

Appendix 1. Protocol for Systematic Review of Aerosol, Spatter and Droplet Generation in Dentistry

Protocol for systematic review (registered on Prospero PROSPERO 2020 CRD42020193058 at: https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=193058)

Background

Emergence of COVID-19

Study of a cluster of cases of atypical pneumonia in Wuhan City, China in December 2019 led to the description of a novel respiratory disease: COVID-19 (Zhu et al. 2020). COVID-19 was shown to be caused by a novel coronavirus related to the SARS-CoV virus that emerged in 2003 and which causes severe acute respiratory syndrome (SARS) (World Health Organization [WHO] 2020). The new virus was designated SARS-CoV-2. SARS-CoV-2 is highly infectious and binds avidly to ACE2, the entry receptor found on a number of human cell types (Zhou et al. 2020). Transmission is thought to be via droplets, direct contact and fomites. The virus survives relatively well in the environment and infectious virus particles can be detected up to 72 hours after inoculation of plastic and steel surfaces (Van Doremalen et al. 2020). The minimum infective dose of the virus is not yet known. SARS-CoV-2 has also been shown to remain viable in air in artificially generated droplet nuclei for at least 3 hours suggesting that airborne transmission could be possible (Lewis 2020; van Doremalen et al. 2020). Particle size is a continuum, from larger particles, often involved splatter through droplets, droplet nuclei and smaller ones in aerosols. However, whether small-particle aerosols generated during clinical procedures behave in a similar way to larger ones remains unknown but is clearly highly relevant to dental practice.

Health systems response in the UK and globally

The infectivity and potentially severe consequences of COVID-19 have meant that it has had a major impact on most aspects of healthcare. Dental care requires close contact with patients. Patients may be infected but asymptomatic or pre-symptomatic and there has been significant concern over transmission through aerosol generation during dental procedures. In many countries, only emergency/ urgent dental care has been provided during the acute phase of the pandemic and the use of AGPs to deliver dental care, minimised, with dental teams using

extended PPE (Johnson et al. 2020, Verbeek et al. 2020). National guidance across the United Kingdom and beyond, has led to cessation of all dental routine care and a focus on Advice, Analgesics and where necessary Antibiotics (Faculty of General Dental Practice [FGDP] 2020; Scottish Dental Clinical Effectiveness Programme[SDCP] 2020). However, events have moved now to a phase in many countries where dental care needs to be provided and practices are being opened up for care (SDCP 2020).

The majority of dental care, much of which has traditionally been surgical in nature, is delivered in primary care settings, although by surgical interventions carried out on a frequent and regular basis, it is a very different setting from general medical primary care. For undergraduate teaching and postgraduate specialty training, and in many secondary dental care hospitals, most clinical care is supervised and practiced in dental surgery (single or open plan multi-unit) rooms. For all dental surgery settings, there has been great emphasis on infection control supported by education and training initiatives.

Evolution of infection control within Dentistry

Universal precautions have been standard Dentistry's practice as a result of evidence-informed infection control. Infection control processes in dentistry have evolved over time, particularly in response to blood borne diseases including Hepatitis and Human Immunodeficiency virus (HIV) /Acquired Immune Deficiency Syndrome (AIDS), water borne infections including legionellosis and Creutzfeldt-Jakob (CJD) prion transmission (Porter 2007; Verbeek et al. 2020) There has been recognition of the risks of respiratory infections associated with dental aerosols (FGDP 2020). Nevertheless, despite outbreaks of Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome-related coronavirus (MERS), none of these has resulted in changes to Dentistry with even remotely similar speed and impacts as the recent outbreak of COVID-19. This has brought dramatic new challenges for the practice of dentistry worldwide given the infectivity, relatively high morbidity and mortality rate of the disease, and with the virus being harboured in the upper respiratory tract and saliva. In addition, because the nature of transmission is likely to involve aerosol generating procedures and because dental care is provided in close contact with patients for prolonged periods of time, dentistry and dental settings are potentially high risk for care delivery.

Aerosol Generating Procedures and dental care

There is no clear definition of an aerosol generating procedure with new terms such as aerosol generating exposure (AGE) being suggested. Aerosol Generating Procedures seems to be the most commonly used term but has no accepted standard definition. Policy documents have focused on high speed drills and ultrasonic scalers, air/water (triple) syringes and air polishers as sources of AGPs, with rubber dam and high-speed suction reducing AGPs (American Dental Association [ADA] 2020; British Orthodontic Society [BOS]2020; Centres for Disease Control and Prevention 2020; FGDP 2020; SDCEP 2020). The challenge of retaining consistency and accuracy in meanings when communicating between clinicians, researchers, teachers and with policy makers and the general public without adding to confusion, means that it is important to consider terminology carefully.

In order to manage the potential risks of transmission through aerosol during a clinical dental encounter, it is important to understand the risk of exposure during the processes and procedures of dentistry, identifying the extent of and microbial contamination of aerosol generation during clinical encounters. In addition, it is also important to understand the pattern of spread and settle of aerosols in dentistry, so that it is possible to determine the time needed for decontamination between patient appointments. Currently for some countries there are no specified patient spacing times and for others there for AGPs a gap of 120 minutes is expected between each patient (Cochrane Oral Health 2020) .

Although the important outcomes of research into the impact of bio-aerosols generated in the dental surgery, are prevention of infection of staff and transmission to or between patients, most research into AGPs has focused on exposures to a range of detectable micro-organisms, blood products and surrogate measures involving dyes to demonstrate spread of the bio-aerosol. These have been carried out in clinical situations and in simulation exercises.

Rationale for the Review and Methodology Choice

Whilst much research is needed to inform the shape of future of dental care, in relation to the SARS-CoV-2 virus, we need to make the best use of past research to inform decisions around AGPs and be clear about the knowns and the unknowns swiftly but with accuracy.

Initially we had planned to undertake a rapid review of the evidence, however, it became clear that there is an absence of comprehensive, high quality systematic reviews in this area and that primary studies used widely varying methodology and were difficult to find because of

terminology. For these, and other, reasons, it was more appropriate to carry out a systematic review.

This systematic review will collect and synthesise the evidence contained in the literature using transparent methodology, aligned to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al. 2009). Against the background of COVID-19 and the uncertainty surrounding procedures that generate bio-aerosols within clinical dentistry, we are undertaking this review to create knowledge for evidence-informed decision making. The research objectives were formulated by a group including academics, clinicians and scientists from paediatric dentistry, primary dental care, dental public health, oral microbiology and virology.

Other work currently being undertaken in this area

Current work by Cochrane Oral Health includes rapid reviews of mouthwashes and nasal sprays and methods to reduce contaminated aerosols produced during dental procedures also a rapid review of international dental guidelines for return to dental services (Cochrane Oral Health 2020).

Research question:

What is known and what is not known about bio-aerosols relevant to clinical dentistry?

Objectives:

- 1: To identify and catalogue activities within clinical dentistry and the dental surgery that generate bio-aerosols
- 2: For these activities, to:
 - a) Characterise the pattern of aerosol spread and settle relevant to the dental surgery and dental laboratories
 - b) Identify whether there is evidence of an association with exposure, infection and transmission of pathogenic micro-organisms
 - c) List micro-organisms that have been studied
 - d) Record outcomes and outcome measures
3. To identify gaps in the evidence related to bio-aerosols relevant to clinical dentistry

Methods

Protocol and Registration

This protocol has been registered under the International Register of Systematic Reviews, ID number CRD42020193058

(https://www.crd.york.ac.uk/PROSPERO/display_record.php?RecordID=193058).

Eligibility Criteria for study selection

Inclusion criteria:

1. Study methodology – including but not limited to; trials, observational, experimental (including those using manikins, modelling studies, etc), qualitative studies, non-clinical reports and other relevant studies
2. Topic of study - investigate activities that generate bioaerosols relevant to clinical dentistry (including studies where an intervention is the main topic of the study but there is a measure of bioaerosol generation as part of the study baseline or control measures)

AND

3. Where there is a measure of the result of a bio-aerosol. These might include:
 - Contamination: Colony Forming Unit [CFU] counts, count of visible droplets/stains, grid count;
 - Volume of aerosol generation and/or suspension: pl, ml;
 - Distance: mm, cms, m;
 - Field of splatter/contamination: mm², cms², m²
 - Concentration of contamination: colony forming units per ml, viral load per ml
 - Duration of procedure, contamination etc; and
 - Particle size: µm
4. Types of settings
Dental practices and hospital settings, including simulated environments where there are relevant to the conduct of dental procedures and investigations
5. English or Chinese language

Exclusion criteria

1. Studies that measure bioaerosol generation but where these are not related to single procedures and are carried out at an environmental or broader level (i.e. measure bacterial counts over a day in a surgery)
2. Non-English language articles, apart from Chinese journal articles (insufficient resources)
3. Aspects of the dental environment which may increase risk of infection and transmission e.g. waiting rooms, high throughput, reception areas, bathrooms (these are generic issues which may be covered elsewhere)
4. Grey literature

Information Sources

Medline (OVID), Embase (OVID), Cochrane Central Register of Controlled Trials, Scopus, Web of Science and LILACS databases will be searched for studies meeting the inclusion criteria. ClinicalTrials.gov will be searched for any recently completed, ongoing, or recruiting trials from the start of the databases to May 2020 but earlier trials may be found and included through hand searching of references.

Search

The search strategy will be comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings) and keywords.

Many of the studies we are seeking date back to the 1960s and may not have been well "tagged" in databases. These may be missed by search engines so we will screen the references of reviews and all included studies to ensure we have comprehensively gathered as much literature as possible within the time constraints.

Screening and selection of studies

Titles and abstracts will be screened independently and in duplicate by two reviewers. Where either of the two reviewers consider a paper potentially eligible for inclusion, the full text will be sought. The full texts of articles selected as potentially eligible will be retrieved and assessed independently and in duplicate for inclusion. Bibliographies of full texts will be screened for potentially eligible publications and full texts retrieved. Systematic reviews and policy documents, whilst not included in the data extraction, will be selected through screening and the bibliographies screened for other studies that might be potentially included. Where full texts cannot be retrieved, this will be documented. The search results will be exported into

Rayyan and de-duplicated, then managed through transfer to Endnote or Zotero and a database created in Excel. Full texts will be obtained and screened independently and in duplicate by two reviewers for inclusion. Differences will be resolved by consensus within the research group.

Data extraction

A standardised data extraction form will be developed *a priori* and refined based on repeat pilot testing with a minimum of five publications and three data extractors. Eight reviewers will be trained in completion of the data extraction form. Reviewers will extract data into an excel spreadsheet singly but consult another reviewer where data to be extracted is unclear. Missing data will be managed by contacting study investigators and/or through inter-library loan applications.

For studies where there is an intervention being measured for its ability to alter aerosol spread, only data relating to the baseline or control (i.e. without the intervention effect) will be extracted and analysed.

Data items

The items of data collected will include:

- Study demographics - year of publication, country carried out in or if not stated, authors' institutions' country, authors conflict of interest stated, source of funding stated;
- Methodology- clinical or simulation study, location of study, details of procedure conducted including relevance to today's clinical practice and duration, equipment used in the study, area measured for contamination spread, details of any microbiological measure of aerosol, droplet or splatter spread including number of samples, outcome and outcome measure, details of non-microbiological measure of aerosol, droplet or splatter spread, including number of samples, outcome and outcome measure;
- Findings - related to the reviews' outcomes, details of particle sizes measured and terminology accuracy;
- Relevance of the study to the review question- considering whether the evidence is directly applicable, for example where studies are based in a clinical setting and use clinical procedures or are less directly applicable, for example, when they are laboratory based or involve simulated procedures.

Risk of bias/Quality assessment

There are no standard quality tools for methodologies used in these papers or for assessing the quality of their reporting. We have therefore taken a pragmatic approach and assessed quality measures we consider important. Rather than assign an arbitrary numerical value to these which maybe misleadingly summated, we have opted to use a traffic light system to show a pictorial representation of the quality of key aspects for each study, allowing the overall quality for items to be seen as well as the quality for each study.

For each item we will assign red where the study does not meet standard and green for meeting standard. For standards where we considered it possible for them to be partially met, an amber colour will be assigned. Disagreement between reviewers will be resolved through discussion with the wider team.

Was the study industry funded (related to the study materials being investigated)?

- Red: Yes, industry funded
- Amber: Not mentioned
- Green: Statement that not industry funded

Was there a conflict of interest?

- Red: Conflict of interest declared (related to the topic or study materials being investigated)
- Amber: Not mentioned
- Green: Clearly states not industry funded or no conflict of interest statement

Relevance to routine clinical dentistry

- Red: mannikin or simulation study not involving human participants
- Amber: human participant study but involving procedures e.g. closed chambers which are very unlike usual dentistry
- Green: undertaken in dental operatories with human participants

Procedure description

- Red: Inadequately described
- Amber: Adequately described to be able to understand what was done but could not be reproduced and could be reproduced
- Green: Described in detail and could be reproduced

Equipment used in Procedure

- Red: Adequately described (type of item e.g. air rotor)(but no further detail
- Green: Described in detail (type of equipment e.g. air rotor, including make and where obtained)

Sample size

- Red: Not mentioned
- Amber: Mentioned but not described in enough detail to reproduce
- Green: Adequately described in detail and could be reproduced

Controls (for microbial studies)

- Red: No control measures described
- Green: Control measures described for example leaving a plate out for an hour before the procedure
- Not applicable

Sensitivity of measurement for contamination measure (separate for microbiological, blood and visual for spatter)(Table 1)

- Red: Low sensitivity
- Amber: Moderate sensitivity
- Green: High sensitivity

Outcome (Contamination)

- Red: Outcome reporting do not meet standard i.e. not expressed or statistical tests were not appropriate, not reported
- Amber: Outcome reporting partially meets standard
- Green: Outcomes clearly stated with appropriate descriptive statistics to express contamination for areas as point estimates and include measures of distribution (e.g. standard deviation, standard error and range) and if statistical tests are used to analyse associations, these are appropriate, and include confidence intervals and the probability levels (p value)

Detection sensitivity of contamination assessment tool

Assessment of sensitivity of detection methods for oral microbiology measures - the methods for detecting contamination will be varied and there is no standard measure of the sensitivity of studies using bacterial culture or other methods. However, studies using the culture of bacteria are widely used in this field and their methodology determines the degree of sensitivity they have in detecting contamination. Oral bacteria are fastidious and slow-growing. They require complex blood-containing culture media and incubation times of at least 7 days. The majority of oral bacteria are obligate or facultative anaerobes. Many are also capnophiles requiring carbon dioxide for growth. The optimum atmosphere for growth is therefore anaerobic conditions that include CO₂. This is available in most commercially available anaerobic workstations or jar systems. Size of petri dish is not critical and will be proportional to numbers which should be corrected for as part of the analysis. Standard size petri dishes are 9 cm in diameter. We will categorise studies using culture of oral bacteria as part of their outcome measure as high, medium and low detection sensitivity:

- High: Blood-containing complex agar media, anaerobic incubation, 7 days or more incubation
- Medium: Blood-containing complex agar media, anaerobic incubation, 48 hours or more incubation
- Low: Non-blood containing basic medium OR aerobic incubation OR <48 h incubation

The difference between high and low sensitivity is likely to be of the order of 100-1000 fold. Saliva cultured under high sensitivity conditions will yield c 10^8 CFU/ml; low sensitivity: 10^5 - 10^6 .

Table 1: Sensitivity of measurement for contamination measure (separate for microbiological, blood and visual for spatter)

Measurement of microbial contamination			
	Blood agar used?	Incubation environment	Incubation duration (days)
Low	The study did not use blood agar as growth media. Not stated.	Aerobic environment was used. Not stated	Incubation time (1-3 days) was unsatisfactory for cultivating a wide range of bacteria with different replication rate. Not stated.
Moderate	The study used blood agar as growth media.	Aerobic or anaerobic (in consideration to other parameters).	The study used a moderate incubation time for cultivating a moderate range of bacteria with different replication rate.
High	The study used blood agar as growth media.	Anaerobic environment was adopted that allowed.	Incubation time (7 days or more) was satisfactory for cultivating a wide range of bacteria with different replication rate.
Measurement of blood contamination			
Low	Visible detection with no other equipment used.		
Moderate	Visible detection with the use of visibility of enhancers (e.g. fluorescent dye).		
High	Sophisticated method used for blood detection such as DNA detection with PCR.		
Measurement of non-microbial and non-blood contamination			
Low	Visible detection with no other equipment used.		

	<p>Used test with no consideration of dilution effect of blood in interpretation (false negatives).</p> <p>Used test with no consideration of impact of hypochlorite in interpretation of surfaces in dental settings (false positives at higher dilutions which is relevant for surfaces rather than gowns/masks/drapes)</p>
Moderate	Visible detection with the use of visibility of enhancers (e.g. fluorescent dye).
High	<p>Direct testing;</p> <p>Used agents appropriately, these agents include:</p> <ul style="list-style-type: none"> ● Kastle–Meyer (KM) reagent using phenolphthalein followed by hydrogen peroxide 3% ● Leucomalachite green (LMG) reagent followed by hydrogen peroxide 3% ● Luminol <p>Considered dilution effect of blood in interpretation as suggested by (2014; 2006)):</p> <ul style="list-style-type: none"> ● MG: neat blood to dilution to 10^{-3} Gives 100% positive results (less sensitivity with more dilution but still 54.4% at 10^{-7}) ● LMG: neat blood to dilution of 10^{-2} Gives 100% positive results (less sensitivity with more dilution but still 33.3% at 10^{-7}); and <p>Considered impact of hypochlorite in interpretation of dental settings (relevant for surfaces rather than gowns/masks/drapes).</p>

Summary measures and data synthesis

A narrative synthesis will be undertaken given the likely heterogeneity of data. We will present summary characteristics' data for the included studies as an overall group (e.g. dates of studies, countries of origin etc) and within each of the activity subgroups.

We will list activities within clinical dentistry and the dental surgery that have been shown to generate bio-aerosols.

We will present the data within groups by dental activities (i.e. ultrasonic scaling, high speed drilling) and include any information related to other aerosols in the dental surgery such as coughing where these are described. We will include details of differences in time, procedure and equipment. Where appropriate these will be broken down by method of investigation (i.e. biological spread, non-biological contamination) or outcome measure.

Using the activities as an umbrella for each topic, we will synthesise the evidence for each activity and present an overview by organising the evidence in a way that will explain to knowledge users the extent of the evidence, the direction of evidence findings. We will do this by presenting the primary objectives, methods, results and relevant limitations for the studies, grouped where possible. The evidence syntheses for each activity will include:

- contamination of the surgery environment and personnel will be presented through information on pattern and spread of aerosols across the area being investigated (i.e. parts of the body on personnel or patients, different areas of the surgery);
- any evidence of association between aerosol generation and exposure, infection and transmission of pathogenic micro-organisms;
- the list micro-organisms that have been studied; and
- outcomes (areas contaminated with bio-aerosols) and outcome measures (CFUs, %contaminated surfaces etc).

Synthesising the data above, we will identify gaps in the evidence related to bio-aerosols relevant to clinical dentistry.

Risk of bias across studies

We will assess any risk of bias across the cumulative evidence. It will not be possible to carry out a statistical assessment of publication bias but we will consider the spread of evidence through publications dates' analysis to look for increases in evidence production to see if these align to events such as infectious disease outbreaks.

Discussion

Whilst our prespecified outcome measures would ideally have been overall mortality, number of cases of infections (as defined in the individual studies), severity of infectious disease, harms

(as reported in the individual studies), and adherence, they will, in reality be related to contamination or not, contamination load and spread. We have therefore focussed this systematic review on contamination of the environment and people in the dental room whilst dental activities are being carried out. The findings of this review will provide context for, as well as data to inform recommendations on which to base policy to restart dental care, gaps in evidence where research needs to be focussed and the degree of confidence to which statements around contamination in the dental environment associated with procedures can be made.

Funding

There are no external sources of funding for this research and it is supported by the authors' institutions

Conflict of Interest

All of the authors confirm they have no conflict of interest with regard to this work, to report.

References

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Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X, Huang B, Shi W, Lu R et al. 2020. A novel coronavirus from patients with pneumonia in China, 2019. *New England Journal of Medicine*. 382(8):727-733.

