infection prevention and control measures.
- As new evidence emerges, consider introduction of point of care testing for staff and students.
- Ensure staff and students have knowledge of, and access to, mental health and wellbeing resources.

### *Patients*

- Patients should be provided with clear information about their dental appointment in advance including advice not to attend if they have symptoms of COVID-19 or suspect they have come into contact with someone with COVID-19 prior to their appointment.
- Patient information should include advice about parking, arrival times at clinic, entrances, infection prevention and control precautions and COVID-19 screening.
- Patients should be encouraged to attend their appointment alone as far as possible or practicable.
- Upon arrival at the Dental Hospital or Clinic, patients and escorts must

sanitise their hands and be asked to wear their face covering or be provided with a facemask. Patients may be exempted from the requirement to wear a face covering for medical reasons on an individual basis.

- Upon arrival at the Dental Hospital or Clinic, patients and escorts will be screened for COVID-19 symptoms and assessed for exposure to contacts.
- Waiting times within the building should be reduced as much as possible.
- Immediately prior to entering an AGP restricted open plan clinic, patients must be provided with a fluid resistant surgical face mask (type IIR) and single use or reusable eye protection. The eye protection must be worn for the duration of the visit and the mask worn for the duration of the visit other than during the operative procedure.
- Patients must leave the AGP open plan clinic upon completion of their clinical care and their PPE removed upon exit into designated clinical waste containers.
- Patients who are known or suspected to have COVID-19 infection should not be treated by an undergraduate student.
- Patients who are at extremely high risk of severe COVID-19 illness should not be treated by an undergraduate student on an open plan clinic.

## The Open Plan Clinical Environment

Before outlining the mitigation of risk in open plan clinic environments it is important first to briefly summarise some key definitions to highlight the difference between terms and the clinical difference that this makes.

- Aerosol definition: “liquid or solid particles, <5 µm in diameter, suspended in air”. (WHO, 2014)<sup>2</sup>
- Droplet definition: “air-borne particles > 5-10 µm in diameter” (WHO, 2014)<sup>2</sup>
- Splatter definition “mixture of air, water and/or solid substances, e.g. dental filling material, carious tissues, sandblasting powder, etc. [diameter of] water droplets in splatter from 50 µm to several millimetres in diameter and are visible to the naked eye... have sufficient mass and kinetic energy to move ballistically and **quickly settle** on objects due to the action of gravitation forces. Splatter shows

limited penetration into the respiratory system. Splatter particles, moving along trajectories, can come into contact with the mucosa of nostrils, open mouth, eyes and skin. They are deposited on hair, clothes and in the immediate surroundings of the splatter source.” (Szymanska, 2007)<sup>8</sup>

- Particles  $\leq 10\mu\text{m}$  are most likely to penetrate into the lung and cause infection; airborne transmission of SARS-CoV-2 occurs when smaller respiratory particles ( $\leq 5\mu\text{m}$ ) circulate in the area for prolonged periods and are absorbed across the respiratory mucosa and conjunctiva (Cook, 2020).<sup>9</sup>

- Concerns within dentistry are:

- i. Respiratory droplets from patients, staff, students coughing, breathing, sneezing etc. These are now minimised through patients wearing masks most of the time and full-time wear of masks for staff and students in hospital environments. There is an extremely small risk of unknown gag reflex in a patient and coughing during impression taking, otherwise other measures should mitigate.

- ii. Splatter from procedure affecting eyes or respiratory system or causing fomites that can cross-contaminate and then are introduced into respiratory or ocular systems by poor hand hygiene. Mitigated by: physical barriers to partition off patients undergoing procedures producing splatter; physical distance of  $\geq 2\text{m}$  between patients; level 2 PPE (Fluid resistant surgical mask due to the size of particles) for staff and students undergoing procedures; standard PPE for patients (bib, eye protection) although other measures reduce likelihood of significant splatter drastically.

