NHS Education for Scotland

Scottish Dental Clinical Effectiveness Programme

Mitigation of Aerosol Generating Procedures in Dentistry

A Rapid Review

Version 1.0

25 September 2020

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Version history

Version	Date	Summary of changes
V1.0	25/09/2020	First publication

Contents

Summary

SDCEP has conducted a rapid review of the evidence related to the generation and mitigation of aerosols in dental practice and the associated risk of transmission of SARS-CoV-2. A process of considered judgment of this evidence, assessed in the context of the balance of benefits and harms, acceptability and feasibility of the proposed intervention, has been used to reach agreed positions. **It is important to stress that this document does not have the status of guidance.** It is provided primarily for use by policy makers and those who are developing clinical guidance relevant to dental care delivery during the COVID-19 pandemic.

This summary lists the Agreed Position Statements provided within the main text of the document. The summary is not comprehensive and for a full appreciation of the Agreed Position Statements, the basis for making them and other points for consideration, it is necessary to read the full document.

Aerosol generating procedures [Refer to Section 3]

Aerosol particles <5 µm present an increased risk of respiratory infection transmission. The Working Group agreed to categorise dental procedures into three groups according to the characteristics of the instruments used and assumptions regarding aerosol generation.

Group A procedures use powered, high velocity instruments that emit or require water or irrigants for cooling. These procedures will produce aerosol particles <5 µm and require airborne transmission-based precautions, procedural mitigation and fallow time.

Group B procedures use powered, low velocity instruments. These procedures may produce aerosol particles <5 µm, with the amount depending on instrument use, and require procedural mitigation and standard infection prevention and control precautions as routinely used in dentistry.

Group C procedures do not use powered instruments. These procedures may produce splatter but are unlikely to produce aerosol particles <5 µm, and require standard infection prevention and control precautions as routinely used in dentistry.

Examples of instruments/procedures that fall into each group are given in Table 3.1.

Procedural mitigation [Refer to Section 4]

Procedural mitigations have been proposed as patient-level interventions to reduce the potential risk of SARS-CoV-2 transmission from dental aerosols. Several procedural mitigations have been reviewed by the Working Group and the Agreed Position Statements for each are listed below.

High volume suction

The Working Group's agreed position is that the use of high volume suction **is recommended** to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

Rubber dam

The Working Group's agreed position is that the use of rubber dam **is recommended** to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

Summary

Pre-procedural mouth rinses

The Working Group's agreed position **is to not recommend*** the use of pre-procedural mouth rinses to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

Antimicrobial coolants

The Working Group's agreed position **is to not recommend*** the use of antimicrobial coolants to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

Environmental mitigation [Refer to Section 5]

Environmental mitigations have been proposed as surgery-level interventions to reduce the potential risk of SARS-CoV-2 transmission from dental aerosols. As effective ventilation is the primary means of the dispersal of aerosols, all dental care providers are strongly encouraged to consider the need for modifications to dental surgery ventilation to meet the requirements of current UK healthcare guidance and legislation.

Fallow time and air cleaners have been reviewed by the Working Group and the Agreed Position Statements for each are listed below.

Fallow time

The Working Group's agreed position is that a pragmatic fallow time **is recommended** to reduce the potential risk of SARS-CoV-2 transmission associated with treatment that involves a Group A dental procedure.

A proposed scheme for determining fallow times for Group A dental procedures is presented in Figure 5.1 and incorporates:

- an assumption that high volume suction is standard practice for most Group A procedures;
- a benchmark fallow time, dictated by ventilation rate, of 15-30 minutes;
    - when ventilation is poor and suction is not used, this time is longer (up to 60 minutes).
- a modest reduction in fallow time (e.g. by 5 minutes) with use of high-volume suction, rubber dam and short aerosol generation;
- a minimum fallow time of 10 minutes (the time required to allow larger droplets to settle before environmental cleaning).

Air cleaners

The Working Group's agreed position **is to not recommend*** the use of air cleaners to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

*Agreed positions 'to not recommend' an intervention are conditional statements. These interventions are not recommended for universal adoption in practice but some practitioners might choose to use them after careful consideration of all relevant factors, as detailed in Sections 4 and 5.

1 Introduction

The emergence of the novel coronavirus disease 2019 (COVID-19) caused by the highly infectious SARS-CoV-2 virus at the end of 2019 led the World Health Organisation (WHO) to declare a global pandemic on 11 March 2020.[1] The introduction of public health control measures by many governments led to severe curtailment of the delivery of dental health services. The initial peak of COVID-19 cases in the UK occurred in April 2020, and since June 2020 there has been a partial remobilisation of dental services.

Dental care providers have worked hard to introduce major modifications to their standard operating procedures, for example pre-visit triaging and patient scheduling to manage footfall within premises. Due to ongoing uncertainty about the risk of transmission of SARS-CoV-2 from dental treatments that generate aerosols (aerosol generating procedures [AGPs]), the number and range of treatments that can be delivered remain significantly reduced.

There has been a tendency to assume the same risk for all AGPs across healthcare, when in fact the nature of aerosol generation and mitigations already in place before the COVID-19 pandemic vary widely across medical and dental settings. Other than personal protective equipment (PPE), which is not within the scope of this review, the mitigation which causes the most concern for dental professionals in the UK is the requirement for a fallow time between patients following a clinical procedure that involves an AGP.

Given the concerns regarding AGPs and their mitigation in dental health care, SDCEP initiated a rapid review of the evidence related to the generation and mitigation of aerosols in dental practice and the associated risk of transmission of SARS-CoV-2. The aim of this rapid review was to identify and appraise the evidence related to several pre-determined key questions about AGPs in dentistry and to use a process of considered judgment of this evidence and other relevant factors to reach agreed positions that may be used to inform policy and clinical guidance. For more information on the scope of this review, refer to the SDCEP website (www.sdcep.org.uk).

To conduct this review, SDCEP convened a multidisciplinary Working Group comprising subject specialists from disciplines including particle physics, aerobiology and clinical virology, in addition to those performing multiple roles within dentistry. Representatives from all four of the devolved UK nations participated in the work of the Group. The Working Group was supported by a methodology team that undertook the literature searches, evidence appraisals and summaries. The considered judgement process was modelled on the GRADE evidence-to-decision framework[2] and took into account the available evidence assessed in the context of risk, benefits and harms. The agreed positions for each of the key questions, and a narrative that provides context and proposals to support implementation, are presented in this document. Further details about SDCEP and the methodology employed for this rapid review are provided in Appendix 1.

It is important to stress that this document does not have the status of guidance. Instead, the agreed position statements and the considered judgements on which they are based are made freely available internationally for use by policy makers and those who are developing clinical guidance relevant to dental care delivery during the COVID-19 pandemic. This rapid review will also be of interest to dental professionals in all settings, those in training, dental educators and patients.

The agreed position statements presented in this document are based on the evidence available at the time of publication. In view of the constantly evolving situation, this is a living document and the Working Group will continue to meet as necessary to assess new evidence to maintain currency of the document.

2 The COVID-19 Pandemic - Risk and Impact on Dental Care

During the early stages of the COVID-19 pandemic, the focus was on the management of the COVID-19 caseload and reducing transmission. This has impacted on the delivery of routine health and dental care, leading to service reductions and other indirect consequences. This section considers the risks posed by COVID-19 to the dental team and patients and the impact of COVID-19 on dental services and patient care.

2.1 Risk

A risk is defined as the chance that something hazardous will not be contained, leading to harm or injury. Risk probabilities can be hard to determine objectively in the real world where a number of interacting factors are at play. However, to contextualise the risks associated with COVID-19 transmission in a dental surgery, it is worth considering a calculation based on the community prevalence of SARS-CoV-2 infection, which at time of writing is relatively low (see Section 2.2.1).

Patients who contact dental services for care are screened to minimise the attendance of those who have COVID-19. However, some asymptomatic patients may not be identified by screening. Recent evidence suggests that approximately 20% (95% CI 17-25%) of SARS-CoV-2 infections are asymptomatic,[3] which at a community infection level of 25 per 100,000 approximates to 1 in 20,000 individuals. Appendix 2 presents risk estimates at higher and lower levels of community infection. Additionally, some patients could be pre-symptomatic but there are currently no reliable estimates.

Only a small proportion of asymptomatic carriers would require concurrent dental treatment that entails an aerosol generating procedure. Therefore, the conditional probability of an unrecognised infected patient receiving dental treatment that generates an aerosol is even lower. Effective testing and tracing systems should also reduce the risk of an asymptomatic patient attending for treatment. Moreover, the risk to the dental team will be mitigated by the use of appropriate PPE.

These risks can be anchored using the verbal, fractional and community-based classification proposed by Calman and Royston (see Table 2.1.).[4] Following this scheme, the risk of an asymptomatic patient attending for dental treatment would likely be considered as 'very low' risk.

Table 2.1 Description of risk*

Risk Description	Percentage	Fraction	Community
High	1	More than 1 in 100	Street
Moderate	0.1	1 in 100 to 1 in 1000	Village
Low	0.01	1 in 1000 to 1 in 10,000	Small town
Very Low	0.001	1 in 10,000 to 1 in 100,000	Large town
Minimal	0.0001	1 in 100,000 to 1 in 1,000,000	City
Negligible	0.00001	Less than 1 in 1,000,000	Province or Country

*Adapted from Calman and Royston[4]

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2.2 Underlying SARS-CoV-2 risk

Current data indicate that, of those who develop COVID-19 symptoms, 40% have mild symptoms without hypoxia or pneumonia, 40% have moderate symptoms and non-severe pneumonia, 15% have significant disease including severe pneumonia, and 5% experience critical disease with life-threatening complications.[5] A recent estimate of the case fatality rate in England is 1.5%.[6] People over the age of 70 and those with a range of chronic diseases are at greater risk, as are people from Black, Asian and minority ethnic (BAME) groups and those from lower socio-economic backgrounds.[7]

When considering the potential risks posed to the dental team and patients by SARS-CoV-2, there are a number of important considerations related to the virus that should be taken into account:

1. The prevalence of COVID-19 and transmission rate.
2. The level of SARS-CoV-2 present in the mouth and saliva.
3. The amount and viability of SARS-CoV-2 present in dental aerosols.

2.2.1 Prevalence of COVID-19 and transmission rate

The number of COVID-19 cases in the population varies across countries and localities. The WHO provides criteria for the number of COVID-19 cases, as does the UK. While the UK's virus alert level does not map directly to the WHO criteria, they are compared in Table 2.2.