Appendix 2 PRISMA checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1-2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6

Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6-10
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I ²) for each meta-analysis.	N/A
Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6-11
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	5
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	11
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Summary 12-16 Details for individual studies: Appendix 4
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	17-22 Further details: Appendix 6
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Summary: 11-14 Details for individual studies: Appendix 4
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	17- 19 Further details: Appendix 6
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Summary: 22 Details for individual studies: Appendix 6

DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	22-24
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	24
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	24
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	25

Appendix 3. Table of included studies

Table 3. Included studies. Note that the unique study IDs are carried across to the superscript references in the tables of the paper

First author and year	Unique Study ID	Study Reference	Procedure categories
Agostinho 2004	2	Agostinho AM, Miyoshi PR, Gnoatto N, Paranhos HDFO, Figueiredo LCD, Salvador SL. 2004. Cross-contamination in the dental laboratory through the polishing procedure of complete dentures. <i>Braz Dent J.</i> 15(2):138-143.	Slow-speed handpiece
Aguilar-Duran 2020	98	Aguilar-Duran L, Bara-Casaus JJ, Aguilar-Duran S, Valmaseda-Castellón E, Figueiredo R. 2020. Blood spatter in oral surgery: Prevalence and risk factors. <i>J Am Dent Assoc.</i> 151(6):438-443.	Oral Surgery
Al-Amad 2017	3	Al-Amad, S. H., Awad, M. A., Edher, F. M., Shahramian, K., & Omran, T. A. (2017). The effect of rubber dam on atmospheric bacterial aerosols during restorative dentistry. <i>Journal of Infection and Public Health</i> , 10(2), 195-200.	High-speed handpiece
Al Eid 2018	4	Al-Eid R, Ramalingam S, Sundar C, Aldawsari M, Nooh N. 2018. Detection of visually imperceptible blood contamination in the oral surgical clinic using forensic luminol blood detection agent. <i>J Int Soc Prev Community Dent.</i> 8(4):327-332.	Oral Surgery procedure
Balcos 2019	5	Balcos C, Saveanu I, Bobu L, Bosinceanu D, Bolat M, Gradinaru I, Hurjui L, Barlean M, Armencia A. 2019. The risk of contamination through ultrasonic	Ultrasonic scaling
Barnes 1998	6	Barnes JB, Harrel SK, Rivera-Hidalgo F. 1998. Blood contamination of the aerosols produced by in vivo use of USSs. <i>J Periodontol.</i> 69(4):434-438.	Ultrasonic scaling
Belting 1963	93	Belting CM, Haberfelde GC, Juhl LK. 1964. Spread of organisms from dental air rotor. <i>J Am Dent Assoc.</i> 68:648-651.	High-speed handpiece Air/water (triple) syringe
Bentley 1994	8	Bentley CD, Burkhart NW, Crawford JJ. 1994. Evaluating spatter and aerosol contamination during dental procedures. <i>J Am Dent Assoc.</i> 125(5):579-584.	Ultrasonic scaling High-speed handpiece

Choi 2018	9	Bentley CD, Burkhart NW, Crawford JJ. 1994. Evaluating spatter and aerosol contamination during dental procedures. J Am Dent Assoc. 125(5):579-584.	Ultrasonic scaling
Chuang 20	10	Chuang CY, Cheng HC, Yang S, Fang W, Hung PC, Chuang SY. 2014. Investigation of the spreading characteristics of bacterial aerosol contamination during dental scaling treatment. J Dent Sci. 9(3):294-296.	Ultrasonic scaling
Cochran 1989	92	Cochran MA, Miller CH, Sheldrake MA. 1989. The efficacy of the rubber dam as a barrier to the spread of microorganisms during dental treatment. J Am Dent Assoc. 119(1):141-144.	High-speed handpiece
Dahlke 2012	13	Dahlke WO, Cottam MR, Herring MC, Leavitt JM, Ditmyer MM, Walker RS. 2012. Evaluation of the spatter-reduction effectiveness of two dry-field isolation techniques. J Am Dent Assoc. 143(11):1199-1204.	High-speed handpiece
Dawson 2016	14	Dawson M, Soro V, Dymock D, Price R, Griffiths H, Dudding T, Sandy JR, Ireland AJ. 2016. Microbiological assessment of aerosol generated during debond of fixed orthodontic appliances. Am J Orthod Dentofacial Orthop. 150(5):831-838.	Slow-speed handpiece
Day 2008	15	Day CJ, Price R, Sandy JR, Ireland AJ. 2008. Inhalation of aerosols produced during the removal of fixed orthodontic appliances: A comparison of 4 enamel cleanup methods. Am J Orthod Dentofacial Orthop. 133(1):11-17.	High-speed handpiece Slow-speed handpiece
Devker 2012	16	Devker N, Mohitey J, Vibhute A, Chouhan VS, Chavan P, Malagi S, Joseph R. 2012. A study to evaluate and compare the efficacy of preprocedural mouthrinsing and high volume evacuator attachment alone and in combination in reducing the amount of viable aerosols produced during ultrasonic scaling procedure. J Contemp Dent Pract. 13(5):681-689.	Ultrasonic scaling
Davya 2019	17	Divya R, Senthilnathan KP, Santhosh Kumar MP, Senthil Murugan P. 2019. Evaluation of aerosol and splatter contamination during minor oral surgical procedures. Drug Invention Today. 12(9):1845-1848.	Oral Surgery
Dos Santos 2014	18	Dos Santos IRM, Moreira ACA, Costa MGC, e Barbosa MC. 2014. Effect of 0.12% chlorhexidine in reducing microorganisms found in aerosol used for dental prophylaxis of patients submitted to fixed orthodontic treatment. Dental Press J Orthod. 19(3):95-101.	Air polishing
Earnest 1991	20	Earnest R, Loesche W. 1991. Measuring harmful levels of bacteria in dental aerosols. J Am Dent Assoc. 122(12):55-57.	High-speed handpiece
Feres 2010	21	Feres M, Figueiredo LC, Faveri M, Stewart B, de Vizio W. 2010. The effectiveness of a preprocedural mouthrinse containing cetylpyridinium chloride in reducing bacteria in the dental office. J Am Dent Assoc. 141(4):415-422.	Ultrasonic scaling
Fine 1992	22	Fine DH, Furgang D, Korik I, Olshan A, Barnett ML, Vincent JW. 1993a. Reduction of viable bacteria in dental aerosols by preprocedural rinsing with an antiseptic mouthrinse. Am J Dent. 6(5):219-221.	Ultrasonic scaling

Fine 1993 a	23	Fine DH, Mendieta C, Barnett ML, Furgang D, Meyers R, Olshan A, Vincent J. 1992. Efficacy of preprocedural rinsing with an antiseptic in reducing viable bacteria in dental aerosols. J Periodontol. 63(10):821-824.	Ultrasonic scaling
Fine 1993 b	24	Fine DH, Yip J, Furgang D, Barnett ML, Olshan AM, Vincent J. 1993b. Reducing bacteria in dental aerosols: Pre-procedural use of an antiseptic mouthrinse. J Am Dent Assoc. 124(5):56-58.	Ultrasonic scaling
Graetz 2014	25	Graetz C, Bielfeldt J, Tillner A, Plaumann A, Dorfer CE. 2014. Spatter contamination in dental practices--how can it be prevented? Revista medico-chirurgicala a Societatii de Medici si Naturalisti din Iasi. 118(4):1122-1134.	Ultrasonic scaling
Greco 2008	28	Greco PM, Lai C-H. 2008. A new method of assessing aerosolized bacteria generated during orthodontic debonding procedures. Am J Orthod Dentofacial Orthop. 133(4):S79-87.	High- speed handpiece
Grenier 1995	29	Grenier D. 1995. Quantitative analysis of bacterial aerosols in two different dental clinic environments. Applied and Environmental Microbiology. 61(8):3165-3168.	Ultrasonic scaling High-speed handpiece
Grundy 1967	30	Grundy JR. 1967. Enamel aerosols created during use of the air turbine handpiece. J Dent Res. 46(2):409-416.	High-speed handpiece
Gupta 2014	31	Gupta G, Mitra D, Ashok KP, Gupta A, Soni S, Ahmed S, Arya A. 2014. Efficacy of preprocedural mouth rinsing in reducing aerosol contamination produced by USS: A pilot study. J Periodontol. 85(4):562-568.	Ultrasonic scaling
Hallier 2010	32	Hallier, C., Williams, D. W., Potts, A. J. C., & Lewis, M. A. O. (2010). A pilot study of bioaerosol reduction using an air cleaning system during dental procedures. <i>British Dental Journal</i> , 209(8), E14	Ultrasonic scaling High-speed handpiece Oral surgery
Harrel 1996	34	Harrel SK, Barnes JB, Rivera-Hidalgo F. 1998. Aerosol and splatter contamination from the operative site during ultrasonic scaling. J Am Dent Assoc. 129(9):1241-1249.	Ultrasonic scaling Hand scaling
Harrel 1998	33	Harrel, S. K., Barnes, J. B., & Rivera-Hidalgo, F. (1998). Aerosol and splatter contamination from the operative site during ultrasonic scaling. <i>Journal of the American Dental Association (1939)</i> , 129(9), 1241-1249.	Ultrasonic scaling
Harrel 1999	35	Harrel SK, Barnes JB, Rivera-Hidalgo F. 1999. Aerosol reduction during air polishing. Quintessence International. (30(9):623-628.	Air polishing
Hausler 1966	36	Hausler WJ, Jr., Madden RM. 1966. Microbiologic comparison of dental handpieces. 2. Aerosol decay and dispersion. J Dent Res. 45(1):52-58.	High-speed handpiece

Holloman 2015	37	Holloman JL, Mauriello SM, Pimenta L, Arnold RR. 2015. Comparison of suction device with saliva ejector for aerosol and spatter reduction during ultrasonic scaling. <i>J Am Dent Assoc.</i> 146(1):27-33.	Ultrasonic scaling
Ireland 2003	97	Ireland AJ, Moreno T, Price R. 2003. Airborne particles produced during enamel cleanup after removal of orthodontic appliances. <i>Am J Orthod Dentofacial Orthop.</i> 124(6):683-686.	Slow-speed handpiece
Ishiharma 2008	38	Ishihama K, Iida S, Koizumi H, Wada T, Adachi T, Isomura-Tanaka E, Yamanishi T, Enomoto A, Kogo M. 2008. High incidence of blood exposure due to imperceptible contaminated splatters during oral surgery. <i>J Oral Maxillofac Surg.</i> 66(4):704-710.	Oral Surgery
Ishiharma 2009	39	Ishihama K, Koizumi H, Wada T, Iida S, Tanaka S, Yamanishi T, Enomoto A, Kogo M. 2009. Evidence of aerosolised floating blood mist during oral surgery. <i>J Hosp Infect.</i> 71(4):359-364.	Oral Surgery
Janani 2018	40	Janani K, Santhosh Kumar MP. 2018. Microbial contamination of dental care clothing - a quantitative study. <i>Drug Invention Today.</i> 10(4):421-425.	Oral Surgery
Jawade 2016	41	Jawade R, Bhandari V, Ugale G, Taru S, Khaparde S, Kulkarni A, Ardale M, Marde S. 2016. Comparative evaluation of two different ultrasonic liquid coolants on dental aerosols. <i>J ClinDiagn Res.</i> 10(7):ZC53-ZC57.	Ultrasonic scaling
Jimson 2015	43	Jimson S, Kannan I, Parthiban J, Jayalakshmi M. 2015. Evaluation of airborne bacterial contamination during procedures in oral surgery clinic. <i>Biomedical and Pharmacology Journal.</i> 8:669-675.	Oral Surgery
Junevičius 2005	42	Junevicius J, Surna A, Surna R. 2005. Effectiveness evaluation of different suction systems. <i>Stomatologija.</i> 7(2):52-57.	High-speed handpiece
Kaur 2014	44	Kaur R, Singh I, Vandana KL, Desai R. 2014. Effect of chlorhexidine, povidone iodine, and ozone on microorganisms in dental aerosols: Randomized double-blind clinical trial. <i>Indian J Dent Res.</i> 25(2):160-165.	Ultrasonic scaling
King 1997	45	King TB, Muzzin KB, Berry CW, Anders LM. 1997. The effectiveness of an aerosol reduction device for USSs. <i>J Periodontol.</i> 68(1):45-49.	Ultrasonic scaling
Kobza 2018	46	Kobza J, Pastuszka JS, Bragoszewska E. 2018. Do exposures or aerosols pose a risk of dental professionals? <i>Occup Med.</i> 68(7):454-458.	Oral Surgery
Kritivasan 2019	47	Kritivasan S, Nazia Zareen I, Muralidharan NP. 2019. Assessing the extent of aerosol spread in prosthetic dental lab. <i>International Journal of Scientific and Technology Research.</i> 8(11):3190-3192.	Slow-speed handpiece
Labaf 2011	48	Labaf H, Owlia P, Taherian A, Haghgoo R. 2011. Quantitative analysis of changes in bacterial aerosols during endodontic, periodontic and prosthodontic treatments. <i>African Journal of Microbiology Research.</i> 5(27):4946-4948.	High-speed handpiece Ultrasonic scaling

Larato 1966	91	Larato DC, Ruskin PF, Martin A, Delanko R. 1966. Effect of a dental air turbine drill on the bacterial counts in air. J Prosthetic Dent. 16(4):758-765.	High-speed handpiece
Logothetis 1995	49	Logothetis DD, Martinez-Welles JM. 1995. Reducing bacterial aerosol contamination with a chlorhexidine gluconate pre-rinse. J Am Dent Assoc. 126(12):1634-1639.	Air polishing
Manarte-Monteiro 2013	50	Manarte-Monteiro P, Carvalho A, Pina C, Oliveira H, Manso MC. 2013. Air quality assessment during dental practice: Aerosols bacterial counts in an university clinic. Revista Portuguesa de Estomatologia, Medicina Dentaria e Cirurgia Maxilofacial. 54(1):2-7.	High-speed handpiece
Micik 1969	89	Micik RE, Miller RL, Mazzarella MA, Ryge G. 1969. Studies on dental aerobiology. I. Bacterial aerosols generated during dental procedures. J Dent Res. 48(1):49-56.	High-speed handpiece Air/water (triple) syringe Hand scaling Prophylaxis
Miller 1971	90	Miller RL. 1995. Characteristics of blood-containing aerosols generated by common powered dental instruments. American Industrial Hygiene Association Journal. 56(7):670-676.	Ultrasonic scaling High-speed handpiece Air/water (triple) syringe Prophylaxis
Miller 1995	51	Miller RL, Micik RE, Abel C, Ryge G. 1971. Studies on dental aerobiology. II. Microbial splatter discharged from the oral cavity of dental patients. J Dent Res. 50(3):621-625.	High-speed handpiece Air/water (triple) syringe
Mohan 2016	52	Mohan M, Jagannathan N. 2016. The efficacy of pre-procedural mouth rinse on bacterial count in dental aerosol following oral prophylaxis. Dental and Medical Problems. 53(1):78-82.	Ultrasonic scaling
Muzzin 1999	53	Muzzin KB, King TB, Berry CW. 1999. Assessing the clinical effectiveness of an - aerosol reduction device for the air polisher. J Am Dent Assoc. 130(9):1354-1359.	Air polishing
Narayana 2016	54	Narayana T, Mohanty L, Sreenath G, Vidhyadhari P. 2016. Role of preprocedural rinse and high volume evacuator in reducing bacterial contamination in bioaerosols. J Oral Maxillofac Path. 20(1):59-65.	Ultrasonic scaling
Nejatidanesh 2013	55	Nejatidanesh F, Khosravi Z, Goroohi H, Badrian H, Savabi O. 2013. Risk of contamination of different areas of dentist's face during dental practices. Int J Prev Med. 4(5):611-615.	Ultrasonic scaling High-speed handpiece
Oliveira 2018	56	Oliveira A, de Alencar RM, Porto JCS, Ramos I, Noleto IS, Santos TC, Mobin M. 2018. Analysis of fungi in aerosols dispersed by high speed pens in dental clinics from teresina, piaui, brazil. Environmental Monitoring and Assessment. 190(2).	High-speed handpiece

Prospero 2003	59	Prospero E, Savini S, Annino I. 2003. Microbial aerosol contamination of dental healthcare workers' faces and other surfaces in dental practice. <i>Infect Control Hosp Epidemiol.</i> 24(2):139-141.	Ultrasonic scaling High-speed handpiece
Purohit 2009	60	Purohit B, Priya H, Acharya S, Bhat M, Ballal M. 2009. Efficacy of pre-procedural rinsing in reducing aerosol contamination during dental procedures. <i>J Infect Prevent.</i> 10(6):190-192.	Ultrasonic scaling High-speed handpiece
Ramesh 2015	61	Ramesh A, Thomas JT, Muralidharan NP, Varghese SS. 2015. Efficacy of adjunctive usage of hydrogen peroxide with chlorhexidine as preprocedural mouthrinse on dental aerosol. <i>National Journal of Physiology, Pharmacy and Pharmacology.</i> 5(5):431-435.	Ultrasonic scaling
Rao 2015	62	Rao RM, Shenoy N, Shetty V. 2015. Determination of efficacy of pre-procedural mouth rinsing in reducing aerosol contamination produced by USSs. <i>Nitte University Journal of Health Science.</i> 5(3):52-56.	Ultrasonic scaling
Rautemaa 2006	63	Rautemaa R, Nordberg A, Wuolijoki-Saaristoe K, Meurman JH. 2006. Bacterial aerosols in dental practice - a potential hospital infection problem? <i>J Hosp Infect.</i> 64(1):76-81.	High-speed handpiece Hand scaling
Reddy 2012	64	Reddy S, Prasad MGS, Kaul S, Satish K, Kakarala S, Bhowmik N. 2012. Efficacy of 0.2% tempered chlorhexidine as a pre-procedural mouth rinse: A clinical study. <i>J Indian Soc Periodontol.</i> 16(2):213-217.	Ultrasonic scaling
Retamal-valdes 2017	65	Retamal-Valdes B, Soares GM, Stewart B, Figueiredo LC, Faveri M, Miller S, Zhang YP, Feres M. 2017. Effectiveness of a pre-procedural mouthwash in reducing bacteria in dental aerosols: Randomized clinical trial. <i>Braz Oral Res.</i> 31:e21.	Ultrasonic scaling
Rivera-Hidalgo 1999	66	Rivera-Hidalgo F, Barnes JB, Harrel SK. 1999. Aerosol and splatter production by focused spray and standard ultrasonic inserts. <i>J Periodontol.</i> 70(5):473-477.	Ultrasonic scaling
Sadun 2020	69	Sadun AS, Himratul-Aznita WH, Taiyeb-Ali TB, Fathilah AR, Saub R, Safii SH, Che Ab Aziz ZA. 2020. Effectiveness of pre-procedural rinsing with essential oils-based mouthrinse to reduce aerosol contamination of periodontitis patients. <i>Sains Malaysiana.</i> 49(1):139-143.	Ultrasonic scaling
Saini 2015	70	Saini R. 2015. Efficacy of preprocedural mouth rinse containing chlorine dioxide in reduction of viable bacterial count in dental aerosols during ultrasonic scaling: A double-blind, placebo-controlled clinical trial. <i>Dental Hypotheses.</i> 6(2):65-71.	Ultrasonic scaling
Samaranayake 1989	88	Samaranayake LP, Reid J, Evans D. 1989. The efficacy of rubber dam isolation in reducing atmospheric bacterial contamination. <i>ASDC J Dent Child.</i> 56(6):442-444.	High-speed handpiece
Sawhney 2015	71	Sawhney A, Venugopal S, Girish Babu RJ, Garg A, Mathew M, Yadav M, Gupta B, Tripathi S. 2015. Aerosols how dangerous they are in clinical practice. <i>J Clin Diagn Res.</i> 9(4):52-57.	Ultrasonic scaling
Serban 2013	72	Serban D, Banu A, Serban C, Tuță-Sas I, Vlaicu B. 2013. Predictors of quantitative microbiological analysis of spatter and aerosolization during scaling. <i>Revista medico-chirurgicala a societatii de medici si naturalisti din iasi.</i> 117(2):503-508.	Ultrasonic scaling