- iii. Aerosol generated by a dental procedure known as an aerosol generating procedure or “AGP”.<sup>10</sup>

AGPs are a matter of some controversy worldwide with procedures included in this grouping varying sometimes substantially from country to country (Cochrane review, Covid 19 dental reopening rapid review).<sup>11</sup> There is some agreement within the UK’s devolved nations that the use of the following potentially result in AGPs:

- High speed (‘air turbine’, ‘air rotor’) handpieces
- Surgical handpieces
- 3-in-1 syringe (air plus water)
- Powered scalers (sonic/ ultrasonic).

The UK definition that includes an estimation of particle size is the Welsh CDO Standard Operating Protocol, “AGPs are procedures that create aerosols i.e. air suspension of fine ( $\leq 5\mu\text{m}$ ) particles”. It is this size difference to droplet and splatter that mandates the use of FFP3 to filter these very small particles out.<sup>11</sup>

*Zoning:* The open plan clinical environments may be zoned into non-AGP or AGP in a manner that makes best use of the institution’s estate. To give two possible examples: it may be more practical to zone an entire 20 chair clinic as an AGP or non-AGP only clinic, whereas with a 40 chair clinic it may be more practicable to construct a dividing wall to create 2 zones on the same “clinic”. In the latter example careful attention would have to be paid to the changes in ventilation and air change created by the partition wall. The same would be true if “pods” or rooms were created out of individual cubicles on an open plan clinic. Dependent on the ventilation and air change parameters, creating multiple pods or sealed rooms on a previously open plan clinic may in fact paradoxically worsen the situation in respect of aerosol. This is why at the start of this document the group stressed the need for individualised solutions to the bespoke environments of each dental hospital/school.

### *Non-AGPs*

The main risks to mitigate in non-AGPs are droplet and splatter. Although these are generated in a different manner their mitigation is almost identical:

- Risk mitigated for staff and students by: Level 2 PPE - fluid resistant surgical mask (Type IIR), eye protection (visor) and apron for staff and students; reducing footfall and increasing physical distancing; exemplary cross-infection control post procedure.
- Risk mitigated for patients and the public by: mandatory face coverings in hospitals; reduced footfall (no unnecessary accompanying person for majority of procedures); physical distancing; use of face-coverings when not undergoing dental procedure (but physically distanced when undergoing procedure); exemplary cross-infection control by staff and students.

Splatter risk can be further mitigated for all concerned by: physical distancing of  $\geq 2\text{m}$  between patient heads<sup>7</sup>; physical barriers as appropriate e.g. dividing screens or cubicle partition walls.

Patients, the public, staff and students should all adopt exemplary hand (to elbow in case of staff and student) hygiene of 20 seconds using soap and water and ‘catch it,

bin it, kill it' for coughs or sneezes. The use of alcohol gel may also be substituted if hands (to elbow in the case of staff and students) are visibly clean.

In summary, for an open plan clinic zoned for non-AGP:

- None of the following can be used on a non-AGP clinic currently: high-speed air-turbine handpiece, slow speed air-motor handpiece with water spray, electric micro-motor handpiece with water spray, 3-in-1 spray, ultrasonic or sonic scaler
- Patients should be  $\geq 2\text{m}$  apart and preferably with some form of physical barrier between them
- Appropriate PPE should be adopted for patient, staff and student.<sup>12</sup>

## AGPs

AGPs on open plan clinics should be conducted in a zoned manner (see [Zoning](#) for description of examples) with only AGPs occurring in that zone. This clinic should be clearly identified as conducting AGPs and entrance to the clinic should be appropriately controlled, for example like a laser theatre or a room using X-rays. All staff and students on the clinic should wear FFP3 respirator masks, eye protection, and apron if not assisting or providing an operative intervention. If providing or assisting an operative intervention, staff or student should be wearing a fluid resistant gown or coverall and gloves in addition to a FFP3 respirator, and visor. Air change per hour should be ascertained and optimised as far as practically possible for the clinic in use.