Table 2.2 Comparison of WHO criteria and UK coronavirus alert levels

WHO Criteria	UK Coronavirus Alert Levels
No cases: with no confirmed cases	**1.** COVID-19 no longer in the UK
Sporadic cases: with one or more cases, imported or locally detected	**2.** Number of cases and transmission low
Clusters of cases: experiencing cases, clustered in time, geographic location and/or by common exposures	
Community transmission: experiencing larger outbreaks of local transmission defined through an assessment of factors including, but not limited to: • large numbers of cases not linkable to transmission chains • large numbers of cases from sentinel lab surveillance; and/or multiple unrelated clusters in several areas of the country/territory/area	**3.** Virus in general circulation **4.** Transmission is high or rising exponentially **5.** Risk of health services being overwhelmed

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According to data from the COVID Symptom Study (https://covid.joinzoe.com/), on 22 September 2020 the number of self-reported new infections per day in the UK was 11,867, with the daily number of new cases per million across the UK regions varying from 24 to 1184 (2.4 to 118.4 per 100,000). The cumulative numbers of confirmed cases and rates per 100,000, at the time of writing, for the constituent parts of the UK, along with the average of new cases and estimated number of asymptomatic patients, are shown in Table 2.3.

Table 2.3 Number of confirmed COVID-19 cases and rates per 100,000

Country	Total Number of cases[1]	Cumulative Rate per 100,000[1]	Current Average No. cases per 100,000[2]	Estimated Average No. asymptomatic patients per 100,000
England	343,655	610.5	15	3
Northern Ireland	9,466	499.9	42	8
Scotland	24,626	450.8	20	4
Wales	20,878	662.2	24	5

Data accessed 22 September 2020.

[1]https://coronavirus.data.gov.uk/region#category=nations&map=rate; [2]www.bbc.co.uk/news/uk-51768274

The average number of confirmed COVID-19 cases per 100,000 and estimated number of asymptomatic cases is presented at country level in Table 2.3. However, there is considerable variation across and within health and council areas and local level data can be accessed from a range of sources as detailed in Appendix 2. Although at the time of writing the number of new cases of COVID-19 is rising, with a number of clearly recognised 'hotspots', the average for the constituent countries of the UK remains low. Furthermore, the risk of a member of the dental team encountering an asymptomatic patient will remain low until the average number of cases reaches 500 per 100,000 (see Appendix 2).

The accuracy of estimates of prevalence relies upon the accuracy of testing. The current diagnostic test for COVID-19 relies on the detection of SARS-CoV-2 nucleic acid, and is therefore not an indication of infectivity.[8] In addition, as prevalence falls, so does the positive predictive value of the test, with a consequent increase in the proportion of false positives.

On the basis of our current understanding of the transmission of SARS-CoV-2, there has been concern about the potential for dental practices to become sources of COVID-19 superspreading events. These are defined as transmission events where multiple people are infected with the virus. However, of the 1400 super-spreader events listed in a public access database (https://covid19settings.blogspot.com/p/about.html) none have been linked to a dental setting.

The role of asymptomatic cases in transmission has also been highlighted as a concern. At the time of writing there have been no confirmed cases of COVID-19 transmission in the literature linked to dental settings despite the potential risk of transmission in such environments.

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2.2.2 Level of virus present in saliva

A number of studies have detected SARS-CoV-2 in saliva[9,10] and salivary testing has been suggested for diagnosis of SARS-CoV-2 infection.[11,12] SARS-CoV-2 may reach the saliva from the upper and lower respiratory tracts, through the gingival crevicular fluid or via the major and minor salivary glands. Liu et al. demonstrated that epithelial cells of salivary glands have elevated expression of the Angiotensin-Converting Enzyme 2 (ACE2) receptor, which plays a critical role in allowing SARS-CoV-2 to enter cells.[13] A study by To et al. in patients with laboratory-confirmed SARS-CoV-2 infection reported a median salivary load of 3.3×10^6 copies/ml (range 9.9×10^2 – 1.2×10^8 copies/ml) in early morning saliva from the posterior oropharynx, though this does not equate to the amount of viable virus.[14] As the virus is detected in saliva, and droplets are produced when speaking, coughing, sneezing, or even breathing, this presents a potential transmission route.[15,16] Saliva also presents a reservoir for the generation of aerosols that might contain SARS-CoV-2, particularly during the use of high-speed drills and powered scalers.

2.2.3 SARS-CoV-2 and aerosols

While dental aerosols pose a theoretical risk for SARS-CoV-2 transmission, this is a potential risk that is yet to be confirmed. Studies to identify SARS-CoV-2 in aerosols and clinical environments typically use techniques to detect viral RNA. However, this does not equate to infectious particles unless viable virus has been confirmed through isolation and culture.

Van Doremalen et al.[17] demonstrated in an experimental study that the stability of SARS-CoV-2 was similar to that of SARS-CoV-1 under the conditions tested. A similar experimental study reported retained infectivity and virion integrity of SARS-CoV-2 for up to 16 hours in respirable-sized aerosols.[18] While these results from laboratory experiments support the proposal that aerosol transmission of viable virus is possible, neither of these studies took place in a clinical environment. In subsequent correspondence relating to their paper, Judson and van Doremalen highlighted that there was '*insufficient data regarding aerosol-generating medical procedures and SARS-CoV-2*' and this continues to be the case for dental aerosol-generating procedures.[19]

Although modelling suggests that members of the dental team may be at higher risk of COVID-19 infection, due to their close proximity to patients and the potential risks from dental aerosols, observational evidence does not currently support this hypothesis when appropriate personal protective equipment (PPE) is worn. Studies have shown that where healthcare workers wearing appropriate PPE have been exposed to COVID-19 patients, nosocomial transmission has not occurred.[20,21]

2.3 Impact on dental services and patient care

As a consequence of the COVID-19 pandemic, restrictions on dental health service provision across the UK were rapidly implemented. From mid-March, access to routine dental care and secondary care services was severely limited. During this period, some dental professionals were redeployed to support the pandemic response.

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In England a limited return to face-to-face dental care was permitted from 8 June 2020. However, the resumption of a full range of dental care provision, including AGPs, was contingent on risk management by the individual practices and subject to Infection Prevention and Control (IPC) and PPE requirements. In Scotland, a limited range of AGPs could be provided for patients requiring urgent dental care from 17 August 2020, again subject to IPC and PPE requirements. Wales last updated its standard operational procedures (SOPs) for non-COVID-19 patients and the provision of orthodontic treatment on 7 September 2020 and Northern Ireland last updated its operational guidance on 10 September 2020.

2.3.1 Dental services and personnel

Reports in the literature[22-24] identify raised anxiety and stress amongst dental health professionals in relation to three elements: the risk of contracting and transmitting COVID-19, moral injury and financial threats to practice viability. At the time of writing, there is no published evidence of disease transmission in a dental setting, but anxiety is still an issue. Moral injury is anxiety caused by not being able to provide the most appropriate and timely care, due to restrictions in care provision. This is increasingly recognised as a concern among healthcare providers,[25-27] and is also likely to be the case for dental healthcare professionals. Relevant wellbeing resources are being widely promoted.

Reductions in dental patient throughput have had significant financial impact worldwide.[28,29] Whilst financial support has been made available in some areas, concerns about future employment and dental workforce planning remain. The viability of some practices in the UK will be at risk without a return to pre-COVID-19 activity levels and/or structural changes in payment systems for both NHS and private providers. A recent British Dental Association (BDA) survey[30] showed that most practice owners/ principals with a largely private commitment thought it likely or extremely likely they would face financial challenges in the coming year, while nearly half of practices with the highest NHS commitment anticipated financial challenges. Work commissioned by the Chief Dental Officer of England has a more optimistic outlook but recommends a range of support packages.[31]

Given the concern about implementation of a post-AGP fallow time, a focus group of dental professionals was convened to inform this review. Seventy percent of the participants thought it would be challenging to determine a fallow time. The key factors identified included the provision and certification of adequate ventilation in the surgery, determining the effectiveness of suction, using rubber dam, determining the duration of an AGP and appointment scheduling. Eighty two percent of participants thought the implementation of fallow time would be challenging. Several contributory factors were identified, for example, increased burden on dental hygienists and dental therapists (including lack of dental nurse support and reduction and/or changes to working hours), possible reductions in patient turnover, reduced profitability and social distancing.

2.3.2 Patient care

Unsurprisingly, the impact of COVID-19 on the provision of dental care has been considerable. Data from Public Health Scotland's Management Information and Dental Accounting System (MIDAS) demonstrate a pattern of change from before to during the pandemic that is likely to be similar across the UK. In April 2020, the first full month of the UK COVID-19 lockdown, the number of patient contacts per month

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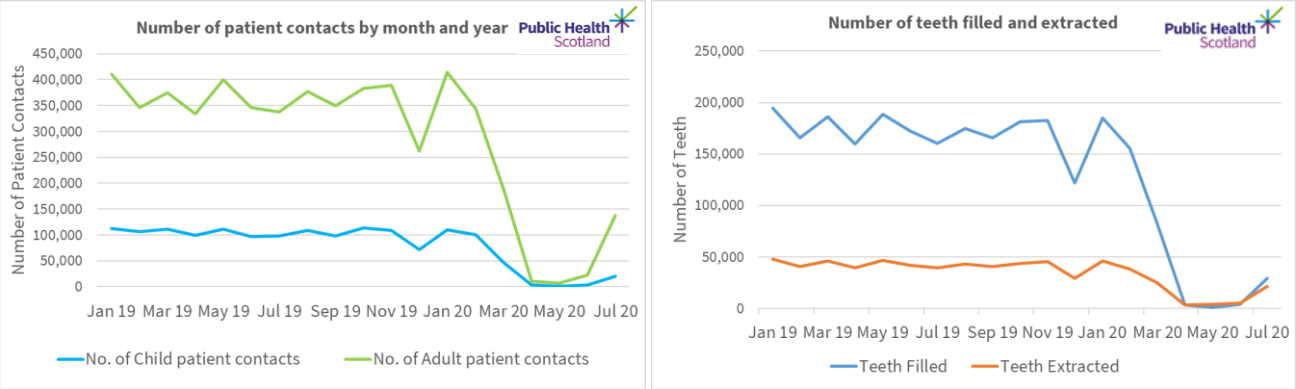
decreased by 97% from the average in the 12 months prior to March 2020 (461,525). Between April 2020 and May 2020, patient contacts fell further before beginning to increase again in June 2020. By July 2020, patient contacts had increased substantially. However, this was still only 34% of the monthly average pre-lockdown (Figure 2.1a).