Sethi 2019	73	Sethi K, Mamajiwala A, Mahale S, Raut C, Karde P. 2019. Comparative evaluation of the chlorhexidine and cinnamon extract as ultrasonic coolant for reduction of bacterial load in dental aerosols. <i>J Indian Soc Periodontol.</i> 23(3):226-233.	Ultrasonic scaling
Shetty 2013	74	Shetty SK, Sharath K, Shenoy S, Sreekumar C, Shetty RN, Biju T. 2013. Compare the efficacy of two commercially available mouthrinses in reducing viable bacterial count in dental aerosol produced during ultrasonic scaling when used as a preprocedural rinse. <i>J Contemp Dent Pract.</i> 14(5):848-851.	Ultrasonic scaling
Singh 2016	76	Singh A, Shiva Manjunath RG, Singla D, Bhattacharya HS, Sarkar A, Chandra N. 2016. Aerosol, a health hazard during ultrasonic scaling: A clinico-microbiological study. <i>Indian J Dent Res.</i> 27(2):160-162.	Ultrasonic scaling
Stevens 1963	96	Stevens RE, Jr. 1963. Preliminary study--air contamination with microorganisms during use of air turbine handpieces. <i>J Am Dent Assoc.</i> 66:237-239.	High-speed handpiece
Swaminathan 2014	78	Swaminathan Y, Thomas JT, Muralidharan NP. 2014. The efficacy of preprocedural mouth rinse of 0.2% chlorhexidine and commercially available herbal mouth containing salvadora persica in reducing the bacterial load in saliva and aerosol produced during scaling. <i>Asian Journal of Pharmaceutical and Clinical Research.</i> 7:71-74.	Ultrasonic scaling
Tag El-Din 1997	94	Tag El Din AM, Ghoname NAH. 1997. Efficacy of rubber dam isolation as an infection control procedure in paediatric dentistry. <i>EMHJ.</i> 3(3):530-539.	High-speed handpiece (Paediatric patient)
Timmerman 2004	80	Serban D, Banu A, Serban C, Tuță-Sas I, Vlaicu B. 2013. Predictors of quantitative microbiological analysis of spatter and aerosolization during scaling. <i>Revista medico-chirurgicala a societatii de medici si naturalisti din iasi.</i> 117(2):503-508.	Ultrasonic scaling
Toroğlu 2001	81	Toroglu, M. S., Bayramoglu, Z., Yarkin, F., & Tuli, A. (2003). Possibility of blood and hepatitis B contamination through aerosols generated during debonding procedures. <i>Angle Orthodontist</i> , 73(5), 571-578.	High-speed handpiece
Toroğlu 2003	82	Toroglu, M. S., Haytac, M. C., & Koksai, F. (2001). Evaluation of aerosol contamination during debonding procedures. <i>The Angle orthodontist</i> , 71(4), 299-306.	High-speed handpiece
Travaglini 1966	95	Toroglu MS, Bayramoglu Z, Yarkin F, Tuli A. 2003. Possibility of blood and hepatitis b contamination through aerosols generated during debonding procedures. <i>Angle Orthodontist.</i> 73(5):571-578.	High-speed handpiece
Veena 2015	83	Toroglu MS, Haytac MC, Koksai F. 2001. Evaluation of aerosol contamination during debonding procedures. <i>Angle Orthodontist.</i> 71(4):299-306.	Ultrasonic scaling

Wada 2010	84	Wada T, Ishihama K, Yonemitsu K, Sumioka S, Yamada C, Higuchi M, Kogo M. 2010. Blood contamination of environmental surfaces in outpatient oral surgery operator. Asian Journal of Oral and Maxillofacial Surgery. 22(1):12-16.	Oral Surgery
Watanabe 2013	85	Watanabe A, Tamaki N, Yokota K, Matsuyama M, Koheguchi S. 2018. Use of atp bioluminescence to survey the spread of aerosol and splatter during dental treatments. J Hosp Infect. 99(3):303-305.	Ultrasonic scaling
Yamada 2011	87	Yamada H, Ishihama K, Yasuda K, Hasumi-Nakayama Y, Shimoji S, Furusawa K. 2011. Aerial dispersal of blood-contaminated aerosols during dental procedures. Quintessence International. 42(5):399-405.	Ultrasonic scaling High-speed handpiece Oral Surgery

Appendix 4. Extracted data

Study information					
Unique Study ID	Study author and reference	Country	Aim of study (verbatim from the paper)/ Please directly quote from the study paper	what was the study design in general? Observation, intervention	Type of data/study design.
2	Agostinho 2004	Brazil	To show, by reproducing the routine conditions of polishing complete dentures, the transmission of potentially pathogenic microorganisms to the operator, polishing cones and new prostheses.	Observational	Observational
98	Aguilar-Duran 2020	Spain	determine the prevalence of blood particles on masks with visors and surgical caps in oral surgery procedures and establishing the main risk factors for blood spatter".	Observational	Observational
3	Al-Amad 2017	UAE	The objective of this study was to determine the effect of using a rubber dam on the amount of bacteria cultured from various regions of the clinician's head during routine restorative dental treatment. "female dental students in their fourth and fifth years" n=52 (2 groups of 26) enrolled but completing study n=47 with 188 collection points"	Observational	Observational
4	Al Eid 2018	Saudi Arabia	To identify the extent of visually imperceptible blood contamination of the different surfaces of the oral surgery clinic and the PPE used therein, using forensic luminol.	Observational	Observational
5	Balcos 2019	Romania	"to evaluate the surface contamination during ultrasonic scaling in relation to certain variables of this operation. also "the distance of contamination was evaluated according to certain variables after ultrasonic scaling"	Observational	Observational
6	Barnes 1998	USA	"to determine if blood is present in the aerosols produced by subgingival ultrasonic scaling."	Observational	Observational
93	Belting 1963	USA	"The purpose of the present study was to determine whether infectious bacteria are propelled into the atmosphere when the dental air rotor is used."	Observational	Prospective observational
8	Bentley 1994	USA	This was a pilot study in 2 parts. Both tested methodologies for 1)spatter and 2) aerosols generated with high speed instrumentation but also reported results: 1) evaluated the distribution of spatter using fluorescent dye added to the handpiece water supply - drilled for 30 mins 2) evaluated aerosols using blood agar culture plates placed around the subject, dentist, assistant and operator a) high speed b) ultrasonic	Observational	Observational
9	Choi 2018	Republic of Korea	"This study aimed to reduce the risk of infection in dental treatment rooms through the airborne bacteria from aerosols during scaling, by promoting the use of face shields and prophylactic antimicrobial agents, and ultimately, to improve the quality of the medical services provided."	Intervention	Described by the authors as cross-sectional observational. Had an intervention but subjects divided into 2 groups, not randomised and designed to evaluate the effect of mouthwashes on bacteria on face shields. Only control (non-mouthwash) data are reported here

10	Chuang 20	Taiwan	"to understand the spreading characteristics of airborne bacterial contaminants during dental scaling treatment." " to obtain the four-dimensional (left, right, height and time) spreading characteristics of bioaerosols in single-chair dental clinic."	Observational	Observational "Integrated sampling of airborne bacterial aerosols was performed at 14 selected sampling sites, to understand the spreading characteristics and occupational exposure of dentists in the experiment."
92	Cochran 1989	USA	"This study reevaluated the rubber dam as an adjunctive infection control barrier for full-length restorative procedures in the dental office."	Intervention	Prospective observational
13	Dahlke 2012	USA	"To compare the effectiveness of two dry-field isolation techniques— the Isolite system (Isolite Systems, Santa Barbara, Calif.) and a dental dam with bite block and concurrent use of an HVE—with that of HVE alone (control) to reduce spatter from a dental operative site. Our null hypothesis was that the dry-field techniques would not result in a significant reduction of spatter compared with the control technique".	Intervention	Laboratory controlled trial
14	Dawson 2016	UK	"The aim of this study was to investigate the bioaerosols created during the debonding and enamel cleanup after orthodontic fixed appliance therapy. The specific objective was to investigate the effect of preprocedural rinsing before debond, with either water or chlorhexidine gluconate, on the bacterial load and biodiversity of the aerosol produced".	Intervention	Clinical trial
15	Day 2008	UK	"Our aim in this study was to assess the aerosols produced during enamel cleanup with either fast- or slow-speed hand pieces and a tungsten carbide bur, with and without water cooling. The aerodynamic diameter of the aerosol particles and, therefore, the likely level of deposition in the lung was determined along with particulate composition".	Observational	Simulation Clinical Setting
16	Devker 2012	India	Aim: To evaluate and compare the efficacy of preprocedural mouthrinsing using a bis-biguanide (chlorhexidine gluconate 0.2%) alone, high volume evacuator attachment alone and both preprocedural mouthrinsing (chlorhexidine 0.2%) and high volume evacuator attachment used together to reduce the amount of viable aerosols produced during ultrasonic scaling procedure".	Intervention	Split mouth trial
17	Davya 2019	India	"The present study was done to evaluate the aerosol and splatter contamination from various minor oral surgical procedures and to assess the risk of spread of nosocomial infection in our dental institution".	Observational	Observational clinical
18	Dos Santos 2014	Brazil	"The aim of this in vivo study was to assess whether the prior use of 0.12% chlorhexidine as mouthwash would decrease contamination caused by aerosolized sodium bicarbonate during dental prophylaxis of patients undergoing fixed orthodontic treatment".	Intervention	Quantitative longitudinal study (but its actually a trial comparing mouthwash and no mouthwash)
20	Earnest 1991	USA	Not stated but appears to be to investigate Dental aerosols produced during caries excavation and mutans streptococci and S. sanguis contamination	Observational	Observational longitudinal design
21	Feres 2010	Brazil	"To evaluate the efficacy of a preprocedural mouthrinse containing 0.05 percent CPC in reducing the levels of viable bacteria in oral spatter".+E23E18	Intervention	Randomized, double-masked, placebo-controlled clinical trial
22	Fine 1992	USA	"To determine the efficacy of preprocedural rinsing with an antiseptic mouthrinse* in reducing the level of viable bacteria contained in aerosols generated by ultrasonic scaling".	Intervention	Double-uncontrolled, cross-over, clinical study
23	Fine 1993 a	USA	"To investigate if the effect of pre-procedural rinsing with this antiseptic mouthrinse could be demonstrated 40 minutes after rinsing".	Intervention	Double-blind, controlled clinical study
24	Fine 1993 b	USA	"To report the results of 2 double blind controlled clinical trials to determine the efficacy of a new antiseptic mouthrinse in reducing the numbers of viable bacteria in dental aerosols when used pre-procedurally".	Intervention	Double-blind, controlled clinical study

25	Graetz 2014	Germany	"pilot study looked at the use of a special new cannula combined with a high-flow evacuation system for the reduction of spatter during scaling with different sonic and ultrasonic scalers to give further recommendations for working safely".	Intervention	in vitro pilot study
28	Greco 2008	USA	"We used a novel system developed to collect aerosolized bacteria generated during orthodontic debonding procedures. We assessed the presence of bioaerosols and subsequently liberated specie bacteria during the removal of orthodontic appliances. Also, a pilot study of the protective efficacy of several commonly used dental masks was assessed".	Intervention	Clinical longitudinal
29	Grenier 1995	Canada	The aim of this investigation was to use a slit type of air sampler to quantify bacterial aerosols generated during dental treatments. This study was conducted to observe variations before, during, and after dental treatments in two different clinical environments, a closed dental operator and a multichair dental clinic.	Observational	Clinical longitudinal
30	Grundy 1967	UK	"This study is concerned with tooth particles, which are another possible source of contamination of the air surrounding the operator who is using the turbine handpiece. Various sampling technics were tried for collecting particulate tooth substance that might be suspended in the air adjacent to the site of tooth preparation".	Observational	Experimental lab
31	Gupta 2014	India	"To evaluate and compare the efficacy of bacterial aerosol contamination generated by ultrasonic scalers following commercially available preprocedural rinses with HRB, 0.2% chlorhexidine gluconate (CHX),II and water".	Intervention	"double blind , placebo controlled randmosied 3-group Water (control, 2 mouthwashes) paralell deisgn"
32	Hallier 2010	UK	"To measure the levels of bioaerosol associated with dental procedures and to determine if these could be reduced in the local environment by use of the IQAir system both before and during certain types of dental procedure".	Observational	Prospective observational study
33	Harrel 1996	USA	"The present study investigates the use of an aerosol reduction device that combines a high volume evacuator sheath with the ultrasonic scaler handpiece".	Intervention	Experimental (Prospective ?)
34	Harrel 1998	USA	" In virto study to evaluate the amount of aerosol and splatter contamination produced by various types of ultrasonic scalers, inserts and power levels without the confounding variable of coolant water".	Intervention	Experimental (Prospective ?)
35	Harrel 1999	USA	Recently, a new device that attaches to the nozzle of an air polisher has been introduced. This device is designed to control the spray associated with air polishing by creating a containment area that is sealed to the tooth. The study evaluates the effectiveness of this device in reducing spray and aerosol contamination during in vitro air polishing.	Intervention	Experimental (Prospective ?)
36	Hausler 1966	USA	"This report presents data characterizing aerosol production by an air turbine handpiece used in such a controlled-environment dental operatory".	Observational	Laboratory experiemntal
37	Holloman 2015	USA	"to compare the effectiveness of the Isolite suction device with that of the saliva ejector for reducing aerosols and spatter during ultrasonic scaling in a clinical environment. We sought to assess whether the Isolite suction device decreased the aerosol and spatter during ultrasonic scaling by at least 65% when compared with the saliva ejector. As a secondary objective, we aimed to identify an alternative method to collect and quantify aerosols and spatter".	Intervention	Interventional/ RCT?

97	Ireland 2003	USA	"To determine whether the particles produced during enamel cleanup with a tungsten carbide bur, run dry, in a slow-speed handpiece, would be in the range of PM10 and PM2.5 and so might be of concern to the operator, staff, and patient".	Observational	Observational/cross-section
38	Ishihama 2008	Japan	We investigated the incidence of blood-contaminated splattering that occurred during oral surgery for an impacted mandibular third molar in 25 patients.	Observational	Cross-section observational
39	Ishihama 2009	Japan	Investigated whether surgery for an impacted third molar performed with high speed rotating instruments would produce blood-contaminated aerosols.	Observational	Cross-section observational
40	Janani 2018	India	"To determine the level and type of bacterial contamination presents on disposable surgical dental care clothing worn over scrubs of dental students to assess the risk of spread of nosocomial infection in a dental institution.	Observational	Observational study/cross-section
41	Jawade 2016	India	"to evaluate the effect of povidone iodine and chlorhexidine gluconate as an ultrasonic liquid coolant on aerosols in comparison with distilled water. The objectives of this study were to compare the potency of povidone iodine and chlorhexidine gluconate on reducing dental aerosols and quantitative assessment of microbial content of dental aerosols at right, left and behind the dental chair".	Observational	Observational study/Comparative
43	Jimson 2015	India	"To assess the bacterial composition of aerosols formed during surgical procedures".	Observational	Observational study/Comparative
42	Junevičius 2005	Lithuania	"To perform quantitative analysis and spatial distribution analysis of environmental spread of oral and cooling fluids mixture and to evaluate the effectiveness of different suction system".	Intervention	Observational study/Comparative element
44	Kaur 2014	India	"To assess the effect of chlorhexidine, povidone iodine, and ozone on the microorganisms in dental aerosols".	Intervention	Interventional/ RCT
45	King 1997	USA	"To determine in vivo whether an aerosol reduction device for an ultrasonic sealer is effective in reducing the amount of aerosol spray produced during ultrasonic instrumentation.	Intervention	Interventional/split mouth, controlled trail
46	Kobza 2018	Poland	To analyse the number of colony-forming units (CFUs) in bioaerosols and assess whether exposure limits are exceeded. Objective: To measure the concentration of bacteria and fungi in aerosols, in rooms where oral surgery was performed using high-speed instruments.	Observational	Observational study/Comparative
47	Kritivasan 2019	India	" To estimate and demonstrate the extent of aerosol production in the prosthetics labs while trimming and shaping the prosthetic materials removed from the patients mouth".	Observational	Observational/cross-section
48	Labaf 2011	Iran	"To assess quantitative analysis of dispersion of bacterial aerosols during three dental treatments including endodontic, periodontic and prosthodontic treatments	Observational	Observational/cross-section
91	Larato 1966	USA	"To determine : (1) if a marked increase occurs in the number of organisms in the surrounding air during and after use of the air turbine drill; (2) if the organism-bearing droplets ejected in the air by the drill remain suspended for an extended time in the form of droplet nuclei ; and (3) what types of organisms are liberated into the air when using the high-speed drill".	Observational	Observational study/Comparative
49	Logothetis 1995	USA	" to compare bacterial aerosol contamination generated by an air polishing device following two consecutive 30-second rinses with chlorhexidine (Peridex), an antiseptic mouthwash with essential oils (Listerine) or water.	Intervention	Interventional/ RCT

50	Manarte-Monteiro 2013	Portugal	"To assess the clinic atmosphere quality regarding the Index of Air Microbial contamination (IMA), according to dental aerosols bacterial counts, when different dentistry procedures are performed.	Observational	Observational/cross-section
89	Micik 1969	USA	"This study in dental aerobiology quantitated and compared, under controlled conditions, bacterial concentrations in aerosols produced during dental procedures and by naso-oral activities".	Observational	Observational/cross-section
51	Miller 1971	USA	"The study was undertaken to determine rates of production, particle size distribution, persistence and blood content of aerosols generated by powered dental instrument forces, and the filtration efficiency of nine makes of surgical masks worn by dentists primarily for prevention of occupational infection".	Observational	Prospective experiment
90	Miller 1995	USA	" A study was conducted that quantitated and mapped the patterns of splatter occurring in the dental operator as a result of dental instrumentation and various vocal and respiratory activities".	Observational	Observational/cross-section
52	Mohan 2016	India	"The study was performed to assess the efficacy of pre-procedural rinsing with chlorhexidine mouth wash in reducing bacterial aerosol contamination following oral prophylaxis".	Intervention	RCT
53	Muzzin 1999	USA	"To determine the effectiveness of an aerosol reduction device during air polishing".	Intervention	Prospective split-mouth intervention study
54	Narayana 2016	India	"This study was to analyze the number of colony forming units (CFUs) in bioaerosols generated during ultrasonic scaling procedure as well as to evaluate the efficacy of chlorhexidine 0.12% (CHX) preprocedural mouth rinse and high volume evacuator (HVE) in minimizing the bioaerosol contamination".	Intervention	Prospective split-mouth intervention study
55	Nejatidanesh 2013	Iran	"The aim of this study was to evaluate the risk of contamination in high-risk areas of dentist's face during dental practice".	Observational	Prospective observational
56	Oliveira 2018	Brazil	"This quantitative and qualitative study aimed to evaluate the level of fungal contamination in aerosols dispersed by high rotation pens in dental clinics from Teresina, Piaui, Brazil".	Observational	Prospective observational study
59	Prospero 2003	Italy	"This study was conducted with the aim of focusing attention on the need for infection control procedures in dentistry. The quantitative and qualitative bacterial contamination of dental healthcare workers' faces and other surfaces in dental practice during routine procedures was determined".	Observational	Prospective observational study
60	Purohit 2009	India	to determine the efficacy of pre-procedural rinsing with chlorhexidine in reducing bacterial aerosol contamination during use of ultrasonic scaler and high speed air turbine handpiece.	Intervention	Prospective experimental split mouth study
61	Ramesh 2015	India	"in this pilot study, the efficacy of preconditioning using 1.5% hydrogen peroxide followed by rinsing with 0.2% chlorhexidine was evaluated over chlorhexidine alone, with saline as a negative control in reducing the microbial counts in the aerosol produced during ultrasonic scaling".	Intervention	Interventional/RCT
62	Rao 2015	India	" To determine the efficacy of preprocedural rinsing with an antimicrobial mouthrinse containing chlorhexidine in reducing the level of viable bacteria contained in aerosols generated by ultrasonic scaling"	Intervention	Comparative two-arm prospective study involving mouthwash
63	Rautemaa 2006	Finland	"To determine how far airborne bacteria spread during dental treatment, and the level of contamination".	Observational	Observational/cross-section
64	Reddy 2012	India	" To compare and determine the effect of temperature in reducing the bacterial load of the aerosols produced by the ultrasonic units".	Intervention	Interventional/RCT
65	Retamal-valdes 2017	Brazil	"To evaluate the effect of a pre-procedural mouthwash containing cetylpyridinium chloride (CPC), zinc lactate (Zn) and sodium fluoride (F) in	Intervention	Interventional/RCT

			the reduction of viable bacteria in oral aerosol after a dental prophylaxis with ultrasonic scaler".		
66	Rivera-Hidalho 1999	USA	" This study compares the amount of aerosol produced by a traditional ultrasonic scaler insert and that produced by a new focused style insert. In addition, the effect of using an aerosol reduction device with both types of inserts is evaluated	Intervention	Interventional study/control trail (experiment)
69	Sadun 2020	Malaysia	" To evaluate the effectiveness of pre-procedural rinsing with essential oils-based mouthwash in reducing aerosol contamination in a dental clinical setting during dental procedures, as well as to isolate and identify microbial contaminants in bioaerosol produced during treatment of caries and periodontal patients"	Intervention	RCT
70	Saini 2015	India	"To evaluate and compare the efficacy of bacterial aerosol contamination generated by ultrasonic scalers following preprocedural rinse with commercially available ClO2 (Chlorine Dioxide) , 0.2% CHX (Chlorhexidine), and water"	Intervention	Intervention/ RCT
88	Samaranayake 1989	UK	"To evaluate quantitatively the changes, if any, in atmospheric bacterial pollution, when conservative procedures are performed in two groups of pedodontic patients with and without rubber dam isolation"	Observational	Observational/cross-section
71	Sawhney 2015	India	"To determine the microbial atmospheric contamination during initial periodontal treatment using a modern and at present widely used piezoelectric scaler and to evaluate the efficacy of two commercially available mouth rinses (0.2% Chlorhexidine mouth rinse and Listerine) in reducing bacterial contamination when used as a pre-procedural rinse, with and without high volume evacuation (Aerosol reduction device)"	Intervention	Intervention/RCT
72	Serban 2013	Romania	"To analyze the infection risk through spatter and aerosolization during scaling and to create a prediction model of the total number of hemolytic bacteria using patient's clinical features"	Intervention	RCT
73	Sethi 2019	India	"To compare and evaluate the efficacy of chlorhexidine and cinnamon extract as an ultrasonic coolant in reduction of aerosol contamination and biofilm formation during ultrasonic scaling in comparison with the distilled water (DW)"	Intervention	Intervention/RCT
74	Shetty 2013	India	"To evaluate and compare the efficacy of preprocedural mouthrinses (chlorhexidine digluconate and tea tree oil) in reducing microbial content of aerosol product during ultrasonic scaling procedures by viable bacterial count"	Intervention	RCT
76	Singh 2016	India	"To evaluate the aerosol contamination produced during ultrasonic scaling by the help of microbiological analysis"	Intervention	Single centre, double-masked, RCT
96	Stevens 1963	USA	"The purpose of this preliminary study was to demonstrate the existence of a spray contaminated with microorganisms from the flora in the patient's mouth and to determine the extent of the microorganism-bearing spray created in the field of operation by the use of the air turbine handpiece."	Observational	Observational/cross-section
78	Swaminathan 2014	India	to compare the effectiveness of herbal mouthwash as a pre procedural mouth rinse over 0.2% chlorhexidine mouthwash in reducing the bacterial count in saliva and also to know whether the reduction of bacterial count in the saliva has any effect on the proportionate reduction of the aerosol production in two groups of patient with herbal mouthwash and chlorhexidine mouthwash.	Intervention	RCT 3 arms with 10 patients in each arm. Arm 1 (control) = rinse with saline; Arm 2 = with 0.2% chlorhexidine and arm 3 with herbal mouthwash. But also determined the spread and amount of contamination by collecting aerosol at 1,2 and 3 feet distance