The following should be carefully considered, dependent on the local clinical environment, in order to mitigate risk on an AGP open-plan clinic:

- There should be a minimum of 2 metres between head of chairs to decrease the risk of cross-contamination of splatter.<sup>7</sup> Data from one study recently conducted in a UK dental hospital suggests a 5 metre distance results in a 60,000 – 70,000 dilution effect of any cross-contamination between open plan clinic bays.<sup>13</sup>
- If going within 4 metres of an AGP or onto the main body of the clinic, staff and students must be wearing level 3 PPE with the gown/coverall exchanged for an apron if not providing or assisting an operative intervention.<sup>14</sup> This 4m zone accounts for extremely small amounts of contamination identified at 4m using spectroscopy by Allison et al. It is therefore an *exceedingly cautious* approach.<sup>15</sup>

- Distancing is required for a dual purpose: 1) to reduce footfall by decreasing number of chairs in use; 2) reducing the number of chairs in use allows for further separation of patients, reduction in overall aerosol generation in the clinic, adoption of a checkerboard pattern (where appropriate) which allows for a greater dilution effect of any aerosol due to greater distance and also empty cubicles for either donning or doffing.
- Patients should enter the clinic wearing a fluid resistant surgical mask and eye protection prior to the session beginning. The eye protection should stay *in situ* for the procedure and the mask replaced following completion of the procedure. If there is more than one exit they should then exit the clinic through the closest exit and dispose of the mask and either have the eye protection disinfected or dispose of it.
- Use of rubber dam for all restorative procedures should be considered in order to reduce the amount of saliva within any aerosol generated.
- Dental suction with a wide bore suction tip (ideally greater than 8mm in diameter) provided by an assistant is mandatory to reduce aerosol spread (Holliday et al 2020).<sup>13</sup>
- Dependent on the local environment and ventilation, screening between the chairs can be considered.
- Minimising the use of ultrasonic scalers through more use of hand scaling would be one practical method to increase the relative amount of chair space for AGPs.
- Electric or motor driven handpieces may represent an alternative to air turbine handpieces and may reduce aerosol, but data are not yet available to confirm or refute this.
- All procedures should have an operator, an assistant, and “runners” separate to the operating/assisting team in order to obtain any other equipment or consumables that have not been predicted to be needed in the pre-operative set-up period. The assistant should provide suction throughout the whole of the AGP using a wide bore (not Yankeur or saliva ejector type) aspirator tip.

Fallow times will vary dependent on air change per hour and mitigations employed from the list above. The Scottish short-life working group provides helpful estimations in Appendix 2, Tables 1-4<sup>7</sup> and also explains that the fallow time for the bay begins post cessation of the AGP. For an open plan clinic, it is important

to consider a single clinic finish time and then a fallow time for the whole clinic. During this fallow time, it may be possible to utilise cross-ventilation to maximise clearance but during procedures there is a risk of the turbulence created potentially spreading aerosol in a manner that may be unpredictable.<sup>13</sup> Staff and students should not remove their FFP3 or visor until out of the aerosol area which, dependent on the local clinical environment, may be in safe areas near the exit of the clinic or outside the clinic zone. If the member of staff's visor is contaminated during supervision of one procedure it must be appropriately cleaned prior to moving to any other supervisory act elsewhere on the clinic. Despite the very small risk of SARS-CoV-2 transmission in an open plan clinic if the above procedures are followed, it is possible to further enhance risk mitigation by redirecting patients who are at extremely high risk of severe COVID-19 illness to closed clinical environments. A system for identifying and redirecting these patients should be established in the local institution.

## Clinical Supervision in the Open Plan Clinic Environment

Clinical supervisors are required to supervise dental treatment carried out in a clinical bay environment. The open clinic differs from a single surgery environment and given the requirement for supervisors to move from chairside to chairside, infection control and PPE protocols need to ensure that the level of PPE is appropriate for the procedure being supervised and that the risk of cross-contamination is reduced to as low as practicable.

### *Hand Hygiene*

Washing hands thoroughly with soap and water for at least 20 seconds, is essential to reduce the transmission of infection.<sup>15</sup> All clinical staff, students and patients/carers should wash their hands or decontaminate their hands with alcohol-based hand rub (70% ethyl alcohol) when entering and leaving the dental facility.<sup>16</sup>

All clinical staff must have performed handwashing (washing from elbow down to hand) immediately before every episode of direct patient care and after any activity or contact that potentially results in hands becoming contaminated, including donning and doffing PPE.