Figure 2.1 (a) Impact on patient contacts **(b) Impact on restorations and extractions**

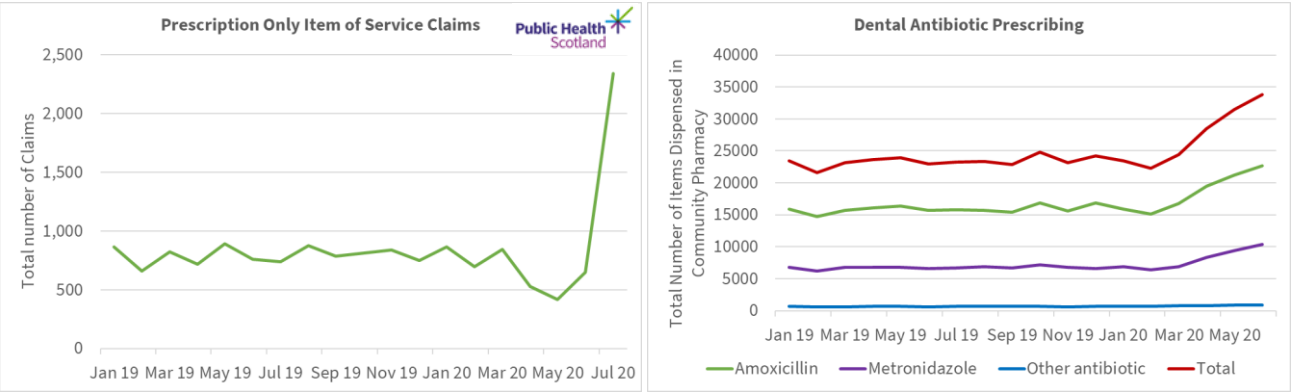


Data supplied by Public Health Scotland

As would be expected, a similar pattern in individual treatments is observed pre- and post-lockdown. However, by July 2020 the number of teeth extracted had risen to 52% of the pre-lockdown monthly average while the number of teeth filled had only reached 17% of the pre-lockdown monthly average (Figure 2.1b).

The average claims for a prescription fee, which can only be made if no other treatment is provided, decreased by 33% in April 2020 from the previous 12 monthly average and decreased further in May 2020. As with other treatments, there was a rise between June and July 2020, with claims for a prescription fee increasing to approximately 300% of the pre-lockdown monthly average (Figure 2.2a).

Figure 2.2 (a) Impact on item of service prescribing **(b) Impact on antibiotic prescribing**



Data supplied by Public Health Scotland (a) and extracted from PRISMS (b)

Data extracted from the Prescribing Information System for Scotland (PRISMS) shows that in the 12 months prior to March 2020, an average of 23,419 antibiotic items were prescribed by NHS primary care dentists and dispensed in community pharmacy in Scotland. The majority were for amoxicillin (68%) or

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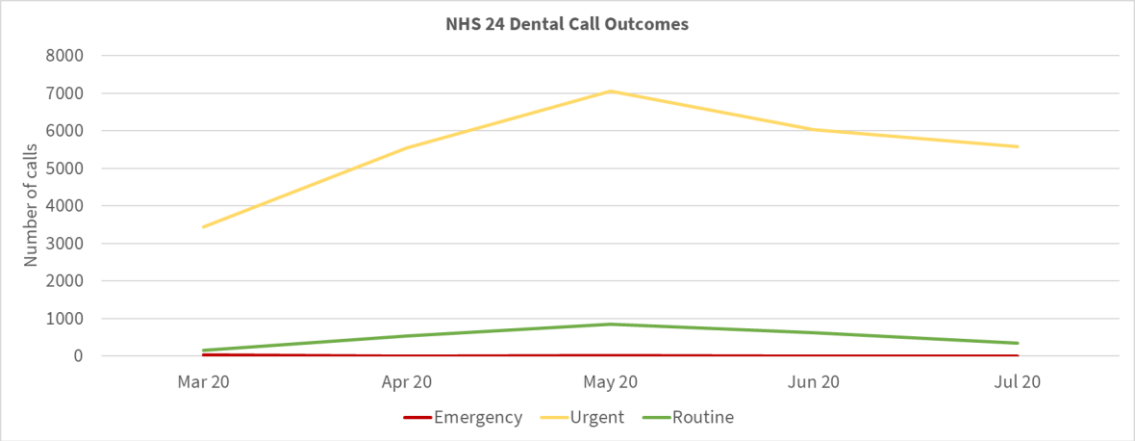
metronidazole (29%). Unlike the number of treatments provided, these prescriptions steadily increased from March 2020, reaching 33,800 in June 2020, a 44% increase from the pre-lockdown monthly average (Figure 2.2b).

A similar picture has been observed across the primary dental care sector in the other UK countries. Specialist referrals to secondary care for dental problems have been adversely affected, and there is particular concern about the reduction of general anaesthetic provision for children and those with special care needs. Activity in dental laboratories has also been severely curtailed.

While direct patient contacts have fallen significantly, in Scotland there has been a 50% increase in calls to NHS24. Data from the Scottish Emergency Dental Services (SEDS) at NHS24 demonstrated an overall increase in call volumes during April and May (Figure 2.3), which represents an increase of 21% and 57% respectively compared with the same time period in 2019 (Figure 2.3).

Figure 2.3 Dental calls to NHS 24



Data supplied by SEDS

Calls have remained at a high level since May 2020, with 82% (range 79-87%) of calls being classified as 'urgent', 7.5% (range 3.8 – 9.6%) being classified as 'routine' and less than 1% classified as 'emergency'.[32]

In a focus group of patients convened to inform this review, around half reported that they had experienced dental problems since March 2020 and had attended a dental appointment either via their own dental practice, an out-of-hours centre or a dental hospital. These participants reported a positive experience, were happy with the treatment provided and chose an antibiotic rather than an extraction if offered. Some were nervous about attending but relaxed once in the surgery when it was evident that there were clear procedures in place to reduce risk. Participants expressed concern over the lack of communication and information about the availability of dental services and treatment limitations. Some reported that they would not be 'in a rush' to attend their dentist unless their oral health was poor, or they were experiencing problems.

3 Aerosol Generating Procedures

3.1 Definitions of aerosol and aerosol generating procedures

An aerosol can be defined as a suspension system of solid or liquid particles in a gas which is usually air.[33] Aerosol particles are created by air currents moving over the surface of a film of liquid; the faster the air, the smaller the particles produced.[34]

Particles are defined by their size:

- Droplets are larger and heavier particles (>5 µm). Droplets can travel up to 1 metre from the source and contaminate surfaces within that range.
- Droplet nuclei are smaller particles (<5 µm) and can stay airborne for long periods of time.

Aerosols are produced by a range of dental procedures as well as by coughing, sneezing and breathing.[33] Routine dental infection prevention and control precautions are sufficient to mitigate against the larger droplets (>5 µm). However, where dental procedures generate aerosols with smaller particles (<5 µm) there may be an increased risk of respiratory infection transmission. These dental procedures have been referred to as aerosol generating procedures (AGPs) and require the use of airborne transmission-based precautions and other mitigation procedures to reduce or remove smaller particles when these might present a risk to health.[35]

The World Health Organization (WHO) defines AGPs as any medical, dental or patient care procedure that results in the production of airborne particles <5 µm in size (aerosols), which can remain suspended in the air, travel over a distance and may cause infection if they are inhaled.[34]

3.2 Categorisation of dental procedures

High energy instruments are most likely to produce smaller particle size aerosols.[33] The limited evidence available indicates that dental procedures that involve the use of high energy instruments, such as high-speed air turbines and ultrasonic scalers, contaminate the air around the dental chair through the production of bioaerosols[36,37] and this is reflected in recent UK national reports.[35,38]

Based on the available evidence, the Working Group agreed to propose three groups of dental procedures that are categorised according to the characteristics of the instruments used and assumptions regarding aerosol generation. These are shown in Table 3.1 in which the precautions required during periods of community transmission, including the PPE recommended in UK national guidance,[39] are also noted. Examples of instruments/procedures that fall into each group are also given. These lists are not exhaustive, but the category definitions can be used to assess in which group a given unlisted instrument/ procedure should be placed.

As the individual circumstances of instrument use for some Group B procedures can vary significantly, further risk assessment by the clinician may be necessary to determine whether additional precautions are required.

3 Aerosol Generating Procedures

Table 3.1 Categorisation of dental procedures according to aerosol production

	Group A	Group B[#]	Group C
	Dental procedures that will produce aerosol particles <5 µm	Dental procedures that may produce aerosol particles <5 µm, with the amount depending on instrument use	Dental procedures that may produce splatter but are unlikely to produce aerosol particles <5 µm
Definition	Procedures that use powered, high velocity instruments that emit or require water or irrigants for cooling	Procedures that use powered, low velocity instruments	Procedures that do not use powered instruments
Precautions	• Airborne transmission-based precautions • Procedural mitigation • Fallow time	• Standard infection prevention and control precautions as routinely used in dentistry • Procedural mitigation	• Standard infection prevention and control precautions as routinely used in dentistry
PPE required*	• Single use disposable gloves • Single use gown • FFP3 respirator or hood • Single use or reusable eye/face protection (visor)	• Single use disposable gloves • Single use apron (gown required if risk of spraying/splashing) • FRSM Type IIR mask • Single use or reusable eye/face protection (visor)	• Single use disposable gloves • Single use apron (gown required if risk of spraying/splashing) • FRSM Type IIR mask • Single use or reusable eye/face protection (visor)
Examples of instruments/ procedures	• Ultrasonic scaler (including piezo) • High speed air/electric rotor (i.e. >60,000 rpm) • Piezo surgical handpiece • Air polishers • 3-in-1 syringe (air and water together[†])	• 3-in-1 syringe (air-only/ water-only) • Slow speed/electric handpiece (i.e. <60,000 rpm) • Prophylaxis with pumice (using slow-speed handpiece/prophy cup) • Diathermy • Denture/ortho adjusting using slow-speed handpiece • Surgical implant procedure • Surgical handpiece	• Extraction (using forceps/elevator) • Hand scaling • Inhalation sedation • Impressions • Intraoral radiographs • Local anaesthetic administration • Dental examination without 3-in-1 syringe • Re-cement crown

*From UK IPC guidance,[39] which also includes advice on sessional use.

[†]While 3-in-1 syringe with combined air and water is categorised as Group A, when used very briefly the amount of aerosol produced may be considerably less than that produced by other Group A procedures. Consequently, if a risk assessment establishes that the combined 3-in-1 will only be used very briefly, and no other Group A procedures are planned, the precautions for Group B procedures can be followed.

[#]For some procedures or instruments categorised in Group B, a further risk assessment of exactly how the instrument will be used is required to determine whether to follow the precautions recommended for Group A procedures.

3 Aerosol Generating Procedures

3.2.1 Dental drill speeds

The high velocity air and water streams used to cool rotary or high frequency dental instruments can combine with mucosalivary fluids, with the resulting mixture 'atomised' by the action of the instrument to produce a bioaerosol. While there is considerable dilution of oral fluids by the coolant, aerosol production can be prolonged and could result in exposure to any potentially infective particles.