94	Tag El-Din 1997	Egypt	"The aims of the present work were to: 1) evaluate quantitatively the changes in atmospheric bacterial pollution when conservative procedure, were performed in a paedodontic clinic and 2) compare the efficacy of rubber dam and antiseptic mouth rinsing in reducing bacterial contamination."	Observational AND Interventional (2parts)	Observational/ comparative and RCT
80	Timmerman 2004	Netherlands	To determine the microbial atmospheric contamination during initial periodontal treatment using a piezoelectric ultrasonic scaler in combination with either high-volume evacuation (HVE) or conventional dental suction (CDS).	Intervention	Randomised trial of suction types monitoring environmental study before during and after treatment comparing high volume evacuation [HVE] with conventional dental suction [CDS]
81	Toroğlu 2001	Turkey	"This study consisted of 2 parts. The aim of the first part of the study was to evaluate the amount of aerosol contamination during the removal of excessive adhesive bonding materials with a handpiece in orthodontic patients and to identify the microorganisms present in the aerosol spray. The second part of the study aimed to clarify the clinical effects of a preprocedural chlorhexidine mouthwash on the amount of aerosol generation".	Intervention	the paper included 2 aims with two different designs: 1) observational/Comparative; 2) Interventional/RCT (split-mouth design)
82	Toroğlu 2003	Turkey	"To determine the presence or absence of blood and hepatitis B in the aerosols generated by a high-speed dental hand piece used during the debonding procedure".	Observational	Observational/cross-section
95	Travaglini 1966	USA	The microbial aerosol, resulting during the use of high-speed dental drills can also act as a pathway for the spread of respiratory infections from patient to dentist by carrying the common cold or influenza virus from the patient's mouth into the surrounding air. ... This study was undertaken to focus the dentist's attention on this health hazard.	Observational	Observational/cross-section
83	Veena 2015	India	"To evaluate the contamination distance, contamination amount and contamination duration of aerosol produced during ultrasonic scaling".	Observational	Observational/cross-section
84	Wada 2010	Japan	"To evaluate the dissemination of blood and distribution of frequent contaminations"	Observational	Prospective, single centre trial
85	Watanabe 2013	Japan	To investigate the contamination patterns produced by aerosol and splatter during ultrasonic scaling followed by professional mechanical tooth cleaning (PMTC)	Observational	Prospective cohort study
87	Yamada 2011	Japan	" To clarify whether blood contaminated aerosols were existant and floating in air during dental procedures and to evaluate the effect of an extraoral evacuator system"	Intervention	Prospective single centre trial

		Study setting								
Unique Study ID	Study author and reference	Nature e.g. Simulation or Clinical (Please choose from the dropdown list)	Type e.g. hospital, practice, laboratory, other (Please choose from the dropdown list)	Other (please specify)	If hospital or practice, was the study in single surgery of multi-chair setting? (please choose from the dropdown list; single, multiple, unclear, not stated N/A)	Was the study setting cleaned/disinfected before the procedure (Please choose from the dropdown list; yes, no, N/A)	Procedure	Procedure – further details	Instrument details	If the duration of the procedure was stated, please enter it here
2	Agostinho 2004	Simulation	Laboratory	N/A	N/A	N/A	Slow-speed handpiece	Prosthodontic: denture polishing in the lab	Dental lab lathe machine (2,600rpm) with polishing cones and pumice	4 mintue
98	Aguilar-Duran 2020	Clinical	Hospital	N/a	Unclear	Not stated	Oral Surgery	Oral Surgery: Extraction of impacted or erupted teeth and implant placement	High-speed air-turbine handpiece with water cooling or low-speed electric straight handpiece with external cooling using a syringe (for extraction). Electric contra-angled handpiece with saline cooling incorporated in the handpiece(for implant placement)	Reported as > or < 30 mins
3	Al-Amad 2017	Clinical	Hospital	N/A	Unclear	Not stated	High-speed handpiece	Restorative: cavity preparation	High speed hand piece with surgical suction tube	30 minutes
4	Al Eid 2018	Clinical	Hospital	N/A	Unclear	Yes	Oral Surgery	Oral Surgery: removal of one or both impacted third molar teeth	Rotary hand piece with low volume vacuum suction	Not stated
5	Balcos 2019	Clinical	Not stated	Unclear whether was hospital or practice but carried out in a dental surgery.	Unclear	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (piezoelectric) with suction	10 mins
6	Barnes 1998	Clinical	General Practice	N/A	Single	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling/subgingival	Ultrasonic scaler (magnetostrictive with a speed of 25 kHz)	30 SECONDS
93	Belting 1963	Clinical	Not stated	N/A	Single	Not stted	High-speed handpiece Air-water(triple) syringe	Restorative: drilling with water on not touching the tooth	High speed handpiece Air-water(Triple) syringe	1 minute

								Restorative: Drilling with water off not touching tooth Water spray		
8	Bentley 1994	Clinical and Simulation (2 parts)	Hospital	N/A	Single	Unclear	Ultrasonic scaling High-speed handpiece	Periodontics :ultrasonic scaling Restorative: tooth preparation	Ultrasonic scaler with saliva ejector High speed handpiece with High volume aspirator	Experiment 1) 2 minutes (spatter) Experiment 2a) 30 minutes (aerosol with high speed Experiment 2b))30 minutes (aerosol with ultrasonic)
9	Choi 2018	Clinical	Hospital	N/A	Single	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	not stated
10	Chuang 20	Clinical	Not stated	Unclear whether was hospital or practice but carried out in a dental surgery.	Single	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (Cavitron with a speed of 25 kHz) with regular-power fluent suction	not stated
92	Cochran 1989	Clinical	Not stated	N/A	Single	Yes	High-speed handpiece	Restorative: cavity excavation	High speed handpiece with rubber dam High speed handpiece without rubber dam	For the air turbine 11.8 - 23.8 mins and for the water spray 8 mins
13	Dahlke 2012	Simulation	General Practice	dental operatory (with the door closed)+ manikin head (KaVo Dental, Charlotte, N.C.) placed into the headrest position of a dental chair.	Unclear	Yes	High-speed handpiece	Restorative: tooth preparation of occlusal surfaces on teeth no. 18,19, and 20.	High speed handpiece (200,000 rpm) and carbide bur (no.330) with HVE	10 seconds
14	Dawson 2016	Clinical	General Practice	Dental operatory in orthodontic department at Hospital in a side surgery, separate	Single	Not stated	Slow-speed handpiece	Fixed Orthodontic appliance removal : enamel cleanup from the residual composite and	Slow-speed handpiece, no preprocedural mouth rinse Slow-speed handpiece,sterile water preprocedural mouth rinse	15 minutes or less

				from the main clinic. Doors and windows remained closed, and no air-conditioning or fan units were operating.				glass polyalkenoate		
15	Day 2008	Simulation	General Practice	performed in a closed side surgery that had not been used for clinical work for more than 5 days	Single	N/A	High-speed handpiece Slow-speed handpiece	Fixed Orthodontic appliance removal : enamel cleanup from the residual composite and glass polyalkenoate	High-speed <u>without water</u> High-speed <u>with water</u> Slow-speed handpiece, no pre-procedural mouth rinse Slow-speed handpiece, sterile water preprocedural mouth rinse.	Not stated
16	Devker 2012	Clinical	General Practice	N/A	Unclear	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling for one quadrant	Ultrasonic scaler (piezoelectric) with HVE	10 mins
17	Davya 2019	Clinical	Hospital	university hospital setting, cubicles separated by glass	Multiple	Yes	Oral Surgery	Oral Surgery: Surgical removal impacted tooth, alveoplasty, and transalveolar extraction	High speed handpiece with HVE, pre-procedural mouthrinse using Chlorhexidine was given before all procedures	30 participants (10 in each category of treatment) 30 mins of data collection during procedure
18	Dos Santos 2014	Clinical	Hospital	school of dentistry orthodontic dept postgraduate clinic	Unclear	Yes	Air polishing	Periodontics: dental prophylaxis Polishing. Patient rinsed their mouth with distilled water	Sodium bicarbonate jet of which a container was filled with distilled water	Not stated
20	Earnest 1991	Clinical	Hospital	University clinic	Unclear	N/A	High-speed handpiece	Restorative: cavity preparation of the occlusal surface	High-speed <u>without water</u>	not stated and procedure is not fully clear ie which teeth
21	Feres 2010	Clinical	Hospital	university hospital setting	Single	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	10 minutes
22	Fine 1992	Clinical	General Practice	N/A	Unclear	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling for half of the mouth	Ultrasonic scaler (Cavitron Model 3000)	10 mins

23	Fine 1993 a	Simulation	General Practice	N/A	Unclear	Not stated	Ultrasonic scaling	Periodontics: supragingival ultrasonic scaling for half of the mouth	Ultrasonic scaler (Cavitron Model 3000) <u>with air flow vacuum</u>	Five minutes
24	Fine 1993 b	Clinical	General Practice	N/A	Unclear	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	Five-minute
25	Graetz 2014	Simulation	Hospital	N/A	Single	Not stated	Ultrasonic scaling	Periodontics: supra/subgingival ultrasonic scaling	1) One sonic scaler AIR (Synea, W&H) with saliva ejector (1st arm) and high-speed evacuation system (2nd arm) 2) Ultrasonic scaler VEC (Vector, Dürr) were used with slimline tips with saliva ejector (1st arm) and <u>high-speed evacuation system (2nd arm).</u>	2 Minutes
28	Greco 2008	Clinical	General Practice	dental office	Unclear	Not stated	High-speed handpiece	Fixed Orthodontic appliance removal : remove the excess adhesive material left on the right side of the upper and the lower dental arches	High speed handspeed (30,000 rpm) with no water	length of procedure plus 10 min for 24 patients
29	Grenier 1995	Clinical	Hospital	dental school	Single + Multiple	N/A	Ultrasonic scaling High-speed handpiece	Periodontics: Ultrasonic scaling Restorative: drilling	Ultrasonic scaler with Rubber dam High speed hand piece with rubber dam	High-speed drilling= 8 minutes. Ultrasonic scaling=15 minutes.
30	Grundy 1967	Simulation	Laboratory	N/A	N/A	N/A	High-speed handpiece	Restorative: wet/dry drilling	High speed enamel cutting	sampling at .5 minute periods The interval between samples was 2 minutes during particle count sampling. A steady rise in the counts taken in control periods between cuttings indicated a "hangover") effect of particles still suspended in

										the air from the previous experimental period. To reduce this effect, the sampling interval for all calcium estimations was increased to 5 minutes and, for 1 minute of this period, the air surrounding the mouth was cleared with a forced blast from an air compressor.
31	Gupta 2014	Clinical	Hospital	N/A	Single	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (piezoelectric) with high volum suction	30 mins
32	Hallier 2010	Clinical	Hospital	N/A	3 Settings were used: 2 were Multiple. 1 was a single room clinic	Yes	Ultrasonic scaling High-speed handpiece Oral surgery	Periodontics: ultrasonic scaling Restorative: cavity preparation Oral surgery: tooth extraction	Ultrasonic scaler with high volum aspirator High speed handpiece Hand instruments	NS
33	Harrel 1996	Simulation	Other	A clear plastic enclosure 41 X 26 X 41 cm was fabricated to surround a dentoform model on 3 sides and a 1cm ² open overlay grid made of a frame strung with cord placed over paper	N/A	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler with HVE Ultrasonic scaler without HVE	1 minute
34	Harrel 1998	Simulation	Other	A clear plastic enclosure 41 X 26 X 41 cm was fabricated to surround a	N/A	Yes	Ultrasonic scaling Hand scaling	Periodontics: ultrasonic scaling Periodontics: hand	Ultrasonic scaler (Magnetostrictive 25 kHz); Ultrasonic scaler (Autotuned magnetostrictive 30 kHz); Ultrasonic scaler (manually tuned magnetostrictive 25 kHz);	3 seconds

				dentofrom model on 3 sides and a 1cm ² open overlay grid made of a frame strung with cord placed over paper					Ultrasonic scaler (Piezoelectric 42 kHz); and Hand instrument: Gracey 1/2 hand curette	
35	Harrel 1999	Simulation	Other	A clear plastic enclosure 41 X 26 X 41 cm was fabricated to surround a dentofrom model on 3 sides and a 1cm ² open overlay grid made of a frame strung with cord placed over paper	N/A	Yes	Air polishing	Periodontics: dental prophylaxis Polishing	Air polisher jet (model: Prophy-Jet 30, Dentsply Intenational)	2 secs polishing on surfaces of 8 teeth
36	Hausler 1966	Simulation	General Practice	Not sre if actual operatry or simulated operator of 8 by 10 feet with a 9-foot ceiling. The walls and ceiling were plastered and painted with two coats of a water-resistant paint. After providing a drain in the floor, the entire floor was covered with ceramic tile. Aluminum frame	Unclear	Yes	High-speed handpiece	Restorative: cuttig of tooth with handpiece	High speed handpiece with <u>Aerosol reduction device</u>	not clear

				windows were caulked and sealed, and the entrance door was fitted with a self-sealing closure. In the crawl space above the ceiling were installed an air conditioner and its ducts, an exhaust fan, and an air compressor. The air-conditioning unit could be adjusted to introduce tempered air or to recirculate air within the room, or it could be turned off while the exhaust fan was in operation. The exhaust fan was covered to prevent transfer of air when not in operation. As determined by the use of smoke tubes, the room was under positive						
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				internal pressure. The essential furnishings within the operatory were a dental chair, unit, and a hand sink. The dental chair was positioned so that the headrest bracket was located in the center of the room.						
37	Holloman 2015	Clinical	Hospital	N/A	Single	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic Scaler (Cavitron Seletc SPS, 30kHz) with suction	Mean (SD) Times scaling- Control 10.08 (2.75) & Test 9.92 (2.25)
97	Ireland 2003		Not clear	N/A	Not stated	Yes	Slow-speed handpiece	Fixed Orthodontic appliance removal : remove the bonding agent (a light-cured, filled, diacrylate bonding agent: Transbond XT & glass polyalkenoate cement	Slow-speed handpiece with Spiral tungsten carbide	5 and 10 minutes
38	Ishiharma 2008	Clinical	Hospital	N/A	Not stated	Yes	Oral Surgery	Oral Surgery: surgical removal of mandibular impacted third molars	Slow speed handpiece(12,000 rpm) with a steel round-bar and standard suction; and High speed dental turbine handpiece (380,000 rpm) with a diamond point bar with standard suction.	Recorded as <10 , 10-20 or >20
39	Ishiharma 2009	Clinical	Hospital	N/A	Not stated	Yes	Oral Surgery	Oral Surgery: Surgical removal of impacted third molars	High speed handpiece	Duration of high speed instruments ranged from 2to 47.9min. Medium of 6.4min in 70 cases

40	Janani 2018	Clinical	Hospital	N/A	Unclear	Not stated	Oral Surgery	Oral Surgery: Impaction Transalveolar; extraction; alveoloplasty	Not stated	
41	Jawade 2016	Clinical	Hospital	N/A	Unclear	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler <u>with universal tip</u>	20 minutes
43	Jimson 2015	Clinical	Hospital	N/A	Single	Not stated	Oral Surgery	Oral Surgery: Surgical removal of mandibular impacted third molar	Surgical bur and handpiece (speed and/or type was not specified)	N/A
42	Junevičius 2005	Simulation	Other	An even plane surface is formed 25 cm below a phantom and seven microscopy slides of 75x25 mm are put at every 10cm	N/A	N/A	High-speed handpiece	Restorative: drilling	High speed handpiece	5 minutes
44	Kaur 2014	Clinical	Other	N/A	Not stated	Not stated	Ultrasonic scaling	Periodontics: Ultrasonic scaling	Ultrasonic scaler <u>with saliva ejector</u>	10 minutes
45	King 1997	Clinical	Hospital	N/A	Single	Yes	Ultrasonic scaling	Periodontics: Ultrasonic scaling	Ultrasonic scaler (Cavitron Model 3000) <u>with saliva ejector</u>	5 minutes
46	Kobza 2018	Clinical	General Practice	N/A	Single + multiple	Not stated	Oral Surgery	Oral Surgery: Procedure not stated	High speed handpiece <u>with extra-oral evacuator system</u>	Not stated
47	Kritivasan 2019	N/A	Laboratory	N/A	N/A	N/A	Slow-speed handpiece	Prosthodontic: denture polishing and trimming in the lab	Micro-motor (35,000 rpm)	Not stated
48	Labaf 2011	Clinical	Hospital	N/A	Single	Not stated	High-speed handpiece Ultrasonic scaling	Restorative: access cavity preparation for endodontic treatment and tooth preparation for fixed partial denture. Periodontics: ultrasonic scaling	High speed dental handpiece Ultrasonic scaler (Cavitron)	3 hours
91	Larato 1966	Clinical	Hospital	N/A	Single	Not stated	High-speed handpiece	Restorative: cavity excavation	High speed handpiece <u>with aspirating system</u>	1.5-5 mins.
49	Logothetis 1995	Clinical	Hospital	N/A	Single	Not stated	Air polishing	Periodontics: dental	Air polisher jet (Cavitron Cavi-Jet 30)	3 minutes

								prophylaxis Polishing		
50	Manarte-Monteiro 2013	Clinical	Hospital	N/A	Multiple	Not stated	High-speed handpiece	Restorative: access cavity preparation for endodontic treatment, and direct restoration with adhesive or non-adhesive dental materials.	A mixture of hand instruments and high speed handpiece <u>with rubber dam</u>	1-4 hours
89	Micik 1969	Simulation	Other	A human aerosol test chamber was designed and constructed to provide a closed environment with minimal background air contamination. The test chamber, a 30 X 30 X 90-cm rectangular stainless steel box with tapered ends, was suspended above a dental chair. The top was fitted with a 20 X 30-cm window, and the sides with glove ports, sleeves, and surgeon's gloves, allowed the dentist to see and operate	N/A	Yes	High-speed handpiece Air-water(triple)syringe) Hand scaling Prophylaxis	Restorative: cavity preparation (with air coolant+ Water coolant) Wash teeth (water spray+ stream) + Dry teeth (air spray) Periodontics: hand scaling Periodontics: prophylaxis polishing	High speed hand piece <u>with high velocity suction</u> Air-water(Triple) syringe Hand instruments <u>with high velocity suction</u> High speed handpiece and pumice (polishing) <u>with high velocity suction</u> Rubber cup + pumice + slow-speed handpiece <u>with high velocity suction</u>	10-120 SECOND FOR THE DIFFERENT ACTIVIES
51	Miller 1971	Simulation	Other	The experiment was conducted inside a	N/A	N/A	Ultrasonic scaling High-speed handpiece, Air-water(Triple)	Periodontics: ultrasonic scaling Periodontics: prophylaxis polishing	Ultrasonic scaler with <u>high velocity suction (scaling)</u> High speed with <u>high velocity suction</u> Air-water(Triple) syringe	N/A