If arms are bare below the elbows and not covered by a fluid resistant long sleeved

gown, hand washing should be extended to include both forearms (washing from elbow down to hand). Wash the forearms first and then wash the hands.

### *Uniforms and Work Wear*

It is best practice to change into and out of uniforms at work and not wear them when travelling; this is based on public perception rather than evidence of an infection risk.

Uniforms and work wear should be transported home in a disposable plastic bag or washable laundry bag. The plastic bag should be disposed of into the household waste or the laundry bag simply placed into the washing machine with the uniform inside. Uniforms and work wear should be laundered: separately from other household linen, in a load not more than half the machine capacity and at the maximum temperature the fabric can tolerate, then ironed or tumble-dried.

### *PPE*

The appropriate level of PPE required is dependent on the activity being carried out and whether the treatment includes aerosol generating procedures (AGPs) or not. Sessional use of certain single use PPE items should be determined only following significant disruption to local level supply chains.<sup>17</sup>

Gloves must be:

- Worn during every patient contact or procedure
- Changed immediately after each patient and/or after completing a procedure/task
- Never decontaminated with Alcohol Based Hand Rub (ABHR) or soap between use

Plastic aprons must be:

- Worn during every patient contact
- Changed immediately after each patient and/or after completing a procedure/

task

- Forearms should be washed prior to handwashing if apron does not have sleeves

Fluid resistant full length gowns, or sleeved aprons, or coveralls must be:

- Worn when undertaking aerosol generating procedures
- Worn when a disposable apron provides inadequate cover for the procedure or task being performed
- Changed between patients/individuals and immediately after completing a procedure or task unless sessional use is advised due to local/national data

Eye or face protection (full-face visors) must:

- Be worn during all dental procedures including AGPs and during direct supervision or intervention if blood and/or body fluid contamination to the eyes or face is anticipated or likely
- Not be substituted by regular corrective spectacles, which are not considered eye protection
- Not be impeded by accessories such as piercings or false eyelashes
- Not be touched when being worn

A fluid resistant surgical face mask (FRSM Type IIR) must:

- Be worn during all non-AGP dental procedures, direct supervision or intervention
- Be worn when 2 metre social distancing is not possible, for example during clinical patient-based or mannikin-based teaching
- Be well-fitting and fit for purpose, fully cover the mouth and nose (manufacturers' instructions must be followed to ensure effective fit and protection)
- Not touched once put on or allowed to dangle around the neck
- Be replaced if damaged, visibly soiled, damp, uncomfortable or difficult to breathe through

FFP3 respirator masks are used to prevent inhalation of small airborne particles arising from AGPs and must:

- Be worn when undertaking, assisting with or directly intervening in any AGP
- Not be allowed to dangle around the neck of the wearer after or between each use
- Not be touched once put on
- Be removed outside the AGP area
- Be either single use or single session use (disposable or reusable) and fluid-resistant
- Be covered by a full face shield if undertaking or directly supervising an AGP
- Be fit tested for the relevant model to ensure an adequate seal or fit (according to the manufacturer's guidance). Fit checking (according to the manufacturer's guidance) is necessary when a respirator is put on (donned) to ensure an adequate seal has been achieved
- Be compatible with other facial protection used (protective eyewear) so that this does not interfere with the seal of the respiratory protection
- Be discarded and replaced and NOT be subject to continued use if the facial seal is compromised, it is uncomfortable, or it is difficult to breathe through

Where fit testing of a particular type of FFP3 respirator mask fails, suitable alternative equipment must be provided.

Reusable respirators can be utilised by individuals if they comply with HSE recommendations. Reusable respirators should be decontaminated according to the manufacturer's instructions.

## Summary

With appropriate and planned mitigations in place it is possible to return to the open plan clinical environment and undertake both non-aerosol and aerosol generating procedures.

Investment will be required to allow the required mitigations to be implemented across all UK and Irish Schools.

This is a live document and will be updated as evidence emerges.

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