Several reports conclude that it is high speed dental handpieces that are most associated with contamination via bioaerosol generation.[35,37,40,41] However, none provides a clear indication of what is meant by 'high speed'. A recent unpublished study, carried out in a simulated dental setting, measured aerosol generation by rotational dental instruments operated under different conditions.[42] Atomisation was visualised using high speed imaging and broadband or monochromatic laser light-sheet illumination. The study found that aerosol production by dental handpieces is extremely complex and dependent on multiple factors including speed of rotation, mixing of air and water, method of coolant delivery, type of bur used and position of the high volume suction tip. Although complex, it was observed that the use of instruments at speeds of less than 80,000 to 100,000 rpm appears to reduce the risk of atomisation significantly, and at less than 60,000 rpm leads to minimal aerosol production.

Informed by these observations, high speed air or electric rotors operating at speeds greater than 60,000 rpm have been categorised in Group A, and procedures using handpieces operating at speeds less than 60,000 rpm categorised in Group B. A cut-off of 60,000 rpm between the categories was considered to be a suitable precaution that allows for variation in instruments, handpiece use, type of bur etc. and the complexity of factors affecting aerosol generation.

3.2.2 3-in-1 syringe

The categorisation of 3-in-1 syringe use within aerosol generating procedures is widely debated. Five studies[43-47] that investigated the relative levels of contamination resulting from use of the 3-in-1 syringe compared to the use of other dental instruments indicate that the combined air-water spray can, under the conditions tested, produce contaminated splatter and aerosol in similar ranges to a high speed handpiece. Use of the 3-in-1 syringe with either air-only or water-only resulted in lower levels, with water-only causing the least contamination.

The evidence from these studies is likely to be of low certainty overall, due to study limitations, imprecision from small sample sizes reported in single studies and indirectness in relation to measures of aerosol contamination. Notably, in most of the studies, the levels of contamination produced by each instrument were compared as rates, which does not take into account the length of time that the different instruments would typically be used for in dental practice. Therefore, actual levels of contaminated aerosol generated by brief use of a 3-in-1 syringe could be considerably less than from the longer use of a high speed handpiece. Furthermore, in practice, these instruments are likely to be used with high volume suction which will significantly reduce the levels of contaminated aerosol.

Consequently, 3-in-1 syringe with air and water used together is categorised here as a Group A procedure, unless established through a risk assessment that it will only be used very briefly, in which case the same precautions as for Group B procedures can be followed. Use of a 3-in-1 syringe with air-only or water-only are categorised in Group B, reflecting the available evidence.[45-47]

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There are various interventions within dentistry, such as suction and rubber dam, that may have an important role in reducing the volume of bioaerosol generated during dental procedures and/or reducing the level of viral contamination in the bioaerosol. These procedural mitigations can be implemented at an individual patient level and they may reduce the potential risk of SARS-CoV-2 transmission from dental bioaerosols.

The scope of this rapid review included one question related to procedural mitigation.

What current mitigation procedures, alone or in combination and in addition to PPE, are most effective for reducing the risk associated with dental AGPs?

The mitigation procedures considered by the Working Group were high volume suction, rubber dam, pre-procedural mouth rinses and antimicrobial coolants. A variety of other technologies are available but were not considered by the Working Group at this time due to insufficient evidence from clinical studies.

4.1 High volume suction

High volume suction comprises an intra-oral suction device fitted to an evacuation system which can draw a large volume of air within a short period of time. Citing BS EN ISO 10637, HTM 2022 defines the air flow rate for a dental high volume system as a vacuum system with an air intake of more than 250 l/min at the largest bore operating hose.[48] High volume suction units are fitted with a tip of at least 8 mm in diameter attached to an evacuation system; saliva ejectors are not considered high volume suction due to their small apertures. A recent rapid review of international dental guidance documents[49] found that a majority (73%) recommend the use of high volume suction for non-COVID patients. However, only 10% of these documents cite sources in support of the recommendation.

Evidence summary and appraisal

The evidence considered by the Working Group, based on six studies in one Cochrane Review which looked at interventions to reduce contaminated aerosols produced during dental procedures,[50] provides no clear indication that high volume suction reduces the potential SARS-CoV-2 risk associated with dental AGPs. The included studies measured bacterial contamination of sample plates at various distances from the patient's oral cavity, some of which were placed very close to the patient and therefore may have captured contamination from airborne droplets or splatter. The devices used to provide high volume suction also varied between studies and there was very limited information on the level of suction applied. Of the four comparisons in the review relevant to high volume suction, only one demonstrated a significant reduction in aerosol contamination compared to control when measured at a distance of less than twelve inches from the patient's oral cavity.

The evidence presented in the review was rated by the authors as very low certainty, due to heterogeneity, risk of bias, small sample sizes and wide confidence intervals. In addition, the evidence is indirect as the included trials measured reduction in bacterial contamination of aerosols rather than viral contamination.

A rapid review performed as part of a technical report on *Ventilation, water and environmental cleaning in dental surgeries relating to COVID-19*[38] noted that it is difficult to determine the effect of high volume

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suctioning on aerosol reduction and concluded that '*high volume suctioning appears to significantly reduce bacterial air contamination in close proximity to the procedure, however, its effect on aerosols is challenging to extract from the evidence base*' and '*very weak evidence suggests that there may be a high reduction of aerosol dissemination through use of suctioning (80-90%)*'.

Very recent, as yet unpublished research indicates that suction reduces contamination from a simulated aerosol generating procedure at air intake rates as low as 40 l/min, which is well below the definition for high volume suction.[51]

Considered judgement and agreed position

While the evidence supporting the use of high volume suction to reduce the risk associated with dental AGPs is very low certainty, the use of suction does have other benefits (e.g. saliva/debris removal, airway protection) and is standard practice in dentistry. No adverse events were reported in the Cochrane Review[50] and no specific groups for whom high volume suction is likely to be problematic were identified. However, for some individuals, suction may itself induce a gag reflex. Therefore, an individual risk assessment to identify such patients may be necessary.

High volume suction has a number of variables and is both equipment and operator sensitive. While suction is available in all dental practices, there may be practices where the existing 'high volume suction' does not meet the required standard and additional costs may be involved in upgrading facilities to meet these. There are also ongoing costs associated with assessing and calibrating the level of suction, and servicing of the suction equipment, although these costs are unlikely to be additional as use of suction is standard practice.

Following consideration of these factors, the Working Group reached an agreed position:

Agreed Position Statement

The Working Group's agreed position is that the use of high volume suction is recommended to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

This agreed position is based on very low certainty, indirect evidence in favour of high volume suction, insignificant risk of harm, and as a standard current practice, high volume suction is known to be acceptable and feasible.

Implementation Points

- Whenever possible, high volume suction should be used for dental procedures which will produce splatter, droplets or aerosol.
  - High volume suction may not be suitable for certain dental procedures (e.g. biopsy) and some patients (e.g. those with a strong gag reflex).
  - Use of high volume suction might contribute to a reduction in fallow time following a Group A dental procedure.

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- Dental nurse support is necessary to ensure the correct use of high volume suction.
- It is important that suction equipment is maintained according to manufacturer's instructions, is operating effectively and that the suction tip is positioned correctly throughout the procedure.

4.2 Rubber dam

Rubber dam is used during restorative dentistry to isolate the treatment zone from saliva and to protect the patient's airway. Placing rubber dam is within the scope of practice of dental nurses (with additional training), dental hygienists, dental therapists and dentists. However, for some dental procedures, such as sub-gingival restorations, using rubber dam is not feasible. It is also not possible to use rubber dam for periodontal treatment or oral hygiene procedures. A recent rapid review of international dental guidance documents[49] found that a majority (73%) recommend the use of rubber dam for non-COVID patients. However, only 10% of the documents cite sources in support of the recommendation.

Evidence summary and appraisal

The evidence considered by the Working Group, based on five studies in one Cochrane Review which looked at interventions to reduce contaminated aerosols produced during dental procedures,[50] indicates that rubber dam may reduce the potential SARS-CoV-2 risk associated with dental AGPs. The included studies measured bacterial contamination of sample plates at various distances from the patient's oral cavity, some of which were placed very close to the patient and therefore may have captured contamination from airborne droplets or splatter. Of the comparisons in the review relevant to rubber dam, two demonstrated significant reductions in aerosol contamination compared to control, one did not demonstrate a significant difference and the final comparison suggested that rubber dam was inferior to a combined intra-oral isolation and suction device.

The evidence presented in the review was rated by the authors as very low certainty due to risk of bias, small sample sizes, wide confidence intervals and significant heterogeneity. In addition, the evidence is indirect as the included trials measured reduction in bacterial contamination of aerosols rather than viral contamination.

A rapid review performed as part of a technical report on *Ventilation, water and environmental cleaning in dental surgeries relating to COVID-19*[38] noted that there is limited evidence to suggest that rubber dam may reduce bacterial air contamination, with greater reductions observed at distances close to the patient. The authors note that contamination within one metre of the patient may include both aerosol and airborne droplets, with results observed at greater distances more accurately representing aerosol reduction, and concluded that '*there is very limited evidence to suggest that use of rubber dam may reduce bacterial air contamination by approximately 70% at two metres from the source.*'

Considered judgement and agreed position

While the evidence to support the use of rubber dam to reduce the risk associated with dental AGPs is very low certainty, the use of rubber dam does have other benefits (e.g. protection of airway and soft tissues, provision of dry field) and is considered best practice in restorative dentistry. However, rubber dam is only

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appropriate for certain dental procedures and cannot be applied universally. No adverse events were reported in the Cochrane Review.[50] However, there are patients who are unable to tolerate rubber dam (e.g. some patients with learning disabilities or claustrophobia). Although use of the term 'rubber dam' suggests a risk of latex-related allergy/anaphylaxis, most of the materials currently used are latex-free and unlikely to cause an allergic reaction.

Use of rubber dam is highly operator sensitive, and dental professionals who have not used it routinely in the past or recently may require additional training in rubber dam placement and removal. If incorrectly removed, rubber dam may introduce additional risk due to the presence of potentially infectious secretions on the reverse side. There are unlikely to be large costs associated with implementing rubber dam for those patients and procedures for which it is appropriate. However, there are some concerns about the environmental impact of the increased use of single use items.

Following consideration of these factors, the Working Group reached an agreed position:

Agreed Position Statement

The Working Group's agreed position is that the use of rubber dam is recommended to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

This agreed position is based on very low certainty, indirect evidence in favour of rubber dam, with benefits outweighing harms. Use of rubber dam is likely to be acceptable for most patients and feasible with sufficient training and experience.