				stirred-settling aerosol chamber volume=1 m3).			syringe Prophylaxis	Restorative: cavity preparation (with air collant+ Water coolant) water spray + air alone + water wash alone Periodontics: prophylaxis polishing	Rubber cup + pumice + slow-speed handpiece with high velocity suction	
90	Miller 1995	Clinical	Other	A 2.43 X 3.03 X 2.27 meter clean room (8 X 10 X 7.5 feet) was constructed and fitted as a dental operatory.	Single	Yes	High-speed handpiece Air-water(Triple syringe)	Restorative: cavity preparation	Head speed handpiece Air-water(Triple) syringe	20 seconds
52	Mohan 2016	Clinical	Hospital	N/A	Not stated	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	N/A
53	Muzzin 1999	Clinical	Hospital	N/A	Single	Not stated	Air polishing	Periodontics: air polishing	Air polisher jet (Cavitron Jet, Dentsply Preventive Care) with low volume suction	N/A
54	Narayana 2016	Clinical	Hospital	N/A	Single	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler with HVE	N/A
55	Nejatidanesh 2013	Clinical	General Practice	N/A	Not stated	Not stated	Ultrasonic scaling High-speed handpiece	Periodontics: ultrasonic scaling for half mouth Restorative: direct restoration with adhesive or non-adhesive dental materials	Ultrasonic scaler (Cavitron) High-speed handpiece	44 minutes (average duration of the procedure)
56	Oliveira 2018	Clinical	Hospital	N/A	Multiple	Not stated	High-speed handpiece	Restorative: drilling	High speed handpiece	15 minutes
59	Prospero 2003	Clinical	General Practice	N/A	Multiple	Not stated	Ultrasonic scaling High-speed handpiece	Periodontics: ultrasonic scaling Restorative: drilling	Ultrasonic scaler Drills (No further information provided)	N/A
60	Purohit 2009	Clinical	General Practice	N/A	Not stated	Yes	Ultrasonic scaling High-speed handpiece	Periodontics: ultrasonic scaling Restorative: operative work for carious teeth	Ultrasonic scaler (Magnetostrictive at a speed of 30 kHz) High speed handpiece (400,000 rpm)	N/A
61	Ramesh 2015	Clinical	Hospital	N/A	Single	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (piezoelectric) with high volum suction	5 minutes
62	Rao 2015	Clinical	Hospital	N/A	Unclear	Not stated	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (piezoelectric) with motorized suction	30 mins

								for chronic periodontitis clinical conditions		
63	Rautemaa 2006	Clinical	Hospital	N/A	Single	Yes	High-speed handpiece Hand scaling	Restorative: restorative work Periodontics+ Orthodontic (combined): no information provided	High speed handpiece (Restorative) Hand instruments (Ortho+ Perio procedures)	40 minutes
64	Reddy 2012	Clinical	Hospital	N/A	Not stated	No	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	Not stated
65	Retamal-valdes 2017	Clinical	General Practice	N/A	Single	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (Cavitron, 25 kHz)	10 minutes
66	Rivera-Hidalho 1999	Simulation	Other	enclosed plastic box 41x26x41 cm with a grid of 1cm squares on 4 sides.	N/A	N/A	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (Cavitron 3000, 30 kHz) with (Standard) design inserts Ultrasonic scaler (Cavitron 3000, 30 kHz) with (Focused) design insert	1 minute
69	Sadun 2020	Clinical	Hospital	N/A	Not stated	No	Ultrasonic scaling	Periodontics: ultrasonic scaling for advanced periodontitis clinical conditions	Ultrasonic scaler	2 mins
70	Saini 2015	Clinical	Hospital	N/A	Not stated	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	10mins each for experimental and treatment groups
88	Samaranayake 1989	Clinical	Hospital	N/A	Single	Not stated	High-speed handpiece	Restorative: cavity preparation	Ultrasonic hand piece	5-15 mins.
71	Sawhney 2015	Clinical	Hospital	N/A	Not stated	No- However only one patient was treated per day and the treatment ended the same day. The patient was the first patient of the day. The room was fumigated at the end of the day and left for 15 mins	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler with HVE	Not stated
72	Serban 2013	Clinical	General Practice	Multi-centre	Not stated	No- However, the participants were	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	No

						the first patient of the working day, after 12 hours lack of activity.				
73	Sethi 2019	Clinical	Hospital	N/A	Multiple	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	20 mins
74	Shetty 2013	Clinical	Hospital	N/A	Single	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler	10 mins
76	Singh 2016	Clinical	Hospital	N/A	Single	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler <u>with motorized suction</u>	Unclear
96	Stevens 1963	Clinical	Not stated	N/A	Not stated	No	High-speed handpiece	Restorative: cavity preparation	High speed handpiece (200,000-300,000 rpm) <u>with rubber dam</u> High speed handpiece (200,000-300,000 rpm) <u>with HVE</u>	Not stated
78	Swaminathan 2014	Clinical	Hospital	N/A	Not stated	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (piezoelectric 7 kHz) <u>with HVE</u>	Unclear
94	Tag El-Din 1997	Clinical	Hospital	N/A	Not stated	Not stated	High-speed handpiece (Paediatric patient)	Restorative (Paediatric patient): Restorations on anterior (composite) or posterior teeth (amalgam).	High speed handpiece <u>with rubber dam</u> High speed handpiece <u>without rubber dam</u>	5-15 minutes
80	Timmerman 2004	Clinical	Hospital	N/A	Single	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (piezoelectric, Piezo Master 400, EMSs) <u>with HVE</u> Ultrasonic scaler (piezoelectric, Piezo Master 400, EMSs) <u>with conventional dental suction</u>	40 mins
81	Toroğlu 2001	Clinical	Not stated	Unclear whether was hospital or practice but carried out in a dental surgery.	Single	Yes	High-speed handpiece	Fixed Orthodontic appliance removal : remove the excess adhesive material left on the right side of the upper and the lower dental arches	High speed handpiece (30,000 rpm) with tungsten carbide bur and <u>slow speed evacuation</u>	5 minutes
82	Toroğlu 2003	Clinical	Not stated	Unclear whether was hospital or practice but carried out in a dental surgery.	Single	Yes	High-speed handpiece	Fixed Orthodontic appliance removal : remove the excess adhesive material left on the right side of the upper and	High speed handpiece (30,000 rpm) with tungsten carbide bur and <u>mobile oral evacuation</u>	Not stated

								the lower dental arches		
95	Travaglini 1966	Clinical	Not stated	N/A	Not stated	No	High-speed handpiece	Restorative: Cavity preparation of black Class I, II, III, V cavities	High speed handpiece	1-4 minutes
83	Veena 2015	Simulation	Other	A mannequin fitted with phantom jaws on a dental chair.	N/A	N/A	Ultrasonic scaling	Periodontics: ultrasonic scaling	Ultrasonic scaler (magnetostrictive with a speed of 25 kHz) with <u>low saliva ejector</u>	15
84	Wada 2010	Clinical	Hospital	N/A	Single	Yes	Oral Surgery	Oral Surgery: Impacted mandibular third molar extraction	Slow speed handpiece (12,000 rpm) with a steel round-bar and <u>standard suction</u> ; and High speed dental turbine handpiece (380,000 rpm) with a diamond point bar <u>with standard suction</u> .	Not stated
85	Watanabe 2013	Clinical	Not stated	Study setting is unclear-treatment was performed during clinical practice sessions of students in a dental hygiene programme (the patients were also students)	Unclear	Yes	Ultrasonic scaling	Periodontics: ultrasonic scaling + Periodontics: Polishing (professional mechanical tooth cleaning)	Ultrasonic scaler High speed hand speed	Not stated
87	Yamada 2011	Clinical	Hospital	N/A	Multiple	Not stated	Ultrasonic scaling High-speed handpiece Oral Surgery	Periodontics: ultrasonic scaling Restorative: black class II cavity, inlay cavity preparation, and black class I full crown preparation Oral Surgery: impacted third molar extraction	Ultrasonic scaler with <u>two HVEs</u> High speed hand speed with <u>two HVEs</u> High speed hand speed with <u>two HVEs</u>	Not stated

		Which area was measured?			
Unique Study ID	Study author and reference	Person e.g. dental operator, dental nurse/ assistant, patient (choose from dropdown list; Yes, No, N/A)	If Yes please specify who and which parts of body	Environment area measured within surgery or laboratory was it air, ? (choose from dropdown list; Yes, No, N/A)	If Yes, please specify which areas of the environment
2	Agostinho 2004	Yes	Thorax and abdomen area of the technician	No	N/A
98	Aguilar-Duran 2020	Yes	Surgeons and dental assistants: PPE used including facial masks with visor and surgical caps	No	N/A
3	Al-Amad 2017	Yes	Operator: head, autoclaved headscarves were worn then swabbed at 4 different specific locations : the forehead (A), the area overlaying the left ear (B), the area overlaying the submental triangle (C), and the area overlaying the occiput (D).	No	N/A
4	Al Eid 2018	Yes	dentist and dental assistant the PPE	Yes	The clinic area (15 subsites) and
5	Balcos 2019	Yes	patient - area around mouth (right, left, above and below) and operator - chest area	No	N/A
6	Barnes 1998	No	N/A	Yes	The high volume aspirator tip was used as a way of measuring whether blood was generated through subgingival scaling.
93	Belting 1963	No	N/A	Yes	Petri dishes placed in three positions: (1) Infront of the patient mouth at chin level 6 inches away (2) Bracket table in front of the patient, 2 ft. away from patient mouth, (3) On the instrument cabine to the right front of the patient 4 ft. away from patient mouth.
8	Bentley 1994	Yes	Operator: headcaps, masks and gowns. Dental Assistant: headcaps, masks and gowns. Patient: chest	Yes	1) Blood agar culture plates were placed along the six spokes of the headrest extension device at 12 and 24 inches from the subject's mouth 2) bracket table, 3) counter tops, 4) light
9	Choi 2018	Yes	Eye area of visor	No	N/A
10	Chuang 20	Yes	Dentist collar, dentist chest	Yes	11 different areas in the surgery: 1) 0 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 45angle from the treatment tray 2) 100 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 45angle from the treatment tray, located on Bench 1 3)

					50 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 15° angle from the treatment tray 4) 100 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 15° angle from the treatment tray, located on Bench 2 5) 10 cm above the patient's oral cavity, 50 cm above the floor 6) 30 cm above the patient's oral cavity, 50 cm above the floor 7) 50 cm above the patient's oral cavity, 50 cm above the floor 8) On the dental treatment tray 9) 150 cm horizontally from the patient's oral cavity, located on Bench 3 10) 50 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 12° angle from the treatment tray 11) The flush output of the dental handpiece
92	Cochran 1989	Yes	Patient: chest	Yes	4 petri dishes attached to the dental unit light 24 inches above pt mouth
13	Dahlke 2012	No	N/A	Yes, Aerosol generated around patient's mouth	Area surrounding the manikin mouth (just outside the mouth) and around the patient's head area (floor and headrest)
14	Dawson 2016	No	N/A	Yes	the Andersen impactor air sampler placed at 30 cm away from patient's mouth.
15	Day 2008	No	N/A	Yes	The air sampler placed at 30 cm from the tooth
16	Devker 2012	Yes	Reference point: Mouth of the patient. <ul style="list-style-type: none"> • At 6 inches (half feet) from reference point (represent operator's nose level). • At 6 inches (half feet) from reference point (represent assistant's nose level). • At 12 inches (1 feet) from reference point (represent patient's chest area). 	Yes	<ul style="list-style-type: none"> • At 36 inches (3 feet) from reference point on patient's right.
17	Davya 2019	Yes	N/A	Yes	A total of six nutrient agar plates were placed at six different places in the dental cubicle during three different minor oral surgical procedures. Agar plates were kept, on the instrument trolley, on the patient, one in the right middle cubicle, one in the left middle cubicle, and at the right and left corners of the dental cubicle [Figure 2]. They were kept open during the entire duration of the procedure. The plates were kept at a standard distance from the procedural site.
18	Dos Santos 2014	Yes	dish placed onto 1) the clinician's face (forehead area) (taped to a skullcap) (P1). 2) 10 cm from the clinician's mouth (P2). 3) over the patient's thoracic region , 15 cm from the oral cavity	No	N/A
20	Earnest 1991	Yes?	Operator (reported as extraoral sampling): obtained by placing the filter unit, with a 0.45 µm pore size connected to a vacuum, near the operator's face (5-8 ft away). Patient: Intraoral sampling: saliva ejector placed on the occlusal surfaces of the	No	n/a

			teeth, on the side lateral to the cavity preparation, for a 10-second exposure.		
21	Feres 2010	Yes	One plate on patient chest, and one on the examiner forehead	Yes	3 plates attached to a support board at a 50 degree angle to participant chest and 12 inches from patient mouth.
22	Fine 1992	No	N/A	Yes	air sampled using modified vacuum air sampling device 2 inches from patient mouth
23	Fine 1993 a	No	N/A	Yes	The air sampling filter cassette assembly was directed at the subject's mouth at a distance of 2 inches
24	Fine 1993 b	No	N/A	Yes	During the ultrasonic scaling, bacteria in the aerosol were collected on a sterile filter contained in a filter cassette (MSI Clinical Monitor Cassette, 4.2 cm diameter, Fisher Scientific). The cassette containing a sterile 0.45-micron filter was attached to a specially adapted intake tube inserted into a vacuum. For aerosol sampling, the filter cassette assembly was directed at the subject's mouth at a distance of 2 inches with the air flow vacuum set at 55 cubic feet/hour.
25	Graetz 2014	No	N/A	Yes	Area around manikin head (rectangle measuring 1.11m x 1.35m)
28	Greco 2008	No	N/A	Yes, Aerosol generated around patients mouth	Resuscitation mask placed at patient mouth * (the mask was connected to a sterilized 0.22 µm millipore filter mounted in a sterilized 37-mm cassette).
29	Grenier 1995	No	N/A	Air sampling	Air sampler placed 122 cm away from the patient's mouth
30	Grundy 1967	No	N/A	Yes, Aerosol generated around patients mouth	Particulate tooth substance generated from the procedure was collected with the use of " special filters, with pore size of 0.8 µm (±0.05) (no distance from the mouth was reported).
31	Gupta 2014	Yes	3 locations.- patient's chest area, doctor's chest area, and assistant's chest area. The average distance was 12 inches from the patient's mouth to the agar plate.	No	N/A
32	Hallier 2010	No	N/A	Air sampling	Surgery -sampling pump located 20cm away from dental chair
33	Harrel 1996	NA	NA	N/A	N/A
34	Harrel 1998	NA	NA	N/A	N/A
35	Harrel 1999	NA	NA	N/A	N/A

36	Hausler 1966	No	NA	Air sampling	Three air samplers were placed in a straight line at distance of 10, 20, and 30 inches from the tooth.
37	Holloman 2015	No	NA	Yes	6 inches from the oral cavity [pt in supine position / operators position -at 11oclock]
97	Ireland 2003	NO	N/A	Yes (air sampling)	air sampler placed 10 cm from patient mouth
38	Ishiharma 2008	Yes	localisation of stains- Abdomen, Femur, Face shield, Left arm, Left forearm, Mask, Right Forearm, Right arm and Thorax	No	N/A
39	Ishiharma 2009	No	N/A	Yes	Pt sat in recling position 45°. Extra-oral HVE system placed behind the pt where splatters not directly projected. The distance between the mouth of the patient (surgical site) and nozzle of the extra-oral evacuator was set at 20 cm for the first 100 trial cases. Thereafter, the nozzle position was reversed to make the distances 60 cm and 100 cm in 25 and 7 trial cases, respectively.
40	Janani 2018	Yes	Operator's neck (collar), Sleeve and chest area of surgical clothing	No	N/A
41	Jawade 2016	No	NA	Yes	1) 0.4 meters away on either side of the patient; 2) 2 meters behind the patient's
43	Jimson 2015	Yes	1) Patient chest, 2) near surgeon, 3) near attendant	Yes	Instrument trolley
42	Junevičius 2005	No	NA	Yes	the slides were placed at the following distances from phantom head: 27 cm, 32 cm, 39 cm, 47 cm 56 cm, 65 cm 74 cm.
44	Kaur 2014	Yes	Chest of the patient	Yes	1) Mask of the operator; 2) 9 ft behind the patient
45	King 1997	Yes	Face shield	Yes	Bracket tray/ 6 inch away from the patient's mouth.
46	Kobza 2018	No	NA	Yes	Breathing zone of dental practitioners (30-60cm from surgical site)
47	Kritivasan 2019	No	NA	Yes	Plates where placed at a distance of 1ft, 2ft & 3ft respectively from the micro motor positio
48	Labaf 2011	No	NA	Yes	dentist's chair (50 cm distance from active dental unit), on trolley (150 cm distance from active dental unit), on dentist's table (200 cm distance from active dental unit) and sterilization room (300 cm distance from active dental unit).
91	Larato 1966	N/A	N/A	Yes	Air Sampler placed on the bracket table 15 in. (anterior) to and slightly below the patient's mouth
49	Logothetis 1995	Yes	mask of the operator	Yes	2 o'clock position (2 ft away from patient head). Behind the dental chair (3ft away); right & left hand side to the paient (3 ft away). Another point at the left handside to the patient (5ft/8 inch). Infront of the patient (6 ft and 9ft away)

50	Manarte-Monteiro 2013	NA	NA	Yes	Blood agar plates were placed at 1) 0.5 meter 2) 2 meter from the patient head position
89	Micik 1969	No	N/A	Yes, Aerosol generated around patients mouth	"A manifold attached to the front of the chamber (where patient head was) had outlets for four air samples"
51	Miller 1971	No	N/A	Air sampling	Air sample collected from the chamber through the use of a quartz impactor 0.63 cm port
90	Miller 1995	No	N/A	Yes	Five wooden battens were installed on a plane 0.92 meter (3 feet) above the floor in a pattern radiating from a point 0.304 meter (1 foot) below the patient's mouth to the sides and end of the room. These battens were mounted to rotate on their long axes and were fitted with suction cups at 0.304 meter (1 foot) intervals along their lengths.
52	Mohan 2016	No	N/A	Yes	3 feet away from patient's mouth
53	Muzzin 1999	Yes	Dental hygienist - face	Yes	Air 12 inches away from patient's mouth
54	Narayana 2016	No	N/A	Yes	one plate in each of the 4 corners of the room and one in centre of room (room measured 20x15 feet)
55	Nejatidanesh 2013	Yes	Operator: head (face shield).	No	N/A
56	Oliveira 2018	No	N/A	Yes	Clinic 1: 15 chairs with partition walls (1.7m x 6.5cm.) Plates placed - 1. in front of chair 2. & 3. on partition walls right and left of chair 4. on the neighbouring work bench (distance not stated for any). Clinic 2: 27 chairs no partition walls. Plates placed 1. in front of chair 2. & 3. suspended 1m above the ground \geq 1.8m to right and left and on neighbouring work bench.
59	Prospero 2003	Yes	Operator :Surgical mask	Yes	1) Mobile tray 2) Spitton, Lamp.
60	Purohit 2009	Yes	Operator: chest Patient: chest	Yes	Mimicking Bentley et al. model (ID: 8) : headrest extension device at a distance of 12 inches and 24 inches away from the operating area
61	Ramesh 2015	Yes	patient's chest area approximately 10 in. from the patient's mouth,	Yes	2 plates placed 2 ft at the operator and assistant sides.
62	Rao 2015	Yes	Patient's chest at an average distance was approximately 12 inches from the patient's mouth	Yes	Dentist's chest at an average distance was approximately 12 inches from the patient's mouth
63	Rautemaa 2006	Yes	Operator: mask Dental Assistant: mask	Yes	Plates were placed in six different sectors 0.5- 2 meter from the patient:

					1) 2 plates in front of the patient at a distance of 2 meter. 2) 1 plate behind the patient at 0.5 meter. 3) 1 plate behind assisnt side (patient left hand side) at 1.5 meter. 4) 2 plates behind the operator side (patient right hand side) at 1.5 meter and the surgery compture location (no distance reported).
64	Reddy 2012	No	NA	Yes	at a distance 4 feet at 3, 6 and 12 'O' clock positions
65	Retamal-valdes 2017	Yes	1 plate placed on volunteer's chest (immediately in front of the volunteer's mouth) and one on the clinician's forehead!	Yes	3plates on the reflector, which had been previously designed, one on the bracket tray, and another on the office bench.
66	Rivera-Hidalho 1999	N/A	N/A	N/A	N/A
69	Sadun 2020	No	N/A	Yes	Aerosols collected a distance of 1 ft, 2 ft and 3 ft from the treatment site (patient's mouth).
70	Saini 2015	Yes	1 ft from the reference point (Patient chest), 1 ft from the reference point (Operator position), 1 ft from the reference point (Assistant position) [REFERENCE POINT= PATIENT'S MOUTH]	Yes	8 ft from the reference point (6 o' clock position), 2 ft from the reference point (12 o' clock position) [REFERENCE POINT= PATIENT'S MOUTH]
88	Samaranayake 1989	No	N/A	Yes	1, 2 and 3 meters from the headrest of the dental chair
71	Sawhney 2015	Yes	Patient's chest	Yes	Dental tray and at a distance of 6 inches away from patient's mouth
72	Serban 2013	Yes	Dentist's face mask	No	N/A
73	Sethi 2019	Yes	Patient's chest	Yes	Right side and left side of patient, all three positions (including patient's chest) were within a range of 1 foot and included 2 plates at each location.
74	Shetty 2013	No	N/A	Yes	i. 6 inches (half feet) from reference point (operator's nose level). ii. 6 inches (half feet) from reference point (dental assistant's nose level). iii. 12 inches (1 feet) from reference point (patients chest level).
76	Singh 2016	No	N/A	Yes	Centre of the operatory room cubicle and 40 cm away from the working area near the patient's chest
96	Stevens 1963	yes	Operator: face	No	N/A
78	Swaminathan 2014	No	N/A	Yes	patient's chest area and the operator's side at a distance of 1 foot, 2 feet and 3 feet away from the patient's mouth.
94	Tag El-Din 1997	Yes	Patient: chest	Yes	1) 3 plates on the left and right sides and behind the patient (All placed equidistantly from the child's head). 2) 1 metre; and 3) 2 metres from the head-rest of the dental chair (to further details on distance were reported).

80	Timmerman 2004	No	N/A	Yes	Baseline: 2 plates at centre of operator for 10 min (room unoccupied) Start of procedure: two plates at 40 cm for 5 min and two plates at 150 cm for 20 min. After 20 mins: two plates at 40 cm for 5 min and two plates at 150 cm for 20 min (repeat). While treating a new set of teeth (same patient)
81	Toroğlu 2001	Yes	Operator: faceshield Denatal Assistant: face shield	Yes	1 plate was positioned on the dental unit table (30 cm away from the working area)
82	Toroğlu 2003	No	N/A	Yes, Aersol generated around partients mouth	The tip of the saliva ejector (COLLECTION TOOL) was attached <u>3-4 cm</u> away from the tip of the high-speed dental hand piece
95	Travaglini 1966	Yes	Operator : face patient: face	No	N/A
83	Veena 2015	Yes	The head, chest, arms and inner surface of the face mask of the operator and of the assistant. Each filter paper disc	Yes	From the head rest, adhesive tapes were set up in six directions corresponding to the 12, 2, 4, 6, 8 and 10 o'clock positions up to a distance of 5 ft. (discs were placed at every 1ft distance as well).
84	Wada 2010	No	N/A	Yes	dental chair light arm and bracket table arm
85	Watanabe 2013	Yes	Goggles, Chest, R arm of long-sleeved surgical gown (polyethylene) Face mask (fitted with surgical face shield) of dental operator, also the patient goggles	No	N/A
87	Yamada 2011	No	N/A	Yes	Blood contaminated aerosol realeased in the atmospheric air 1) 50 cm away from patient mouth. 2) 100 cm away from patient mouth.

Microbiological measure of bio-aerosol spread									
Uniqu e Study ID	Study author and reference	Was the measure microbiological ? (Please choose from the dropdown list Yes/ other)	Please state the microbiologica l type (bacteria, viruses, fungi, prions)	If the organism measured was stated specifically, please state here (e.g. aerobic bacteria, respiratory virus, HepB, HIV, aspergilla etc)	How was it measured (e.g. petri dish with blood agar)	What was the unit of measurement? e.g. CFU or % contaminated surfaces etc	Number of samples collected	if stated, what was the time duration for the <u>sampling procedure.</u>	was the level of the generated aerosol evalauted after the procedure?
2	Agostinho 2004	Yes	Bacterial + Fungi	Streptococci, Gram- negative, Yeast	Four open Petri plates with the following culture media were	Mean+% of CFU per mm	30	2 min	No

					attached to the technician: BHI agar , supplemented with 5% S-BHIA, Mitis Salivarius agar (MS) selective for Streptococci, MacConkey agar (MC) selective for Gram-negative microorganisms, Sabouraud dextrose agar (SDA) selective for yeast (all media were incubated at 37oC for 48 h). MC and SDA cultures were maintained under aerobic conditions; SB20, MS and SBHIA used the anaerobic GasPack system.				
98	Aguilar-Duran 2020	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	Al-Amad 2017	Yes	Bacterial	n/a	Sterile cotton swabs that were moistened with sterile normal saline cultured in a TryptikaseSoyAgar. The plates were then aerobically incubated at 37°C for 24h	Number of CFUs per area	188 collection points	30 minutes	No
4	Al Eid 2018	Other	N/A	N/A	N/A	N/A	N/A	N/A	
5	Balcos 2019	Other	N/A	N/A	N/A	N/A	N/A	N/A	
6	Barnes 1998	Other	N/A	N/A	N/A	N/A	N/A	N/A	
93	Belting 1963	Yes	Bacterial	Mycobacterium tuberculosis	Petri dishes containing the phosphate buffer solution with 10 ml. of 23 per cent trisodium phosphate added to destroy bacteria other than Myco. tuberculosis. This liquid was transferred to centrifuge tubes and spun at 2,500 rpm for 30 minutes. The supernatant liquid then was decanted. Lowenstein-Jensen medium was inoculated with the residue and	Colony numbers	90 petri dishes	1 minute	No

					incubated aerobically at 37°C. for 15 weeks. The Petri dishes containing blood agar medium were incubated aerobically for 48 hours at 37°C.				
8	Bentley 1994	Both	Bacterial	alpha haemolytic streptococci	Blood agar culture plates	"bacteria counts"	91	30 mins. (+5, 10, 15 minutes afterwards)	Up to 15 minutes
9	Choi 2018	Yes	Bacterial	Micrococcus luteus and Moraxella osloensis	"To measure the number of bacteria on the surface of the faceshield, 100 µL of each collected sample was dispensed in the LB medium, spread evenly with a sterilized glass rod, and incubated at 36°C for 48 h. After incubation, the viable cell count at the CFU was obtained with the naked eyes and was expressed at the CFU. For identification analysis, the samples were isolated into pure culture with the streak plate culture technique, and were incubated." Gene extraction: boiling lysis method and PCR using universal primers, amplified PCR products electrophoresed to analyse 16S rDNA sequence.	CFU	15 (30 participants in total but half were allocated to the experimental group)	N/A	No
10	Chuang 20	Yes	Bacterial	AIRBORNE	" After all of the experiments were completed, the post-sampled gelatin filters were further dissolved in 10 mL of sterile PBS for serial dilution and culture. Tryptic soyagar (Difco, Sparks, MD, USA) was utilized for bacterial cultivation at 30C for 48 hours for each serial dilution. After cultivation, the bacterial	"an airborne concentration [colony-forming units (CFU)/m3] as a contamination index.	26 (13 from each of 2 patients)	Not stated	No

					colonies grew on agar plates were counted and converted to an airborne concentration [colony-forming units (CFU)/m3] as a contamination index."				
92	Cochran 1989	Yes	Bacterial	Not stated for individual microorganisms	Petri dish	mean CFUs	For the high speed 5 petri dishes and 16 patients - 80 samples. For the triple syringe 5 petri dishes and 10 patients - 50 samples.	For the air turbine 11.8 - 23.8 mins and for the water spray 8 mins	No
13	Dahlke 2012	Other	N/A	N/A	N/A	N/A	N/A	N/A	No
14	Dawson 2016	Yes	Bacterial	N/A	Air sampling (Thermo-Electron 10-800 6-stage viable particle sampler). The impactor device with 6 tiers each tier contain a glass petri dish (correspond to various levels in the respiratory tree).	CFU and morphologically different types on the plates in the device (which sucked air in to derive this from the air)	6 at each level	N/A	No
15	Day 2008	Other	N/A	N/A	N/A	N/A	N/A	N/A	n/a
16	Devker 2012	Yes	bacteria	N/A	Blood agar plates incubated for at 37°C for 24 hours	number of (CFUs).	Total= 360/control=120 (for arm 2 of the study)	20 minus (10 for the procedure +10 minutes after).	No
17	Davya 2019	Yes	Bacterial	N/A	six nutrient agar plate	CFU	30 patients (10 for each of 3 procedures)	Not stated	No
18	Dos Santos 2014	Yes	Bacterial	Mesophilic bacteria	BHI agar incubated at 37°C for 48 hours.	Number of CFU PER PLATER	3 per patient (Two dishes were positioned on the clinician (10 cm from the mouth) and a third one at 15 cm from the patient's mouth) from a total of 23 patients on 2 occasions 30 days apart	3 per patient from a total of 23 patients on 2 occasions 30 days apart	No
20	Earnest 1991	Yes	Bacterial	bulk of the bacteria. We found about 43 percent of the organisms on the extraoral filter were mutans	MM10 sucrose medium	CFU	Not stated	10 seconds	No

				streptococci and S. sanguis					
21	Feres 2010	Yes	Bacterial	Actinomyces gerencseriae Actinomyces israelii Actinomyces naeslundii 1 Actinomyces naeslundii 2 Actinomyces odontolyticus Veillonella parvula Streptococcus gordonii Streptococcus intermedius Streptococcus mitis Streptococcus oralis Streptococcus sanguinis Aggregatibacter actinomycetemcomitans Capnocytophaga gingivalis Capnocytophaga ochracea Capnocytophaga sputigena Eikenella corrodens Campylobacter gracilis Campylobacter rectus Campylobacter showae Eubacterium nodatum Fusobacterium nucleatum subspecies nucleatum Fusobacterium nucleatum subspecies polymorphum Fusobacterium nucleatum subspecies vicentii Fusobacterium periodonticum Parvimonas micra Prevotella intermedia Prevotella nigrescens Streptococcus constellatus Eubacterium saburreum Gemella morbillorum Leptotrichia buccalis Propionibacterium acnes	Blood agar incubated anaerobically at 37°C for 72 hours.	Number of CFU per plate+ . Mean percentage of DNA probe counts	Total 300/ the two controls= 75 (estimated)	10 mins for the plate placed on the operator and patient. Extra 30 mins after procedure (the three plated on the bard)	No

				Prevotella melaninogenica Streptococcus anginosus Selenomonas noxia Treponema socranski					
22	Fine 1992	Yes	Bacterial	colony forming units	Aerosol collected via vacuum, measures taken to negate effect of mouthwash on growth of cells collected plates containing the filters were incubated anaerobically at 37°C for 24 hours followed by aerobic incubation for 24 hours	CFU mean recovered CFU as a mean log 10 (SD)	18 patients	10 mins	No
23	Fine 1993 a	Yes	Bacterial	N/A	Vacuum air sampling device which captured bacteria contained within the aerosol on a sterile filter membrane (PORE SIZE 45 Micron)	Colony counts were transformed to log10	18 patients	The periodontal examination took 10 minutes and the hand scaling an additional 30 minutes. Subjects were allowed to expectorate and swallow during these procedures, but did not rinse or receive irrigation with the dental unit water syringe. Forty minutes after the supervised rinse, subjects received an ultrasonic scaling of the remaining maxillary quadrant for five minutes with the aerosol sampled as described. aerosol were collected on a sterile filter contained in a filter	No

								<p>cassette (MSI Clinical Monitor Cassette, 4.2 cm diameter, Fisher Scientific). The cassette containing a sterile 0.45-micron filter was attached to a specially adapted intake tube inserted into a vacuum air sampling device (MattsonGarvin Model 200, Mattson Garvin Co.). For aerosol sampling, the filter cassette assembly was directed at the subject's mouth at a distance of 2 inches with the air flow vacuum set at 55 cubic feet/hour.</p>	
24	Fine 1993 b	Yes	Bacterial	N/A	<p>Aseptically removed from the air sampling device and overlaid on Enriched Trypticase Soy Agar. The plates were incubated aerobically at 37 C for 24 to 72 hours</p>	<p>Colony counts were transformed to log₁₀</p>	18 patients	<p>The periodontal examination took 10 minutes and the hand scaling an additional 30 minutes. Subjects were allowed to expectorate and swallow during these procedures, but did not rinse or receive irrigation with the dental unit water syringe. Forty minutes after the supervised rinse, subjects received an ultrasonic scaling of the</p>	No

								<p>remaining maxillary quadrant for five minutes with the aerosol sampled as described. Aerosols were collected on a sterile filter contained in a filter cassette (MSI Clinical Monitor Cassette, 4.2 cm diameter, Fisher Scientific). The cassette containing a sterile 0.45-micron filter was attached to especially adapted intake tube inserted into a vacuum air sampling device (MattsonGarvin Model 200, Mattson Garvin Co.). For aerosol sampling, the filter cassette assembly was directed at the subject's mouth at a distance of 2 inches with the air flow vacuum set at 55 cubic feet/hour.</p>	
25	Graetz 2014	Other	N/A	N/A	N/A	N/A	N/A	N/A	n/a
28	Greco 2008	Yes	Bacterial	<p>Sample number Species % of species 1 S haemolyticus 50 S capitis capiti 25 Propionibacterium acnes 25 2 S warneri 33.33 S epidermidis 33.33 S saprophyticus 16.67</p>	agar plate	Bacterial populations CFU	<p>Twenty-three patients were sampled (age range, 13– 66 years) with the new collection method. Table I summarizes their ages, number of brackets</p>	10 min	No

				<p>P acnes 16.67</p> <p>3 Actinomyces viscosus 50</p> <p>S hyicus 25</p> <p>S aureus 25</p> <p>4 S cohnii-cohnii 42.86</p> <p>A viscosus 21.43</p> <p>Streptococcus pneumoniae 14.29</p> <p>S epidermidis 7.14</p> <p>5 S cohnii-cohnii 40</p> <p>S warneri 20</p> <p>A viscosus 20</p> <p>Streptococcus pneumoniae 20</p> <p>6 S epidermidis 50</p> <p>S hominis homin 50</p> <p>7 P acnes 25</p> <p>8 S hominis novo 50</p> <p>S warneri 50</p> <p>9 P acnes 100</p> <p>10 (control, colonies on edges only)</p> <p>S xylosum 37.5</p> <p>S aureus 37.5</p> <p>P acnes 17.5</p> <p>Acinetobacter lwoffii 17.5</p> <p>17 Streptococcus mitis 67</p> <p>A viscosus 33</p> <p>17B A viscosus 20</p> <p>S simulans 20</p> <p>S epidermis 20</p> <p>S auricularis 20</p> <p>Species 20</p> <p>18 S epidermis 57</p> <p>A viscosus 27</p> <p>S aureus 10</p> <p>Streptococcus mitis 3</p> <p>Flavobacterium breve 3</p> <p>19 S aureus 25</p> <p>S auricularis 25</p> <p>S cohnii-cohnii 25</p> <p>A viscosus 25</p> <p>20 Unidentifiable G(+) anaerobic rods 100</p> <p>S hyicus 50</p> <p>21 S cohnii-cohnii 37.5</p> <p>S auricularis 12.5</p>		<p>removed, sample collection time, and bleeding indexes.</p> <p>The average age was 25.62 years, and the average number of bonds removed was 13.22 per patient. Total bonds removed were 304. Table II lists the aerosolized bacterial colonies collected from each patient.</p>		
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				22 Negative (no growth) 0 23 S cohnii-cohnii 40 S epidermidis 20 Streptococcus milleri group 20 P acnes 20 24 S xylosus 75 Leuconostoc sp (cocci) 50					
29	Grenier 1995	Yes	Bacterial	anaerobic bacteria	Slit-to-Agar biological air sampler (model STA 101; New Brunswick Scientific Co., Inc., Edison, N.J.)	cfu/m3	4 Trails (5 samples were collected for each trail and for each procedure).	Total=90 minutes(30 Before+30 during+ 30 after treatment). Then another 30 mins after 2 hours+ 30 minutes after 4 hours of the treatment.	right at the end of the procedure, 2 hours, and 4 hours after the procedure
30	Grundy 1967	Other	N/A	N/A	N/A	N/A	N/A	contiuuous samining for up to an hour (2 minutes interval)	No
31	Gupta 2014	Yes	Bacterial	aerobic bacteria	blood agar plates - incubated 37°C 48hrs	CFU (number count)	72 (24 pts x3 samples each)	30 mins during treatment and 30 min post- treatment	No
32	Hallier 2010	Yes	Bacterial	Staphylococcus & Micrococcus predominant	Blood agar plates using a Buck Bio-culture sampling pump (B30120) (incubated aerobically at 37° for 48hrs)	CFU per cubic metre, cfu/m3	8pts. Each treatmet (x4) bioaerosol measured for 2pt episodes (with without ACS) between 5-9 bioaerosol samples were collected. Baseline -15 separate bioaerosol samples	Plates replaced every 10 mins during treatment	No
33	Harrel 1996	Other	N/A	N/A	N/A	N/A	N/A	N/A	
34	Harrel 1998	Other	N/A	N/A	N/A	N/A	N/A	N/A	
35	Harrel 1999	Other	N/A	N/A	N/A	N/A	N/A	N/A	
36	Hausler 1966	Yes	Bacterial	s marcencens	fresh nutrient agar petri dishes exposed for 2 successive 15 minute periods	CFU per minute on an Anderson sampler with staged for size of colonies: (CFU/ft3/minute);	not clear	3 minutes	No
37	Holloman 2015	Yes	Bacterial	anaerobic bacteria -a- Hemolytic Streptococci; Fusifiform Bacteria; Black	2 methods -in petri dishes 20ml sterile DPBS solouction and in-lab	CFU per mL	50 participants (x2 samples each = 100)	1 sample for duration of scaling	No

				Pigmented; b-Hemolytic Colonies; Eikenella; Prevotella intermedia; Tannerella forsythia ; Porphyromonas gingivalis	spiral plated to fresh blood agar / Brucella Agar solid both Incubated 7 days.			and 1 for 35mins post scaling	
97	Ireland 2003	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/a
38	Ishiharma 2008	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A
39	Ishiharma 2009	Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A
40	Janani 2018	Yes	Bacterial	Cocci, Bcilli	swabs	Number and % of CFU/CM, CFU/ML	135	Not stated	No
41	Jawade 2016	Yes	Bacterial	NA	Petri dish with blood agar	Number of CFU/CM, CFU/ML	30	20 minutes	No
43	Jimson 2015	Yes	Bacterial	NA	Petri dish with blood agar	(CFU)/ cm2.	30	20 minutes	No
42	Junevičius 2005	Other	NA	NA	NA	NA	NA	NA	No
44	Kaur 2014	Yes	Bacterial	Aerobic, anaerobic	Blood agar plate	Number of CFU	Total=60; control arm=20	40 minutes (10 minutes during the procedure + 30 after)	No
45	King 1997	Yes	Bacterial	N/A	Blood agar (bracket tray)/ RODAC plates (face shield)	Number of CFU	12 for each plates	30 mins (blood agar placed on bracket tray)	No
46	Kobza 2018	Yes	Bacterial + Fungi	Bacteria:Gram-positive granulomata. Fungi: Mould fungi	A special filter was placed on the nozzle of the evacuator	Concentration (CFU/m3)	Not stated	Not stated	No
47	Kritivasan 2019	Yes	Bacterial	1. α-haemolytic Streptococci 2. β-haemolytic Streptococci 3. Enterococcus species 4. Coagulase Negative staphylococcus	Petri dish with blood agar	Number of CFU	30	Not stated	No
48	Labaf 2011	Yes	Bacterial	N/A	Petri dish (8 cm in diameter) with blood agar incubated aerobic condition at 37°C for 48 h	Number of CFU	196	3 hours	No
91	Larato 1966	Yes	Bacterial	Hemolytic Staphylococcus albus, Nonhemolytic Staphylococcus albus, Alpha streptococcus (three most common/were exist in all of the sample)	Reynierst slit air sampler, it contains a petri dish with blood agar and slowly rotates slowly (1cicle/60 minutes)	Number of CFU/ft2/min	12 patients	Procedure time (1.5-5 mins) + 30 minutes after the procedure.	