Implementation Points

- Whenever possible, rubber dam should be used for restorative dental procedures which will produce splatter, droplets or aerosol.
  - Rubber dam may not be suitable for certain dental procedures (e.g. restorations at gingival margin, periodontal treatment) and some patients (e.g. some patients with learning difficulties or those with claustrophobia).
  - Use of rubber dam might contribute to a reduction in fallow time following a Group A dental procedure.
- Careful removal of rubber dam is important to minimise the risk of contamination from patient saliva/secretions on the reverse side.
- If rubber dam has not been used routinely, it might be necessary to explain to patients why it is now being used.
- Use of rubber dam which is latex-free is preferable.
  - If you intend to use latex-containing rubber dam, a thorough allergy history is required to identify latex allergy (N.B. allergy to bananas, kiwi, avocado are related to latex allergy and latex-containing rubber dam should not be used for these patients).
- Correct use of rubber dam may require additional training and regular practice.

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4.3 Pre-procedural mouth rinses

Pre-procedural antimicrobial mouth rinses such as povidone iodine and hydrogen peroxide have been suggested as interventions to reduce levels of SARS-CoV-2 in saliva due to their oxidative properties. A majority (82%) of international dental guidance documents recommend the use of pre-procedural mouth rinse.[49] However, only 10 of the 63 documents cite sources in support of the recommendation, while two of the documents recommend a mouth rinse despite indicating there was no evidence of effectiveness.

Evidence summary and appraisal

The evidence, based on four systematic reviews,[52-55] a literature review[56] and three *in vitro* studies,[57-59] does not provide a clear indication that pre-procedural mouth rinses reduce the potential SARS-CoV-2 risk associated with dental AGPs. Two systematic reviews found moderate certainty evidence that pre-procedural mouth rinses can reduce bacterial contamination from aerosols generated by dental procedures.[54,55] However, none of the included studies measured viral contamination or transmission. Two additional systematic reviews that searched for studies reporting on the effect of mouthwash on COVID-19 transmission or on levels of SARS-CoV-2 in saliva or aerosols did not find any relevant studies.[52,53] Three *in vitro* studies provide some support for the antiviral activity against SARS-CoV-2 of certain mouth rinses.[57-59] However, there is a lack of direct evidence for their clinical effectiveness or substantivity in reducing SARS-CoV-2 levels in saliva or dental aerosols.

The clinical evidence from the systematic reviews is of very low certainty due to risk of bias and indirectness, with the clinical trials measuring reduction in bacterial contamination of aerosols rather than viral contamination.

A rapid review performed as part of a technical report on *Ventilation, water and environmental cleaning in dental surgeries relating to COVID-19*[38] noted that while there is evidence that some pre-procedural mouth rinses reduce numbers of viable bacteria in saliva, this cannot be extrapolated to viricidal activity. They also note that a key limitation of this mitigation procedure is that potentially infectious saliva will be continually produced by the patient and therefore any viricidal effects are likely to be short-lived.

Considered judgement and agreed position

The potential benefit of pre-procedural mouth rinse in reducing SARS-CoV-2 risk from dental procedures will be for the dental professionals and possibly other patients attending the surgery, rather than directly for the patient using the mouth rinse. This could complicate and therefore lengthen the consent process. However, patients often appreciate additional measures to reduce risk and may perceive a benefit from use of mouth rinses for themselves and others, even if there is no evidence for this.

No adverse events were reported in the systematic reviews and studies considered. However, some mouth rinses are associated with a risk of irritation, allergic reaction or anaphylaxis and the rinsing process may itself cause contamination. Another concern is the potential for disruption of the normal oral microbiota. Certain mouth rinses carry specific risks such as the risk of excess iodine ingestion from iodine-containing solutions or staining of teeth with chlorhexidine. Some are contraindicated in certain patient groups (e.g. povidone iodine is not recommended during pregnancy or for patients with active thyroid disease, those

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undergoing radioactive iodine therapy or those with iodine allergy). Some patients may also object to the unpleasant taste of some mouth rinses.

There are likely to be some material costs directly associated with using mouth rinses, as well as indirect costs linked to time required for the consent process and dealing with potential adverse reactions. There may also be issues around the availability of certain mouth rinses.

Following consideration of these factors, the Working Group reached an agreed position:

Agreed Position Statement

The Working Group's agreed position is to not recommend the use of pre-procedural mouth rinses to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

Although there is very low certainty evidence of effect, the possible harms of pre-procedural mouth rinses marginally outweigh the potential benefits. While the use of pre-procedural mouth rinses is likely to be acceptable, the various practical difficulties reduce the feasibility of their use. Consequently, the agreed position is to not recommend pre-procedural mouth rinse for the purpose of reducing the potential risk of SARS-CoV-2 transmission. However, this agreed position is conditional rather than strong due to the close balance between benefits and harms. Therefore, some dental teams and patients may choose to use a pre-procedural mouth rinse.

N.B. If a pre-procedural mouth rinse is used, valid consent must be obtained. Antimicrobial mouth rinses are contraindicated in some patient groups and a thorough medical history is required to identify these individuals. Povidone iodine is not recommended during pregnancy or for patients with active thyroid disease, those undergoing radioactive iodine therapy or those with iodine allergy. Chlorhexidine can cause hypersensitivity in some individuals and there have been rare reports of fatal anaphylaxis.

4.4 Antimicrobial coolants

Coolants are used to reduce the temperature of the tooth surface and surrounding tissues when using high speed handpieces or ultrasonic scalers. Antimicrobial coolants are additionally intended to act on the local microflora thereby preventing the contamination of any aerosols produced during dental treatment. The antimicrobial agents are used in solution form and at lower concentrations than would be used in pre-procedural rinses or local irrigation. Note that antimicrobial coolants are distinct from the biocides used to reduce the microbial contamination of dental waterlines.

Evidence summary and appraisal

The evidence considered by the Working Group, based on two studies in one Cochrane Review which looked at interventions to reduce contaminated aerosols produced during dental procedures,[50] indicates that antimicrobial coolants may reduce the potential SARS-CoV-2 risk associated with dental AGPs. The

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two included studies measured bacterial contamination of sample plates at various distances from the patient's oral cavity, some of which were placed very close to the patient and therefore may have captured contamination from airborne droplets or splatter. Comparisons were made between chlorhexidine, povidone iodine, cinnamon extract and distilled water. Chlorhexidine was significantly more effective at reducing aerosol contamination compared to povidone iodine, cinnamon extract and distilled water. Povidone iodine and cinnamon extract were significantly more effective at reducing aerosol contamination than distilled water.

The evidence presented in the review was rated by the authors as very low certainty due to heterogeneity, risk of bias, small sample sizes and wide confidence intervals. In addition, the evidence is indirect as both included trials measured reduction in bacterial contamination of aerosols rather than viral contamination.

Considered judgement and agreed position

Any potential benefit of antimicrobial coolants in reducing SARS-CoV-2 risk from dental procedures will be for the dental professionals and possibly other patients attending the surgery, rather than directly for the patient undergoing the dental procedure. This could complicate and therefore lengthen the consent process.

No adverse events were reported in the systematic review and studies considered. However, some components of antimicrobial coolants are associated with a risk of irritation, allergic reaction or anaphylaxis, although this is based on their use in mouth rinses. Consequently, if a patient with a known allergy requires dental treatment, the coolant would need to be removed from the dental unit waterline. Another concern is the potential for disruption of the normal oral microflora. Certain antimicrobial coolants carry specific risks such as the risk of excess iodine ingestion from iodine-containing solutions or staining of teeth with chlorhexidine. There is also the possibility that antimicrobial coolants could damage dental units/chairs.

There are likely to be some material costs directly associated with using antimicrobial coolants, as well as indirect costs linked to time required for the consent process and dealing with potential adverse reactions.

Following consideration of these factors, the Working Group reached an agreed position:

Agreed Position Statement

The Working Group's agreed position is to not recommend the use of antimicrobial coolants to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

Although there is very low certainty, indirect evidence of effect, the possible harms of antimicrobial coolants outweigh the potential benefits and the Working Group had concerns about the acceptability and feasibility of using antimicrobial coolants. Consequently, the agreed position is to not recommend antimicrobial coolants for the purpose of reducing the potential risk of SARS-CoV-2 transmission.

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Many dental procedures generate splatter, droplets and aerosols of a range of particle sizes.[60] Without new particle sources, a reduction in the number of aerosol particles will take place naturally via a combination of processes, including dilution through air changes, settling, adhesion of particles to surfaces, and coalescence to form larger droplets. Active filtration can also increase the rate of reduction.[33]

Environmental mitigation encompasses the measures that can be implemented at a surgery level to reduce the risk of SARS-CoV-2 transmission from dental bioaerosols and may have an important role that is complementary to the procedural mitigations discussed in Section 4. After procedures that generate aerosols, fallow time is the period allowed for droplets to settle and aerosol to disperse before environmental cleaning commences.

5.1 Ventilation

Dispersion of aerosols that have not been removed by suction is primarily achieved by dilution through air changes. Consequently, the effectiveness of ventilation is the main determinant of fallow time.

UK building regulations recommend whole building ventilation to be 10 l/s/person[61] and current healthcare guidance for new buildings and major refurbishments[62,63] specifies that a treatment room should have at least 10 air changes per hour (ACH). This is also stipulated for a dental treatment room in Scottish Health Planning Note 36 (Part 2 NHS Dental Services in Scotland).[64] A revised version of HTM 03-01 is to be published in late 2020 and is expected to have more exacting requirements that will also apply to dental premises. Therefore, all dental care providers are strongly encouraged to investigate dental surgery ventilation and the modifications that may be necessary to meet the requirements of current UK healthcare guidance and legislation.

5.1.1 Fallow time

The scope of the SDCEP rapid review included the following question related to fallow time.

Following dental treatment using an AGP for COVID-19 and non-COVID-19 patients, how long should the 'fallow period' be before environmental cleaning and seeing the next patient?

A recent rapid review of international dental guidance documents[49] found that less than half (48%) refer to a fallow time. Where a fallow time was recommended, this varied between 2 and 180 minutes and no supporting evidence was cited in these sources. The median fallow time derived from this review is 15 minutes (95% CI: 15 to 30) for "non-COVID-19" patients and 20 minutes (95% CI: 10 to 60) for patients confirmed or believed to have COVID-19. Guidance in the UK recommends a fallow time of approximately 60 minutes for a room of 6 ACH and for 10-12 ACH, a fallow time of 20 minutes is considered pragmatic.[65-67]

Evidence summary and appraisal

A recent systematic review[68] and an additional experimental study[18] indicate that SARS-CoV-2 remains viable in aerosols for several hours but provide no information on the mitigating effect of ventilation or other interventions on virus persistence. These studies were carried out under entirely experimental

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conditions rather than in a clinical environment and provide no information about virus transmission via aerosol.