49	Logothetis 1995	Yes	Bacterial	Airborne	Petri dish with blood agar	CFU	48	30-minute	
50	Manarte-Monteiro 2013	Yes	Bacterial	Gram-positive cocci	blood agar plates, incubated at 37 °C for 48h	Number of CFU/plate and FU/dm ² /h to determine the IMA.	244	1-4 hours as well	No
89	Micik 1969	Yes	Bacterial	n/a	Air sampler used: Anderson six-stage sieve sampler (used with plastic petri plates with heart infusion agar), Anderson Samplers, Provo, Utah.	Median of Rate of Production (cfu/min)	Examination=10 sample; Scaling= 9; Wash teeth (water stream)= 10 ; Prophylaxis (pumice)=12; Cavity preparation (AIR COOLANT) = 10; Dry teeth (air spray)=17; Cavity preparation (water coolant)= 13; Polish restoration (bristle brush)=14; Wash teeth (water spray)= 9	10 to 120 seconds for different activities	No
51	Miller 1971	Other	N/A	N/A	N/A	N/A	N/A	N/A	up to 6 hours (, 2 mins.35mins. ,2hrs,4hrs ,6hrs)
90	Miller 1995	Yes	Bacterial	N/A	N/A	Number of CFU per ft ² , these were mapped using isometric lines to illustrate the distribution patterns observed for the splatter	toothbrushing= 5, and gargling=5, cavity preparation with water spray=5, high speed air turbine cavity preparation dry =7, prophylaxis using rubber cup and pumice=7, polishing a restoration using a bristle disk=7, three-way syringe air spray=5, water spray=5, air-water spray =5, and ultrasonic scaler=5	30 second	No
52	Mohan 2016	Yes	Bacterial	N/A	petri dish with blood agar. Incubated at: 37c for 24.	CFU	10 per participant	N/A	
53	Muzzin 1999	Yes	Bacterial	N/A	petri dish with blood agar	CFU	2 per participant (one with aerosol	2 minutes per participant - one	

							reduction device, one without aerosol reduction device)	minute with aerosol reduction device, one minute without)	
54	Narayana 2016	Yes	Bacterial	N/A	Petri dish with blood agar	CFU	90	20 minutes	
55	Nejatidanesh 2013	Other	N/A	N/A	N/A	N/A	N/A	N/A	No
56	Oliveira 2018	Yes	Fungi	<ul style="list-style-type: none"> • Curvularia clavata Phialemonium obovatum Aspergillus niger Curvularia geniculata Copulariopsis koningii Paecilomyces lilacinus Penicillium citrinum Paecilomyces variotii Mormographiella rticillata Paecilomyces javanicus Candida albicans Cladosporium oxysporum Phaeoacremonium origenum Ramichloridium schulzeri Cladosporium dosporioides Phialophora bubakii bipolaris hawaiiensis Rhinocladiella aquaspersa Acremonium blochii Candida guilliermondii Aspergillus sydowii Cladophialophora devriesii Curvularia senegalensis 	Petri dish with blood agar	% contaminated surfaces	168	5 minutes	No
59	Prospero 2003	Yes	Bacterial	Streptococcus spp; staphylococcus spp; gram-negative bacteria	Petri dish with blood agar	CFU	191 (52 from masks, 52 microbial trays, 52 spittoon, 35 from lamps)	average appointment length was 45 minutes	No
60	Purohit 2009	Yes	Bacterial	N/A	Petri dish with blood agar	CFU	160 (eight from each participant, 4 without mouthrinse, 4 with mouth rinse)	N/A	No
61	Ramesh 2015	Yes	Bacterial		Pre-designated agar plates (100 mm) incubated at 37°C for 48 h.	Number of CFU per plate	15	Not stated	No
62	Rao 2015	Yes	Bacterial	Not stated	Blood agar plates. Incubation: At 37 degree Celsius for 48hrs	CFU count	Not stated but estimated to be 30 for control group (15 patients without	30 mins	No

							pre-procedural rinse ² ; Total no of participants N= 30)		
63	Rautemaa 2006	Yes	Bacterial	airborne	Surface samples were collected with sterile cotton swabs (from the masks)/ Incubated at 37C for 48 h	Number of CFU per plate	96 (estimated)	Agar plates: 1.5 hour (first plate) and 3 hours (second). 40 mins (for mask swabs)	No
64	Reddy 2012	Yes	Bacterial	None	Blood agar plates placed incubated for 48 hours	Number of bacterial colony forming units (CFUs)	30 (ESTIMATED)	Not stated	No
65	Retamal- valdes 2017	Yes	Bacterial	None	Tryptic Soy Agar with Yeast Extract enriched with 5% menadione, 5% sheep blood, and 1% N- Acetylmuramic acid (HNK plates)	counting (CFUs) per plate	Total=60/ control arm=15	30	No
66	Rivera- Hidalho 1999	Other	NA	NA	NA	NA	NA	NA	No
69	Sadun 2020	Yes	Bacterial+ Fungi + Yeast	Gram positive and gram negative bacteria, yeast species,	Collection stand with Brain Heart Infusion (BHI) media plates in triplicate Petri dishes for aerosol. Incubation: 24 hours at 37 °C	CFU count for air samples and Serial dilutions and total plate counts (TPC) for salivary samples	Samples not stated but estimated as 90 for control group (30 patients used distilled water with green & blue food dye x3 plates; Total no of participants N=60)	1 minute for aerosol samples and 1 minute saliva samples	No
70	Saini 2015	Yes	Bacterial	N/A	Tray with blood agar plates	CFU count	Not stated but estimated to be 120 for control group (40 participants with water rinse x5 plate location each; total no of participants N=120)	10 mins sampling prior use of mouthwash and treatment on half quadrant- 30 mins gap- followed by 1mins mouth rinse- then 10mins sampling on the second half quadrant	No
88	Samaranayak e 1989	Yes	Bacterial	Airborne	blood-agar (Oxoid Ltd. , Basingstoke) settle plates incubated at 37° C for 48h	number of colony-forming units (CFUs)	TOTAL= 60/CONTROL ARM=30 (estimated)	Not stated	10 Minutes
71	Sawhney 2015	Yes	Bacterial	Aerobic spore forming bacilli, Mixed group of microbes predominantly <i>Streptococci</i> , <i>Staphylococci</i> species, <i>Pseudomonas</i> species	Petri dish with 5% sheep blood agar plates. Incubation: 37°C for 24 h	CFU count	Not stated but estimated to be 60 for control group (20 patients with water rinse x 3 locations; Total no	Not stated	No

							of participants N=60)		
72	Serban 2013	Yes	Bacterial	Hemolytic bacteria	Petri dish with agar, blood agar and Sabouraud	UFC/m3 and CFU/m3 used interchangeably	Not stated but estimated to be 40 for control group (40 patients with sterile water rinse x 1 agar plate location, Total N=80)	Not stated	No
73	Sethi 2019	Yes	Bacterial	Aerobic bacteria	Petri dish with blood agar plates. Incubation: Aerobically for 48 h	Number of CFUs	Not stated but estimated to be 120 for control group (20 patients for distilled water coolant x 2 plates x 3 sites; Total no of participants N=60)	20 mins	No
74	Shetty 2013	Yes	Bacterial	Aerobic bacteria.	Trays containing Trypticase soy agar plates. Incubation: 37°C for 24 hours	Number of CFUs	Not stated but estimated to be 60 for control group (20 for distilled water rinse x 3 plates, Total no of participants N=60)	10 mins	No
76	Singh 2016	Yes	Bacterial	Gram-positive and Gram-negative	Nutrient agar plates (enriched with 5% sheep blood). Incubation: Aerobic, 37.4°C for 3 days a	CFU count, gram staining, catalase, coagulase tests	Not stated but estimated as 20 (N=20 x1 agar plate post procedure)	20 mins	No
96	Stevens 1963	Yes	Bacterial	Not stated	petri dish with blood agar cultured for 48 hours	CFU	6	15 seconds	No
78	Swaminathan 2014	Yes	Bacterial	Not stated	BHI Agar plates (1000mm)' exposed plates were incubated at 37°C aerobically for 24 hours.	Number of colony forming units (CFU) in aerosol and CFU in the saliva - Table 1: Mean rank of colony forming units for each arm and ar 1,2 and 3 feet	Not stated	The agar plates were exposed for 30 minutes during the professional ultrasonic scaling in all the 3 groups.	No
94	Tag El-Din 1997	Yes	Bacterial	Not stated	petri dish with blood agar cultured for 48 hours at 37C	Number of CFU per plate	120 (calculated 20 patient x 6 plates)	Procedure time (5-15 mintues) +10 minutes afterwards	10 minutes
80	Timmerman 2004	Yes	Bacterial	aerobic bacteria	Petri dishes (11cms) contained brain hart infusion agar, with 5% horse blood added.	CFU	60 (10 plates for each patient)	baseline empty room, 5 mins, 20 mins, 40 mins	No

					Each pair of dishes was split, to culture one of them aerobically and one anaerobically. Both were incubated at 36.71C. The aerobic culturing was performed for 3 days and the anaerobic culturing for 7 days.				
81	Toroğlu 2001	Yes	Bacterial	<i>Staphylococcus, Streptococcus</i>	Blood agar plates (incubated for 3 days at 37C)	Number of CFU per plate	32 (control) 72 (debonding group)	30 minutes (5 minutes during the procedure+ 25 minutes after).	Yes but no separate value was stated
82	Toroğlu 2003	Yes	Viral	Hep.B	Saliva ejector that fit on the handle of the high-speed dental hand piece	Presence of occult blood	26	Not stated	No
95	Travaglini 1966	Yes	Bacterial	Nemolytic staphylococcus albus; nonhemolytic staphylococcus albus; streptococcus; Badltus subllilis; Staphylococcus areus; diphtheroids; Neisseria; Pneumococci	Petri dish with blood agar, cultured for 24 hours	CFU	Not stated	Agar plates were held against patient and dentist masks for 3 seconds following procedures	No
83	Veena 2015	Other	NA	NA	NA	NA	NA	NA	n/a
84	Wada 2010	Other	N/A	N/A	N/A	N/A	N/A	N/A	n/a
85	Watanabe 2013	Both	Bacterial	Gram-positive oral streptococci	Areas close to the 5 cm _ 5 cm squares sampled for the ATP bioluminescence assessment were rubbed with a sterile cottonswab premoistened with sterile 0.01 M phosphate-buffered saline (PBS). Each cotton swab was placed in a test tube containing 1 mL of sterilized PBS. One hundred microlitres of the sample solution was plated on Mitis Salivarius agar (Becton Dickinson, Franklin Lakes, NJ, USA), which is selective for oral streptococci, and incubated at 37_C for five days under	Not stated	Not stated	Not stated	No

30	Grundy 1967	Particles	particulate counts and enamel estimations and weights		<p>Sampling was performed with the plane of the filter placed at distances of 4 and 8 inches above the experimental mouth (Fig. 4) to collect the tooth debris that could enter the operator's eyes and nose under varying conditions. Observation of a number of students in the clinic had confirmed that a patient-operator distance of 4 inches was realistic. Cutting was performed during the time of sampling with a plain-cut flat fissure bur, size 3 (American size 58). Sampling was for 0.5-minute periods at a rate of 10.3 liters per minute for the particle counts. For calcium estimations, the sampling periods varied from 0.5 to 2 minutes at a rate of 12 liters per minute.</p>	particles	not clear	<p>Sampling was performed with the plane of the filter placed at 4 and 8 inches above the experimental mouth (Fig 4) to collect the tooth debris that could enter the operator's eyes and nose under varying conditions. Observation of a number of students in the clinic had confirmed that a patient-operator distance of 4 inches was realistic. Cutting was performed during the time of sampling with a plain-cut flat fissure bur size 3 (American size 58). Sampling was for 0.5-minute periods at a rate of 10.3 liters per minute for the particle counts. For calcium estimations, the sampling periods varied from 0.5 to 2 minutes at a rate of 12 liters per minute.</p>
31	Gupta 2014	N/A	N/A	N/A	N/A	N/A	N/A	N/A

97	Ireland 2003	Airborne particles PM10, PM25.	Size, shape and chemical composition analysis	A Negretti PM10 filter head attached to a vacuum pump (Negretti Automation, Aylesbury, United Kingdom)	pore size of filter size used= 0.6 um	Size determination of the particles conducted with electronic microscope. Energy dispersive x-ray (EDX) provided details to the sample chemical composition.	6	5 and 10 minutes
38	Ishiharma 2008	Blood splatter	number of splatters on operation gown and visor. - visible classified according to size (small, <0.5 mm or large, >0.5 mm) and location. Non visible by count.	Blood - leucomalachite green solution was used to detect non visible splatters locations and numbers recorded of bright green dots formed by peroxide reaction (sensitivity of blood diluted to atleast 1:4000)	N/A	COUNTS of visible and invisible splatters. visible classified according to size (small, <0.5 mm; large, >0.5 mm) and location. A	25 pts	
39	Ishiharma 2009	blood (aerolised)	Number of positive dots - the degree of positivity was divided into three groups; slight (1-3), moderate(4-10), and heavy (13-18)	A special non-woven filter was placed on the nozzle of the HVE. Post surgery leucomalachite green solution added to detect well-diluted blood stains. According to the number of positive dots, the degree of positivity was divided into three groups; slight, moderate, and heavy	N/A	N/A	100pts -	Duration of high speed instruments ranged from 2to 47.9min. Medium of 6.4min in 70 cases

83	Veena 2015	Coloured water (ultrafiltrate-containing fluorescent dye).	presence of one or more bright green peroxide dots on the nonwoven filter sprayed with the test solution	Grade no. 1 qualitative white filter paper discs made from cotton cellulose fibres of diameter 9.0 cm and thickness of 0.2 mm	NA	A transparent grid containing 1 cm ² squares was placed over the filter paper disc and area of contamination was measured by counting the number of contaminated 1 cm ² squares.	30 (CALCULATED)	90
84	Wada 2010	Blood detection using Leucomalachite green presumptive test	Positive or negative chemical reaction to the test	Ethanol sterile absorbent cotton towel (4 cm × 4 cm, STERI COTTO alpha; Kawamoto, Osaka, Japan) was used to wipe down the touch surfaces and collect blood contaminations	After surgery, surfaces of the light arm and bracket table arm were carefully wiped with the ethanol sterile absorbent cotton. The blood presumptive test was then applied for each test cotton sheet	Cotton sheets displaying positive reactions on the blood detection test were considered as positive results.	20	Not stated
85	Watanabe 2013	ATP bioluminescence assay. Samples collected from 5cmx5cm squares using a cotton swab from a LuiPac Pen kit (kikkoman Biochemifa Co, tokyo, Japan). They were analysed immediately using a limitester (Kikkoman Biochemifa CO) in accordance with manufacturers instructions	ATP levels expressed as Relative light units (RLUs)	splatter	Samples collected from key sites 5cmx5cm squares using a cotton swab from a LuiPac Pen kit (kikkoman Biochemifa Co, tokyo, Japan).	ATP bioluminescence assay. They were analysed immediately using a limitester (Kikkoman Biochemifa CO) in accordance with manufacturers instructions	Not stated	10 minutes for the procedure. Sampling was before and after the treatment

87	Yamada 2011	Detection of well-diluted and invisible blood stains using leucomalachite green solution	Presence of one or more bright green peroxide dots on the nonwoven filter sprayed with the test solution	Bright green peroxide dots used as an indication of positive reaction to the test solution	Water absorbant, non-woven towel set on nozzle of the two extraoral evacuator systems. Once treatment is conducted, the filer was removed and tested using the leucomalachite green solution for detection of blood stains	Comparison of positive ratio for each procedure	124 at distance of 100cm behind pateint and 102 at a distance of 50cm behind patient	Not stated
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Unique Study ID	Study author and reference	Key Findings e.g Amount of bio aerosol (verbatim where possible) (Please exclude any findings relating to intervention)	Headline/key messages (Please exclude any findings relating to intervention)	What was the terminology used (e.g. droplets, aerosol, splatter..etc.)
2	Agostinho 2004	There was a high level of contamination to the operator : Results from anaerobic cultures (S-BHIA culture media selective for streptococci)= 97% (mean=298 ± 11) and (MS culture media selective for streptococci)= 40% (187 ± 112); Results from aerobic cultures : (SB culture media selective for mutans)= 27% (mean= 160±117). (SDA culture media selective for yeast)= 13% (mean 90±112); (MC selective for Gram-negative)= 3% (mean=33±65).	Polishing of dentures without previous disinfection leads to a high level of transfer of microorganisms to the professional.	Aerosol
98	Aguilar-Duran 2020	"Visual inspection revealed greater blood spatters on the external part of the visors, followed by the masks and minimal splashes on the caps." "The Kastle-Meyer test detected blood in 28% of the samples (95% confidence interval [CI], 25.1% to 30.6%) that were classified as negative via visual inspection. In 8 samples (3.96%), the test detected blood in the internal part of the visor, 4 of them linked to the use of a high-speed air-turbine handpiece (3 samples from surgeons and 1 sample from an assistant) and the other 4 linked to the use of a low-speed electric straight handpiece (all of them from surgeons)." "We found blood splashes more often from surgeons, although assistants also had positive samples. The use of a high-speed air-turbine handpiece produced the highest percentage of blood splash (77.3%), followed by a low-speed electric straight handpiece (45.6%), and a contra-angle handpiece 20:1 for implant placement (31.8%). Procedures beyond 30 minutes were more prone to have blood contamination. Forty percent of the clinicians were unaware of blood spatters."	The risk of clinician contamination with blood during tooth extraction and implant placement was 46%. The risk increased with the use of high-speed instruments and longer surgery time.	Blood splatter
3	Al-Amad 2017	Point A (forehead) had significantly more CFUs (mean:2.19,SD:3.04) than the three other points (P=0.036). However, two-way analysis of variance showed that using a rubber dam was associated with significantly higher CFUs (P=0.009)	Rubber dam increased higher bacterial contamination of the dentist's head from aerosol using the high speed for all collection points on the head. The forehead was the most contaminated place.	Aerosol
4	Al Eid 2018	Clinical area: blood contamination was detected using four/15 subsites: 1) flooring below the patient's headrest -26 out of 30 cases; 86.67%); 2) instrument tray and handpiece unit - all cases; 100%); 3) operating light and dental chair armrests - all cases; 100%), and 4) cuspidor and suction unit - all cases; 100%). PPE: Blood contamination was detected in all the PPE except the head caps and shoe covers: •Oral Surgeon : 100% contamination of the gloves + face masks. 8% protective	Visually imperceptible blood contamination as a result of aerosolization and splatter is often associated with minor oral surgical procedures. In addition to the critical clinical surfaces which are routinely disinfected, even the flooring beneath the surgical field was found to be contaminated.	blood splatter