A technical report entitled *Ventilation, water and environmental cleaning in dental surgeries relating to COVID-19*,[38] published by National Services Scotland (NSS), aimed to review and produce recommendations with respect to ventilation (and associated aspects) within dental practices and treatment rooms in relation to COVID-19, based on the best available evidence and consensus expert opinion. Regarding fallow time, the literature review on which this technical report was based concluded that the evidence base cannot currently support a defined and appropriate fallow time for dental AGPs in the context of the COVID-19 pandemic. Very weak evidence currently suggests that peaks in bacterial dissemination during dental procedures may take approximately 30 minutes to dissipate.[36,69] This is supported by ongoing research being conducted by the National Physical Laboratory,[70] which shows that peaks of particles within a dental surgery (which may or may not have been directly associated with a dental procedure) rarely exceed 15 minutes before returning to baseline.

The COVID-19 pandemic has prompted numerous studies employing diverse methods to investigate the generation and dispersal of aerosols in dental settings, most of which has not yet been peer reviewed, but which may be considered in future updates of this review.

With regard to procedural mitigation, the NSS literature review estimated that rubber dam and high volume suction can achieve dental aerosol reductions of 70% and 80-90% respectively.[38] The more extensive recent Cochrane systematic review[50] also reported reduced contamination with high volume suction and rubber dam (see Section 4).

Within the NSS technical report,[38] theoretical modelling of airborne contaminants was used to predict fallow times at a wide range of air change rates, for AGPs of varying lengths, and with or without procedural mitigation. The modelling makes a number of assumptions, including that all procedures would generate aerosolised virus at the same rate and that aerosols and larger droplets produced by dental procedures will only be removed by dilution. Consequently, the calculated fallow times are likely to represent an overestimate of the actual times required to remove dental aerosols. In addition, the technical report authors acknowledge that they have adopted a precautionary approach. The proposed fallow times are based on the assumption that after any aerosol generating procedure on any patient, there is aerosolised SARS-CoV-2 virus present that needs to be removed, which unless treating confirmed COVID-19 patients is very unlikely to be the case.

The NSS technical report indicates that 10 minutes is necessary to allow droplets (>5-10 µm in diameter) to settle, regardless of air change rate, and that standard infection control precautions, which are well rehearsed in dental practice, are sufficient to mitigate any hazard that these present. The report recommends that AGPs should not be undertaken in surgeries that have no mechanical or natural ventilation or in those that have mechanical ventilation but no immediate access to room data on air changes per hour (ACH). For surgeries that have access to natural ventilation only and no immediate access to room data on ACH, a risk assessment should be carried out to assess suitability of the area for carrying out AGPs.

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The NSS technical report provides information on the potential additional benefit of recirculating air cleaners (air scrubbers) but provides limited formal evidence to support their use (see Section 5.2).

Overall the evidence about the benefits of a fallow time and how fallow times should be determined is very limited.

Considered judgement and agreed position

The NSS technical report rapid review concluded that there is little evidence to inform how long any fallow period should be. The longer the fallow period, the greater the time for aerosol dispersal and the greater the potential risk reduction, which would be beneficial to both patients and dental team members. However, longer fallow times between patients will reduce capacity, patient access and provision of care with an adverse impact on oral health (see Section 2.3). Some practices may not be able to remain viable if capacity is reduced severely for a sustained period. The view of the Working Group was that the balance of desirable and undesirable effects is only considered to be in favour of having a fallow time if that time period is relatively short.

Procedural mitigation to reduce the amount of aerosol includes the use of high volume suction and rubber dam. Minimising the duration of the procedure may also contribute to reducing aerosol. Effective ventilation is the major environmental factor in dissipating aerosols. Currently, for many premises there are practical and financial concerns about the feasibility of reliably determining and maintaining ventilation rates and improving ventilation to reduce fallow time (see Section 2.3). Measuring air change rates accurately is likely to require specialist input and may not be reliable. In any workspace with natural ventilation, air changes will be affected by atmospheric conditions and in all dental surgeries, layout and working practices are likely to lead to periodic variations in ventilation.

There is a theoretical risk for SARS-CoV-2 transmission via dental aerosols which has yet to be confirmed from observational studies. The prevalence of SARS-CoV-2 in the population and the proportion of asymptomatic people at the time of writing means that the likelihood of treating an asymptomatic infected patient is low or very low (see Section 2.1). Certain dental procedures will generate aerosols with significant amounts of <5 µm particles (Group A in Table 3.1). Consequently, applying a fallow time during periods of sustained community transmission should only be necessary as a precaution following Group A dental procedures.

Following consideration of these factors, the Working Group reached an agreed position:

Agreed Position Statement

The Working Group's agreed position is that a pragmatic fallow time is recommended to reduce the potential risk of SARS-CoV-2 transmission associated with treatment that involves a Group A dental procedure.

This agreed position is based on limited observational evidence that aerosols generated from dental procedures disperse within relatively short periods, a lack of evidence about the presence, viability and

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infectivity of SARS-CoV-2 within a dental aerosol and prevalence of COVID-19 at a level that presents a low risk of seeing an asymptomatic COVID patient. This position has been reached using a thorough considered judgment process that takes into account the available evidence assessed in the context of benefits and harms. The Working Group agreed that on balance a fallow time should be implemented but only following Group A dental procedures. In these circumstances, a fallow time might be beneficial but would be acceptable and feasible only if relatively short and straightforward to determine and implement.

The Working Group confirmed that a minimum fallow time of 10 minutes should apply after Group A procedures to include the time required for larger droplets to settle before environmental cleaning. The Group also agreed that dental procedures should not be conducted in a room that has no natural (i.e. a window) or mechanical ventilation.

For Group B and C procedures, the time for larger droplets to settle is accommodated within the standard infection prevention and control precautions as routinely used in dentistry.

This agreed position assumes that the patient has been screened (but not necessarily tested) for COVID-19 (see Appendix 3) and is not suspected to be SARS-CoV-2 positive. It also acknowledges the possibility that the patient could be infected but asymptomatic (see Section 2). Such patients would fall within the UK IPC Medium Risk COVID-19 Pathway.[39]

Proposed fallow time scheme

The Working Group proposes a pragmatic scheme for the application of discrete fallow times on completion of a Group A dental procedure. This approach to fallow time differs significantly from current UK guidance.[65-67] However, this is an evidence-informed, pragmatic proposal that aims to enable implementation of a precautionary fallow time in a manner that is likely to allow dental services to function both safely and at reasonable capacity.

This proposed scheme, as illustrated in Figure 5.1, incorporates:

- an assumption that high volume suction is standard practice for most Group A procedures;
- a benchmark fallow time, dictated by ventilation rate, of 15-30 minutes;
    - when ventilation is poor and suction is not used, this time is longer (up to 60 minutes).
- a modest reduction in fallow time (e.g. by 5 minutes) with use of high-volume suction, rubber dam and short aerosol generation;
- a minimum fallow time of 10 minutes (the time required to allow larger droplets to settle before environmental cleaning).

This scheme for implementing fallow time is an interim proposal that relies on some knowledge of the ventilation rate in the dental surgery. Being uncertain or having a low ventilation rate is not sustainable and therefore it is vitally important that dental care providers investigate the air change rate within each surgery as a matter of urgency. All dental care providers are strongly encouraged to consider the need for modifications to dental surgery ventilation to meet the requirements of current UK healthcare guidance and legislation.[61-64] This might require specialist technical support and financial investment.

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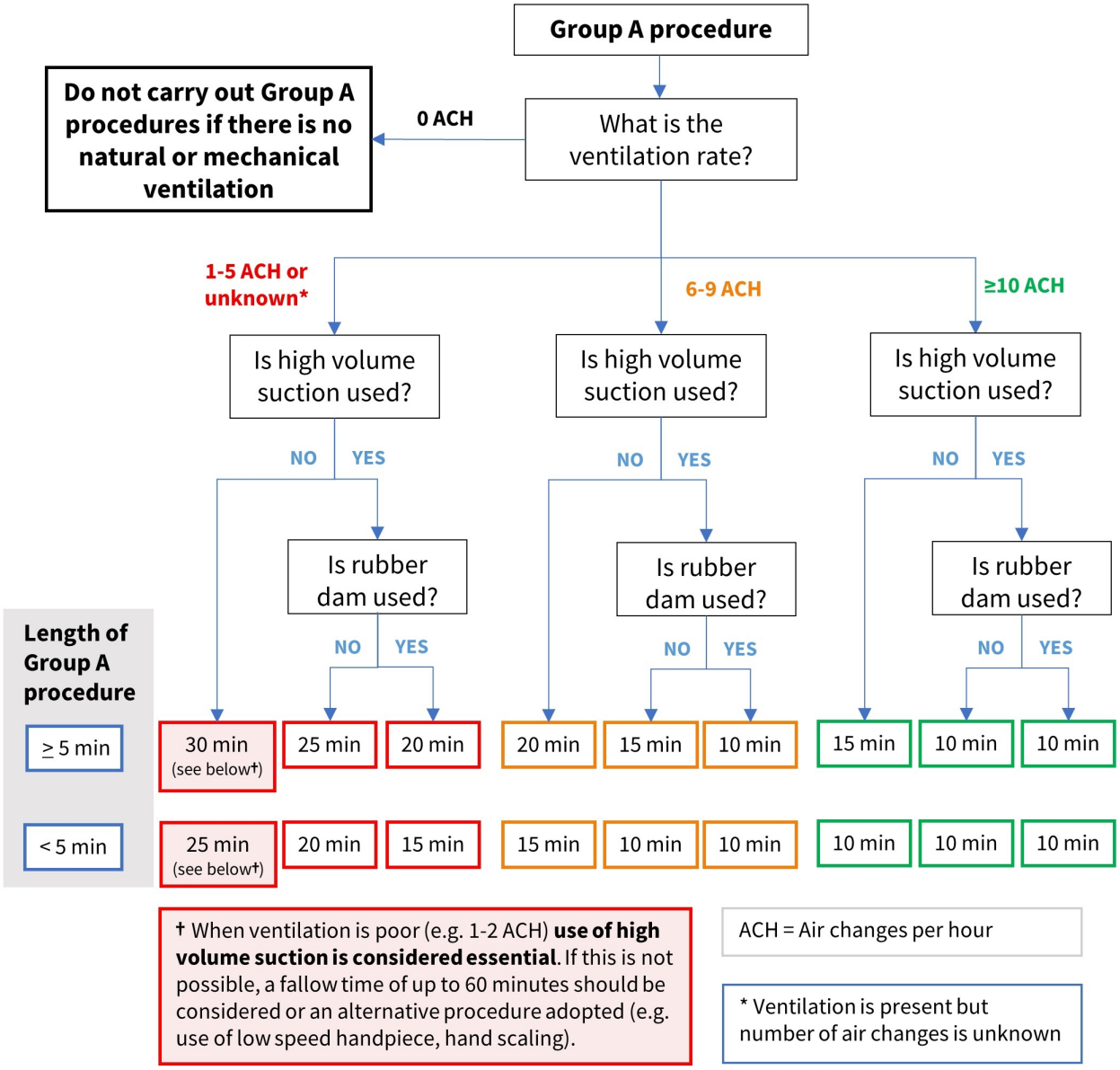
Figure 5.1 Determining fallow times for Group A dental procedures



With the exception of the minimum of 10 minutes, the other fallow times are suggested to inform practitioners' clinical judgment in determining a fallow time suited to their individual circumstances. All suggested fallow times are practicable examples rather than being derived from theoretical modelling calculations.

An important assumption of this proposal is that the use of procedural mitigation, particularly high volume suction, is standard practice, regardless of ventilation. Therefore, the expectation is that whenever possible, Group A procedures will be carried out with procedural mitigation. However, when ventilation is poor (e.g. 1-2 ACH), use of high volume suction is considered essential. If this is not possible, a fallow time of up to 60 minutes should be considered or an alternative procedure adopted (e.g. use of low speed handpiece, hand scaling).

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Application of the fallow time scheme

It is proposed that this scheme for implementing fallow time is suitable when there is community transmission and aerosol generating procedures are permitted. If there is an increase in community transmission (nationally or at a more local level) a decision would be required on whether to suspend provision of Group A dental procedures in some dental settings, as was the case at the beginning of the COVID-19 pandemic. Other established measures to contain the spread of SARS-CoV-2 and the impact of such a suspension on oral health care and oral health would need to be considered as part of this decision.

If a patient has no symptoms, had a negative SARS-CoV-2 (COVID-19) test within the last 72 hours and has self-isolated prior to treatment (i.e. patients within UK IPC Low Risk COVID-19 Pathway[39]), no fallow time is required following a Group A dental procedure.

If a patient has or is likely to have COVID-19 (i.e. patients within UK IPC High Risk COVID-19 Pathway[39]), treatment using Group A dental procedures should be delayed if possible.

Implementation points

- Dental care providers should ensure that the air change rate within each surgery is measured.
- Aerosol generating procedures should not be performed in a room that has no natural or mechanical ventilation.
- It is important that any ventilation equipment is maintained according to manufacturer's instructions and is operating effectively.
- Irrespective of ventilation and the procedural mitigation used, the minimum fallow time following any Group A dental procedure is 10 minutes to allow droplets to settle before environmental cleaning.
- Fallow time can commence at the end of the Group A dental procedure. However, as this can be unpredictable, some practitioners might choose to add the discrete fallow time to the end of the appointment to facilitate scheduling.
- Scheduling appointments that are likely to involve aerosol production at the end of a session would also reduce the impact of fallow time on capacity.

5.2 Air cleaners

While the primary method for reducing contamination in aerosols is dilution through mixing with fresh air via an efficient ventilation system, other approaches also exist. Air cleaners (or air scrubbers) are devices that use technologies such as high efficiency particulate air (HEPA) filtration, germicidal ultraviolet (GUV) light and ionisation, alone or in combination, to remove or inactivate airborne particles. If contaminating particles are removed effectively, recirculating in-room air cleaners (i.e. those with an air flow mechanism) can contribute equivalent air changes per hour (eACH) to the existing ventilation, at levels determined by their particle removal efficiency and air flow rate. Consequently, air cleaners could in principle reduce the fallow time following an AGP.

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Of the 63 international dental guidance documents assessed in a recent rapid review, only 15 refer to air cleaning devices or technologies.[49] The most commonly mentioned were HEPA filtration and UV. None of the documents cited evidence to support air cleaning approaches; two acknowledged a lack of evidence on effectiveness in relation to COVID-19.

The scope of the SDCEP rapid review included the following question related to environmental mitigation.

What environmental mitigation can reduce the 'fallow period' following an AGP?

Evidence summary and appraisal

A Cochrane Review investigating interventions to reduce contaminated aerosols produced during dental procedures included evidence from two clinical trials assessing HEPA filtration-based air cleaners.[50] These studies found that levels of contamination from cavity preparation and ultrasonic scaling were significantly reduced with the air cleaning intervention compared to without.[71,72] These results were rated as being of very low certainty, due to risk of bias, study design and imprecision due to small sample size reported in a single study. In addition, the evidence is indirect as both included trials measured reduction in bacterial contamination of aerosols rather than viral contamination.

A study that assessed the effect of a HEPA-UV device on levels of a virus surrogate in a hospital setting found no statistically significant difference in contamination levels with or without the air cleaner.[73] However, the testing was carried out in rooms with high levels of ventilation. Another small study in a simulated hospital room suggested that the inclusion of UV lights in a combined HEPA-UV unit was beneficial.[74] Additional studies that report outcomes other than direct measures of aerosol contamination, such as bacterial inactivation or clinical outcomes,[75,76] only provide indirect evidence of benefit of air cleaning technologies and are of very low certainty in relation to effectiveness in reducing contaminated aerosols produced during dental procedures.

A health technology policy assessment of air cleaning technologies reported that the effectiveness of in-room air cleaners varies widely, ranging from 12 to 99% across a variety of studies, depending on the technology used, setting and conditions under which evaluation was carried out.[77]

A recent paper prepared by the Environmental and Modelling group (EMG) for the Scientific Advisory Group for Emergencies (SAGE)[78] assessed published literature on air cleaners in a range of laboratory, healthcare and domestic settings. The paper concluded that local air cleaning devices are unlikely to have significant benefit unless the airflow rate through the device is sufficient and suggested that there may be some poorly ventilated spaces where the devices may be useful.

The NSS technical report and rapid review on *Ventilation, water and environmental cleaning in dental surgeries relating to COVID-19*[38] cited a single study[71] as very weak evidence in support of the possible additional benefit of recirculating air cleaning devices. The report advises on various factors to be considered regarding any device, including the efficiency of particle filtration or inactivation, maximum air flow rate, suitability for the size of the room, effect of positioning on efficiency and room air flow, noise levels and maintenance. An illustration of the potential impact of an air cleaning device on the overall air change rate of the room is also provided in the report.

5 Environmental Mitigation

Considered judgement and agreed position

There is limited evidence on the effectiveness of air cleaners for reducing levels of contaminated aerosols in dental settings and no evidence relating to their effectiveness against SARS-CoV-2. Although several documents acknowledge that recirculating in-room air cleaning devices with HEPA filtration and/or GUV are likely to be the most effective, there is insufficient evidence from their use in healthcare settings to establish the size of effect or on which to base direct comparisons between different types of device. The effectiveness of in-room recirculating air cleaning devices is likely to be variable and will depend on the type of device, efficiency of contaminant removal or inactivation, device airflow rate, size of the room, positioning of the device and existing levels of ventilation. Air cleaning devices might be more beneficial for facilities with lower air change rates that are unable to improve ventilation by other means in the short term.

Potential harms associated with using in-room air cleaning devices include accidental exposure to UV light, increased exposure of dental professionals to droplets or aerosol particles due to inappropriate positioning of a device,[79] ozone production by certain ionisation devices,[80] noise and causing an obstruction or trip hazard.

There are costs associated with purchase, installation, usage and ongoing maintenance of air cleaners (e.g. performance testing, replacement of filters, cleaning or replacement of UV lights). There are concerns that ineffective or unsuitable devices could be purchased, efficiency may decrease over time and that appropriate validation systems are not currently in place. Specialist technical advice on device selection, impact on room air flow, installation, performance testing and maintenance will be required to ensure optimal efficiency and to verify additional air change rates delivered by the device.

Following consideration of these factors, the Working Group reached an agreed position:

Agreed Position Statement

The Working Group's agreed position is to not recommend the use of air cleaners to reduce the potential risk of SARS-CoV-2 transmission associated with dental aerosol generating procedures.

Although there is limited evidence of very low certainty that air cleaners might reduce levels of aerosol contamination, taking into account the variability in effectiveness and costs, the agreed position is to not recommend the use of air cleaners as a universal mitigating factor to reduce the potential risk of SARS-CoV-2 transmission. However, this agreed position is conditional due to the close balance of effects. The Working Group acknowledged that any additional benefit of air cleaners for reducing aerosol contamination levels might be greater where existing air change rates are lower and therefore that some dental care providers, who are unable to improve ventilation by other means in the short term, might choose to use recirculating air cleaning devices. Since the level of ventilation is the main determinant of fallow time (see Section 5.1), verifiable equivalent air changes contributed by an effective recirculating air cleaner could reduce the length of the fallow time.

5 Environmental Mitigation

N.B. If an air cleaner is used, technical advice on device suitability, impact on room air flow and installation should be sought to ensure optimal efficiency and to verify additional air change rates delivered by the device. Performance testing and maintenance should be carried out according to manufacturer's instructions.

Fumigation and fogging with disinfection chemicals are not considered in this review. Due to the health risks from exposure to the chemicals used, these approaches are unsuitable for occupied rooms and, since they also require a period of time for clearing, are unlikely to be a useful environmental mitigation for dental AGPs. In relation to COVID-19, the WHO does not recommend routine application of disinfectants to environmental surfaces via spraying or fogging in indoor spaces.[81]

6 Implications for Practice and Future Research

During development of this review, the following have been identified as potential implications for practice and future research.

Practice

- Clear and effective communication between dental practices and patients.
- The role of modern IT and communication devices in the provision of diagnosis and support.
- Increased emphasis on prevention and minimally invasive dentistry.
- Effective use of chairside support for treatment delivery.
- Training in mitigation techniques, for example use of rubber dam.
- The physical and psychological impacts on the dental team, including mental health and wellbeing.
- Specialist technical support for improvements in ventilation.
- Financial implications of improving ventilation to meet minimal technical requirements.

Research and development

- The presence of coronaviruses in saliva, their viability and transmissibility.
- The infectivity of coronaviruses, minimum infective dose, and viability in aerosols generated in dentistry.
- The practicality of testing, including point of care testing, in general dental practice.
- The effectiveness of procedural and environmental mitigation e.g. dental suction, rubber dam, air cleaners.
    - Any future research studies should use standardised methodologies and outcome measurements, including a clear description of procedural and environmental procedures used.
- The technical requirements, assessment and validation of ventilation systems and air cleaners in dental facilities.
- The design and build of new dental facilities.

Appendix 1 Development of this document

The Scottish Dental Clinical Effectiveness Programme (SDCEP) convened a Working Group with representation from all UK countries to carry out a rapid review of the evidence relating to dental aerosols and COVID-19 and to reach an agreed position on the following questions.

a) Which dental procedures produce bioaerosols?
b) Do different AGPs produce different levels of risk?
c) What current mitigation procedures, alone or in combination and in addition to PPE, are most effective for reducing the risk associated with dental AGPs? To include:
    i) Mouthwashes
    ii) Rubber dam
    iii) High volume suction
    iv) Any other factors identified
d) Following dental treatment using an AGP for COVID-19 and non-COVID-19 patients, how long should the 'fallow period' be before environmental cleaning and seeing the next patient?
e) What environmental mitigation can reduce the 'fallow period' following an AGP?

The scope of the review, as agreed by the Working Group, was published on the SDCEP website (www.sdcep.org.uk) and widely circulated.

The Scottish Dental Clinical Effectiveness Programme (SDCEP) operates within NHS Education for Scotland and develops guidance that aims to support dental teams to provide quality dental care. The rapid review of evidence and considered judgements for this report followed, as far as possible within the time constraints, SDCEP's standard guidance development methodology (https://www.sdcep.org.uk/how-we-work/sdcep-guidance-development-process/). A methodology group, including members of the SDCEP Programme Development Team and members of Cochrane Oral Health, identified, appraised and summarised the evidence and collaborated with the Working Group to facilitate all aspects of the rapid review and report.

A comprehensive literature search of online databases Medline, Embase, Cochrane Database of Systematic Reviews, Epistemonikos, Cochrane COVID-19 Study Register, Database of Abstracts of Reviews of Effects and WHO COVID-19 Global Literature Database was conducted on 22 June 2020 by the Trials Search Co-ordinator of Cochrane Oral Health. No date limits were applied. Articles not in English were excluded, unless COVID-19 specific, because of time constraints. A similar supplementary search focussed on air cleaners but restricted to 2010-2020 was also carried out on 25 August 2020.

Records were screened by duplicate reviewers against inclusion and exclusion criteria to identify systematic reviews, guidelines and primary studies relevant to the rapid review questions. Additional manual searching and follow up of citations from relevant articles identified through the systematic search also took place. Other sources of evidence identified by Working Group members during the process were also considered, taking relevance and methodological quality into account.

SDCEP's usual strategy for guidance development is to primarily source recent, good quality systematic reviews and evidence-based guidelines, where available, as a source of synthesised evidence to address the questions. These are supplemented if required with evidence from primary studies. For the rapid

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review of evidence relating to dental AGPs, recent systematic reviews were identified for each of the questions specified in the scope. This included additional relevant pre-publication systematic reviews shared with the Group. These were appraised and the data extracted in duplicate. A GRADE (Grading of Recommendations, Assessment, Development and Evaluation; www.gradeworkinggroup.org) rating for evidence certainty was assigned where possible.

Evidence summaries, which also identified areas where evidence was lacking, were shared with the Working Group to inform and facilitate the considered judgement process, leading to an agreed position for each question. Modelled on the GRADE evidence-to-decision framework for developing guidance recommendations, the Working Group considered the balance of benefits and harms, values and preferences, acceptability and feasibility of the interventions.[2] Meetings of the Working Group were held remotely. Anonymous polling was conducted to facilitate the decision-making process when working with a large group online and to ensure that each Group member had an equal opportunity to contribute to the outcome. The Working Group agreed at the outset that 75% would be accepted as a consensus majority for binary votes. In some instances, not all Group members were in agreement and the relevant agreed positions were informed by the consensus majority. Further information is provided in the accompanying methodology document available at (www.sdcep.org.uk/published-guidance/covid-19-practice-recovery/rapid-review-of-agps/).

Focus groups were carried out to inform the considered judgement process. In this way, the views of dental health professionals towards different approaches to fallow time were obtained. Similarly, the views of the members of the public regarding their experiences of primary care dentistry during the COVID-19 pandemic were explored.

All contributors to SDCEP work are required to declare their financial, intellectual and other relevant interests. At each Working Group meeting, participants are asked to confirm whether there are any changes to these. Should any potential conflicts of interest arise, these are discussed and actions for their management agreed. All declarations of interest and decisions about potential conflicts of interest are available on request.

SDCEP is funded by NHS Education for Scotland (NES). The views and opinions of NES have not influenced the advice given in this document.

The agreed positions outlined in this document are based on the evidence available at the time of publication. In view of the constantly evolving situation, this is a living document and the Working Group will continue to meet as necessary to assess new evidence to maintain currency of the document.

Further details about SDCEP and the development of this report are available at www.sdcep.org.uk.

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Working Group

The Working Group included subject specialists from disciplines including particle physics, aerobiology and clinical virology, as well as individuals from a range of relevant branches of the dental profession, and a patient.

Jeremy Bagg (Chair)	Professor of Clinical Microbiology, University of Glasgow; Head of Glasgow Dental School; Chair of SDCEP Steering Group
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Paul Coulthard	Dean and Institute Director, Institute of Dentistry, Queen Mary University of London (QMUL); President, British Association of Oral Surgeons
Julie Deverick	President of the British Society of Dental Hygiene and Therapy
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Mike Escudier	Professor of Oral Medicine and Education, King's College London; Former Dean, Faculty of Dental Surgery, Royal College of Surgeons of England
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Steven Johnston	Senior Dental Officer, NHS Orkney
Kathy Li	Clinical Research Fellow MRC, University of Glasgow Centre for Virus Research; Honorary Clinical Virologist, NHS Greater Glasgow and Clyde
Tina McGuff	Patient
Gavin McLellan	Deputy Chief Dental Officer, CDO & Dentistry Division, Scottish Government; General Dental Practitioner

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William Priestley	Dental Adviser, Health and Social Care Board, Northern Ireland
Paul Quincey	Principal Research Scientist, National Physical Laboratory (NPL)
Liz Roebuck	Consultant in Paediatric Dentistry, NHS Lothian
Brian Stevenson	Consultant/Hon Senior Lecturer in Restorative Dentistry; Acting Clinical Director, Dundee Dental Hospital
Sandra White	National Lead for Dental Public Health, Public Health England
Gavin Wilson	Specialty Trainee in Oral Surgery, Leeds Dental Institute/University of Leeds; Chief Dental Officer's Clinical Fellow, NHS England/Care Quality Commission

N.B. The individuals listed do not necessarily represent the views of the organisations with which they are affiliated.

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Appendix 1 Development of this document

Methodology Team

SDCEP operates within NHS Education for Scotland. For this publication, members of Cochrane Oral Health assisted with the methodology.

Douglas Stirling	Programme Lead (Guidance), SDCEP, NHS Education for Scotland
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Samantha Rutherford	Specialist Lead, SDCEP, NHS Education for Scotland
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Appendix 2 Prevalence Data

Data Sources

Country	Source
UK	UK Government daily and cumulative test data https://coronavirus.data.gov.uk/cases
UK	NHS rate of triage for coronavirus (COVID-19) and data https://digital.nhs.uk/dashboards/progression-full-width
UK	BBC – COVID summary data https://www.bbc.co.uk/news/uk-51768274
UK	King's College London COVID symptom study https://covid.joinzoe.com/
England	Public Health England COVID-19 epidemiology surveillance https://www.gov.uk/government/news/weekly-covid-19-surveillance-report-published
Northern Ireland	Department of Health COVID-19 Dashboard https://app.powerbi.com/view?r=eyJrIjoiZGYxNjYzNmUtOTlmZS00ODAxLWE1YTEtMjA0NjZhMzlmN2JmIiwidCI6IjljOWEzMGRlLWQ4ZDctNGFhNC05NjAwLTRiZTc2MjVmZjZjNSIsImMiOjh9
Northern Ireland	NISRA COVID-19 Statistics https://www.nisra.gov.uk/statistics/ni-summary-statistics/coronavirus-covid-19-statistics
Scotland	Public Health Scotland COVID-19 data dashboard https://public.tableau.com/profile/phs.covid.19#!/vizhome/COVID-19DailyDashboard_15960160643010/Overview
Wales	Public Health Wales Rapid COVID-19 Surveillance https://public.tableau.com/profile/public.health.wales.health.protection#!/vizhome/RapidCOVID-19virology-Public/Headlinesummary

The Office for National Statistics (ONS) estimates that for the week from 4 to 10 September 2020, around 1 in 900 individuals in England were infected with COVID-19.[82]

Estimated number of asymptomatic patients at different case prevalence rates

Average No. cases per 100,000	Estimated number of asymptomatic patients		Risk Description[4]
	per 100,000	Equates to:	
5	1	One patient in 100,000	Minimal/ Very Low
10	2	One patient in 50,000	Very Low
50	10	One patient in 10,000	Very Low/Low
100	20	One patient in 5,000	Low
400*	80	One patient in 1,250	Low
500	100	One patient in 1,000	Moderate

This table assumes an asymptomatic rate of 20%.

*400 cases per 100,000 is the usual public health threshold for an epidemic.

Appendix 3 Patient COVID-19 Screening

It is important to establish each patient's COVID-19 status before confirming an appointment. If it is essential that the patient is accompanied by a parent, carer or comforter, then that person should also be screened at this point.

- Before scheduling an appointment, assess the patient (and any essential accompanying person) by asking the following questions, and record the response(s):

  - Have you tested positive for COVID-19 in the last 10 days?
  - Are you waiting for a COVID-19 test or the results?
  - Within the last two weeks, do you have:
    - a high temperature or fever;
    - a new, continuous cough*;
    - a loss of, or change in, sense of smell or taste?
  - Do you live with someone who has either tested positive for COVID-19 or had symptoms of COVID-19 in the last 14 days?
  - Have you been in recent contact (within 14 days) with anyone displaying these symptoms or who has been confirmed positive for COVID-19?
  - Have you travelled abroad in the last 2 weeks, to a country which the current government advice requires you to quarantine on your return to the UK?

  * A new, continuous cough means coughing for longer than an hour, or three or more coughing episodes in 24 hours. If the patient usually has a cough, it may be worse than usual.

- If the patient (and essential accompanying person, where appropriate) answers **'NO'** to **ALL** of the questions, the patient can be treated in your practice.
- If the patient (or essential accompanying person, where appropriate) answers '**YES**' to **ANY** of the questions, provide self-help advice by phone and defer appointments for non-urgent care until after their isolation period ends. If the patient needs emergency or urgent care, refer to Urgent Dental Care Centre.

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Scottish Dental
Clinical Effectiveness Programme

The Scottish Dental Clinical Effectiveness Programme (SDCEP) operates within NHS Education for Scotland and aims to support dental teams to provide quality dental care.

With the support of Cochrane Oral Health, SDCEP has conducted a rapid review of the evidence related to the generation and mitigation of aerosols in dental practice and the associated risk of transmission of SARS-CoV-2.

It is important to stress that this document does not have the status of guidance. The aim of this rapid review was to identify and appraise the evidence related to several pre-determined key questions about AGPs in dentistry and to use a process of considered judgment of this evidence and other relevant factors to reach agreed positions that may be used to inform policy and clinical guidance.

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