		<p>eyewear (n = 26/30), 73% surgical gowns (n = 22/30). 47% Handcuffs of the aprons (14/30).</p> <ul style="list-style-type: none"> •DA: 100% gloves; 80% face masks & protective eyewear (n = 24/30); 67% surgical gowns (n = 20/30); 40% handcuffs of the aprons (n =12/30). •Patient: 100% contamination of chest drapes 93% of the protective eyewear (n=28/30) •A statistically significant interaction between surgical procedure time and the frequency of blood contamination in the handcuffs of the aprons of the oral surgeon and the DA (P < 0.01). 		
5	Balcos 2019	<p>Operator "distance" measured for different frequencies for simple suction: frequency 3 - 12.5cm, frequency 4 - 19.3cm, frequency 5 - 25.4. For surgical suction: frequency 3 - 0cm, frequency 4, 1.7cm, frequency 5 - 2.5cm. For all patient sites, increasing frequency increased the contamination. Simple suction less effective than surgical although the results are poorly reported with some graphs not having axis named or labelled. "The largest surfaces contamination were recorded in the case of simple scaling suction, especially on the left side(39.1 cm) and the lower one (49.8 cm) for frequency 5. In the case of surgical scaling suction, the values recorded were lower. In the case of simple scaling suction, the left and lower sides of the contamination surface exceeded the contamination zone "</p>	<p>US scaling is a cause of surfaces and air contamination by generating droplets and aerosols. Higher volume suction reduces this. Higher frequency of USS The type of suction influences the degree of contamination of the surfaces.</p>	aerosols and droplets,
6	Barnes 1998	<p>100% of sites had at least one test strip that was positive for blood in the collected aerosol.</p>	<p>" Blood was present in all test sites of ultrasonic subgingival scaling despite differences in operators, assistants, treatment facilities, patientGI, mean probing depths, coolant volumes, and wide variations in suction pressure of the HVE apparatus collecting th'test samples. The universal presence of blood contamination of ultrasonic aerosols under these divergent conditions would seem to suggest that blood contamination of aerosols might be expected whenever the ultrasonic sealer is used subgin-givally."</p>	Aerosol
93	Belting 1963	<p>Total number of colonies for 5 patients with: Air rotor-water on 6in=3; 2ft=17; 4ft=10: air rotor- water off 6in=18; 2ft=29; 4ft=28: Mouth water spray (triple) 6in=29; 2ft=9; 4ft=5</p>	<p>1. Positive cultures of Myco. tuberculosis were obtained up to 4 ft. in front of the patient under each of the test conditions employed. 2, Approximately twice as many colonies were produced by the air rotor withwater- off method as by the air rotor with water - on method or by the mouth wash spray method. 3, With the air rotor in operation, with or without water, the highest concentration of Myco. tuberculosis was found at 2 ft. in front of the mouth of the patient. 4, When the mouth wash spray was used, the highest concentration o f Myco. tuberculosis was found at 6 in. in front of the mouth.</p>	aerosol
8	Bentley 1994	<p>Experiment 1) (high speed and dye) - "Dye spatter" was reported to be on the operator's arms, chest, lower neck and "around the mannekin" "aerosols were detected as fine powderlike fluorescence that gradually coated the white filter paper disks on surfaces 2 feet or more from the dental chair over several minutes" "the fluorescent dye remained suspended in aerosol droplets and continued to coat new filter paper disks applied to the surfaces of the operatory for at least 10 minutes despite a room air exchange of one every 4 minutes" Experiment 2) Bacterial counts were found most commonly and in highest numbers on the dentists' chest, the assistant, and around the patient but the distribution depended on the procedure being carried out.</p>	<p>"the distribution of bacterially contaminated aerosols and spatter is extremely variable and may be influenced by many factors. These include the type of procedure and whether high-volume evacuation was used; the position of the tooth in the mouth, which affects the position of the operator relative to the subject; the position of the subject in th e dental chair; levels of the microorganisms in the subject's mouth and other factors."</p>	"Spatter consists of droplets usually g reater th a n 50 microns in diam eter" and "Mists (aerosols), in contrast, consist of particles up to 50 microns in size, which

				settle gradually. "
9	Choi 2018	mean CFU over 15 patients (mean ± sd) 52.50 ± 4.95. This was confirmed using SEM to look at the facemasks.	Bacteria were generated during scaling and present on the operator's visor	Spray droplets and aerosols
10	Chuang 20	11 different areas in the surgery for 2 patients: 1) 178CFU/m ³ and 428CFU/m ³ for 0 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 45° angle from the treatment tray 2) 141CFU/m ³ and 122CFU/m ³ for 100 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 45° angle from the treatment tray, located on Bench 1 3) 1129CFU/m ³ and 3432CFU/m ³ for 50 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 15° angle from the treatment tray 4) 1347CFU/m ³ and 1452CFU/m ³ for 100 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 15° angle from the treatment tray, located on Bench 2 5) 2243CFU/m ³ and 4312CFU/m ³ for 10 cm above the patient's oral cavity, 50 cm above the floor 6) 934CFU/m ³ for 30 cm above the patient's oral cavity, 50 cm above the floor 7) 3567CFU/m ³ for 50 cm above the patient's oral cavity, 50 cm above the floor 8) 987CFU/m ³ and 131CFU/m ³ for on the dental treatment tray 9) 43CFU/m ³ and 33CFU/m ³ for 150 cm horizontally from the patient's oral cavity, located on Bench 3 10) 113 CFU/m ³ for 50 cm horizontally from the patient's oral cavity, 80 cm above the floor, at a 12° angle from the treatment tray 11) 140CFU/m ³ for The flush output of the dental handpiece. For sampling site N-AF were 1254 (Case A) and 1433 CFU/m ³ (Case B) for 20 mins after completion of treatment at 150 cm horizontally from the patient's oral cavity, located on Bench 3	In addition, concentrations at sampling site N-AF were 1254 (Case A) and 1433 CFU/m ³ (Case B), which means that bacterial aerosols can remain suspended in the air for over 20 minutes after treatment caused by personnel movements	bioaerosols
92	Cochran 1989	HIGH SPEED: Mean CFU at dental unit light: Maxillary ant = 41 +/- 31; Mandibular ant = 1 +/- 0.5. Maxillary post = 21 +/- 11; Mandibular post = 0. Patient's chest: Maxillary ant = 211 +/- 32; Mandibular ant = 120 +/- 107. Maxillary post = 381 +/- 210; Mandibular post = 36 +/- 19 AIR-WATER SYRINGE: Mean CFU at dental unit light Maxillary = 17 +/- 9; Mandibular = 3 +/- 0.8. Patient's chest Maxillary >500; Mandibular >356.	From the study results rubber dam reduced the CFUs considerably but not completely and to different extents depending on what was done and where in the mouth.. For our review and results with high volume aspiration but no rubber dam: Many more CFU when using high speed and water spray than just high speed for drilling. Dependent on position of drilling and use of triple syringe in the mouth.	"aerosol particles" and "Microorganisms present in aerosol particles and splatter ..."
13	Dahlke 2012	Our data show that the amount of visible spatter increased as we moved mesially from tooth no. 18 to 19 and then to 20. However, the only statistically significant increase occurred in moving from tooth no. 18 to tooth no. 20. This increase can be explained by the fact that the source of the water spray (that is, the handpiece) is positioned closer to the oral aperture for tooth no. 20, and water would be more likely to escape from the mouth than to adhere to the adjacent oral tissue, the dental dam or the Isolite mouthpiece.	Conclusions. The study results showed that use of a dental dam with HVE or the Isolite system significantly reduced spatter overall compared with use of HVE alone. Clinical Implications. Isolation with a dental dam and HVE or with the Isolite system appears to aid in the reduction of spatter during operative dental procedures, potentially reducing exposure to oral pathogens	spatter
14	Dawson 2016	In this study, a marked increase in bacterial load was observed during debond and enamel cleanup, particularly when compared with background air samples where there was no clinical activity. When using a slow-speed handpiece and a spiral fluted tungsten carbide bur for enamel cleanup after orthodontic treatment, the Counting the cultured colonies suggested that rinsing with either water or chlorhexidine actually increased bacterial load and biodiversity compared with nonrinsing. At level 1-6 CFUs were 11.5, 7.3, 2.8, 2.7, 1.5 and 0.9 respectively, at level 1-6 in terms of bacterial colonies these were : 4.8, 3.7, 3.8, 2.3, 3.5, 2.7 respectively at baseline,	When using a slow-speed handpiece and a spiral fluted tungsten carbide bur for enamel cleanup after orthodontic treatment, the bacterial load and diversity of the aerosol produced are lower when a preprocedural mouth rinse is not used.	aerosol
15	Day 2008	The amount of debris deposited on the filter media was highly variable. The combination of fast hand piece with water irrigation demonstrated the highest concentration of debris deposited at the greatest depth in the (artificial) lung. Although the particles are most likely to be deposited in the conducting airways and terminal bronchi, some might be deposited in the terminal alveoli of the lungs and cleared only after weeks or months. The most common elements identified were calcium, phosphorus, silica, and aluminum. Other elements included iron and lanthanum. An	Conclusions: Aerosol particulates produced during enamel cleanup might be inhaled irrespective of hand-piece speed or the presence or absence of water coolant.	Aerosol particulates

		operator can inhale the aerosol particulates produced during enamel cleanup irrespective of hand-piece speed or the presence or absence of water coolant. 2. These particulates will most likely be deposited in the conducting airways and terminal bronchi of the lungs and will be cleared by the mucociliary escalator. 3. Some particles are likely to be deposited in the terminal alveoli and cleared only after weeks or months. 4. The particulates came from the enamel, the bonding adhesive, the band cement, and possibly the hand piece.		
16	Devker 2012	Group 1 pre : at operator nose 90.8, assistant nose 84.17, patient chest 104.5, 3ft from patient on right 22.36, IN group 2 in pre proedural operator nose 90.83, assistant nose 88.36, patient chest 107.13, 3ft on right 20.86 in group 2 with HVE op nose 15.27, assist nose 16.27, chest 18.12 and 3ft away 7.3 cfus	All areas (operator, nurse, patient chest and 3ft away had high CFUS) during ultrasonic procedures. this was significantly lower when HVE was used.	contamination of aerosol
17	Davya 2019	CFU Stranalveolar extraction alveoplasty impaction instrument trolley 601 694 572 on patient 679 776 687 right mid cubicle 417 524 383 left., midcubicle 519 586 439 right corner 327 246 270 left corner 245 225 387	bacterial colony counts were greater in cultures obtained from the left middle cubicle compared with the right middle cubicle and the results were statistically significant (P < 0.05). Bacterial colony counts cultured from dental cubicle following alveoplasty procedure were greater in number when compared to transalveolar extraction procedure.	droplet splatter contamination
18	Dos Santos 2014	dental prophylaxis with water only 9.05 x 10 ² * in terms of positions p13.21 x 10 ² *, P2 7.16 x 10 ² *, P3 1.68 x 10 ³ *	The greater the proximity of the working area, the greater the bacterial dissemination.	contamination and spread
20	Earnest 1991	After 10 seconds of drilling to remove decay, the intraoral filter had 4,478 total bacteria, of which 657 CFU were mutans streptococci, and 898 CFU were S. sanguis (Table). These two groups of organisms comprised 35 percent of the total count. There were as many as 300 species among the predominant flora on the tooth being excavated. The mutans streptococci and S. sanguis were not detected in the intraoral controls, but they were found in four of the 23 extraoral controls. This finding suggested that the ambient air in the room contained residual levels of these organisms agreeing with Gehring's report.3The extraoral filter contained about 5 percent of the total organisms found on the intraoral filter. This finding confirms that the total counts of bacteria in the aerosol diminished as a function of the distance o	Dental aerosols produced during caries excavation contain high proportions of mutans streptococci and S. sanguis. intraoral bacteria levels which reach the opposite side of the dentition are about 4,500 CFU per 10 seconds of drilling, and the extraoral levels in the vicinity of the operators' face are about 200 CFU per 10 seconds of drilling. This aerosol could spread bacteria within the patient's dentition, the oropharyngeal region and the operatory as well as exposing people in the operatory.	contamination of aerosol
21	Feres 2010	Mean decrease in CFUS from control (no rinsing).....0.12% Chlorhexidine group (no of CFUS) -dentist 72 (35) participant 78 (751) support board 79 (276) all 78 (1,062) 0.05% Cetylpyridinium chloride group- dentist78 (38) participant 65 (729) support board 82 (287) all 77 (1,054). Versus control Water (water) (Negative Control B) 0.12% Chlorhexidine group dentist 73 (38) participant 66 (412) board 76 (230) all 70 (680) 0.05% Cetylpyridinium chloride group dentist 79 (41) 61 (382) 79 (242) 68 (665)	We found the highest CFU counts on the blood agar plates on the participant's chest and the support board that was placed 12 inches from the participant's mouth, and the lowest CFU counts on the blood agar plates on the dentist's forehead.	Aerosol and splatter
22	Fine 1992	Reduction of viable aerosolized bacteria control group pre treatment 3.01 (SD 0.33), post treatment 2.83 (SD 0.41)	Study shows the number of recoverable viable organisms from the collection filter	Aerosol
23	Fine 1993 a	There was no significant pre-treatment difference (P >.05) in overall mean baseline bacterial levels between the test and control groups. The mean pre-treatment recoverable counts were 617 (log mean 2.790) and 625 (log mean 2.796) for the antiseptic mouthrinse and the control, respectively. The mean post-treatment recoverable counts were 40 (log mean 1.599) for the mouthrinse and 425 (log mean 2.628) for the control. These correspond to a 93.6 percent reduction in recoverable aerosolized colony-forming units compared with pre-treatment levels for the antiseptic mouthrinse, and a 32.1 percent reduction for the control rinse.	Highlighted the level of viable bacteria in an aerosol produced by ultrasonic scaling 40 minutes later.	Aerosol
24	Fine 1993 b	control baseline 661 (mean count) log 10 (2.82), study 2 baseline 631 (mean count) log 10 (2.81), study 2	highlighted level of viable bacteria in an aerosol produced by ultrasonic scaling 40 minutes later.	Aerosol

25	Graetz 2014	<p>Power-driven devices</p> <p>The size of the contaminated area was significantly different during <u>supragingival scaling</u> for the three different scalers (all groups $p < 0.001$): AIR, TIG, VEC (fig. 3).</p> <p>The same results were found while performing subgingival scaling (all groups $p < 0.001$) (fig. 3). Irrespective of the power-driven device used, <u>subgingival scaling</u> led to a lower contaminated area in percent (median [25th; 75th percentiles]: 0.18 [0.07; 1.05]) compared to supragingival scaling (0.34 [0.1; 2.24]) ($p < 0.001$).</p>	<p>The risk of spatter contamination of the area next to the patient's mouth during scaling increases with the use of sonic versus ultrasonic device as well as with the use of saliva ejector versus high-volume evacuation devices. Also the treatment position of the operator and the region of the mouth that is being treated can influence the generation of potentially infectious spatter. It is therefore strongly advised to use high-volume evacuation devices and to wear a visor during treatment in all positions behind the patient's head to protect the face of the operator. Since even under ideal conditions spatter cannot be avoided, it is strongly recommended to follow the common suggestions for protection during dental treatment: use of eye protection, masks, gloves, clothes coverage and rinsing the oral cavity of a patient preprocedural with antiseptic mouthwash.</p>	<p>spatter, droplets and deposit and aerosol</p>
28	Greco 2008	<p>Table II. Bacterial populations collected, including controls</p> <p>Sample number Species % of species</p> <p>1 S haemolyticus 50</p> <p>S capitis capit 25 Propionibacterium acnes 25 2 S warneri 33.33 S epidermidis 33.33 S saprophyticus 16.67 P acnes 16.67 3 Actinomyces viscosus 50 S hyicus 25 S aureus 25 4 S cohnii-cohnii 42.86</p> <p>A viscosus 21.43</p> <p>Streptococcus pneumoniae 14.29</p> <p>S epidermidis 7.14</p> <p>5 S cohnii-cohnii 40</p> <p>S warneri 20</p> <p>A viscosus 20</p> <p>Streptococcus pneumoniae 20</p> <p>6 S epidermidis 50</p> <p>S hominis homin 50</p> <p>7 P acnes 25</p> <p>8 S hominis novo 50</p> <p>S warneri 50</p> <p>9 P acnes 100</p> <p>10 (control, colonies on edges only)</p> <p>S xylosus 37.5</p> <p>S aureus 37.5</p> <p>P acnes 17.5</p> <p>Acinetobacter lwoffii 17.5</p> <p>17 Streptococcus mitis 67</p> <p>A viscosus 33</p> <p>17B A viscosus 20</p> <p>S simulans 20</p> <p>S epidermis 20</p> <p>S auricularis 20</p> <p>Species 20</p> <p>18 S epidermis 57</p> <p>A viscosus 27</p> <p>S aureus 10</p> <p>Streptococcus mitis 3</p>	<p>Twenty-one species of oral bacteria were identified by the new sampling technique. Two of the 3 masks that were tested offered no protection against the aerosolized bacteria. Conclusions: A new and effective method for collecting airborne bacteria is presented. Some conventional dental masks offer no protection from aerosolized organisms liberated during debonding procedures.</p>	<p>airborne bacteria</p>

		<p>Flavobacterium breve 3 19 S aureus 25 S auricularis 25 S cohnii-cohnii 25 A viscosus 25 20 Unidentifiable G(+) anaerobic rods 100 S hyicus 50 21 S cohnii-cohnii 37.5 S auricularis 12.5 22 Negative (no growth) 0 23 S cohnii-cohnii 40 S epidermidis 20 Streptococcus milleri group 20 P acnes 20 24 S xylosus 75 Leuconostoc sp (cocci) 50</p> <p>The diameters of the bacterial species collected by this technique are sufficiently small to be inhaled and deposited in the alveolar spaces of patients and clinicians. : Twenty-one species of oral bacteria were identified by the new sampling technique. Two of the 3 masks that were tested offered no protection against the aerosolized bacteria. Conclusions: A new and effective method for collecting airborne bacteria is presented. Some conventional dental masks offer no protection from aerosolized organisms liberated during debonding procedures.</p>		
29	Grenier 1995	<p>SCALING PROCEDURE (Colsed clinic): bacterial counts before the dental procedure were low (12 6 4 CFU/m³). Once <u>treatment started</u>, the levels of air contamination increased substantially (7- to 34-fold; 216 6 75 CFU/m³). Immediately <u>after the treatments</u> ended, the levels of bacterial contamination of the air decreased by approximately 80% (to 44 6 14 CFU/m³). At <u>2 and 4 h</u> after the treatments ended, the counts were about the same as they were before the dental treatments began. OPERATIVE PROCEDURE (Colsed clinic): a clear increase in the level of air contamination (75 6 22 CFU/m³) was associated with the use of the high-speed drill. At 2 h after the treatments ended, the counts reached base levels.</p>	Bacterial contamination generated during the operative dental treatments was less than the contamination generated during the ultrasonic scaling treatments. This finding may be related to the fact that patients wore a rubber dam while being treated.	Aerosol
30	Grundy 1967	<p>The results show clearly that, under certain conditions, enamel particles are thrown into the area of the operator's face in considerable number (up to 59 million in a halfminute sample of 5 liters of air; Fig. 5) and in considerable quantity (up to 4 mg. in a 2-minute sample of 24 liters;The particle counts (Fig. 5) for samples taken during the cutting of a lower incisor did not differ significantly from those taken during control periods. During the cutting of an upper incisor, however, the count rose by approximately 53-fold and, for upper and lower molars, by about 12-fold. The counts given here are confined to particles of 5 microns diameter or less.The weights of enamel collected when cutting the upper incisors were also much in excess of those for other teeth. The difference is highly significant at a level of P < 0.001. The results for the dry cutting of the upper molars were significantly higher (P < 0.05) than the controls, but no such significance was found during wet cutting</p>	The amount of flying tooth particles was considerable during the cutting of upper teeth at the front of the mouth. It was much less when other teeth were being cut. This quantity was reduced by using a water spray while cutting.	flying too th particles!!
31	Gupta 2014	<p>Control group Data for CFUs (mean ± SD) location for (pre-treatemnt 1min) water mouth rinse only - Drs Chest area: 93.125 ± 9.61 Assistant chest area:26.125 ± 6.03 Pt chest area: 280.625 ± 22.43 (not incl results for other MR tested HRB & 0.2% CHX) CFUs were highest at the pt chest areas and lowest at the assistant's chest area. Compared with the control group (water) both the test groups were efficient in reducing the number of CFUs. CHX was proven to be more effective in reducing the number of</p>	Study showed that the pt chest area received the greater number of microorganisms than the dental professional, follwed by that of the assistant. This reinforces the importance of wearing PPE	Aerosol

		CFUs on agar plates compared with HRB and water when used as a preprocedural mouthrinse 10 minutes before oral prophylaxis.		
32	Hallier 2010	Bioaerosol levels increased from baseline during all procedures. Greatest increase was for cavity preparation and tooth extraction. Mean level of bioaerosols baseline & during procedures, without ACS - Cavity prep 23.9 cfu/m ³ and 105.1 cfu/m ³ (p = 0.02) , history & exam 23.9 cfu/m ³ and 62.2 cfu/m ³ (p = 0.04) ; Ultrasonic scaling 41.9 cfu/m ³ and 70.9 cfu/m ³ (p = 0.01) Extraction 9.1 cfu/m ³ and 66.1 cfu/m ³ (p = 0.01). The predominant microorganisms isolated were Staphylococcus species and Micrococcus species. Assessment of bioaerosol levels during 4 procedures WITH ACS revealed significant reduction. Statistically significant for 3 procedures; cavity prep (p=0.018), ultrasonic scaling(p=0.027) and tooth extraction (p=0.036)	Bioaerosols levels significantly increased for all 4 procedures from baseline. (bioaerosols were significantly reduced with ACS activation but not to baseline levels)	Bioaerosol
33	Harrel 1996	Number of contaminated squares produced for each trial (5 x2 operators).WITHOUT High Evacuator equipment - operator 1/2 = 93/92, 62/183, 113/58, 284/129, 186/122. Highest number of contaminated squares was 284 without device. Lowest =0 scaler with HVE attachment. Mean number of contaminated squares without HVE device = 132.2 (SD ± 68) and with device = 9.2 (SD ± 14). P<0.05	Aerosol splatter contamination was found in a lab based experiment using an ultrasonic scaler. The HVE attachment device significantly reduced detectable splatter	Aerosol
34	Harrel 1998	Handscaling - negligible contamination - Mean (standard deviation) contaminated squares = 4.2 (± 2.7). Mean max distance 1.6cm (± 0.52cm). All ultrasonic scalers with all inserts produced significantly greater contamination P< 0.01	All ultrasonic units and tips produced significant aerosol and splatter that were ejected a considerable distance	Aerosol & Splatter
35	Harrel 1999	The aerosol reduction device yielded a statistically significant reduction (P < 0.05) in aerosol contamination. The reduction in mean contamination was greater than 97%. Number of contaminated squares without aerosol reduction were Operator 1- 184.25 9 (with 6.16) Operator 2- 166.33 (with 2.58). Pooled data without 175.29 (with 4.37).	Aerosol reduction device caused obvious visible reduction of spray compared to without.	Aerosol
36	Hausler 1966	Composite data obtained from 17 experiments (Fig. 1) demonstrate that the number of droplet nuclei containing S. marcescens decreased rapidly as the sampling distance from the mounted tooth increased. The LPR, however, which is a ratio of the number of bacterial aerosols approximately 5 y or less in size to the total number of bacterial aerosols collected, continues to increase with the sampling distance.	These results demonstrate that the operator is exposed to large numbers of droplet nuclei, of which at least one fifth have the capacity of penetrating the alveolar spaces when the air turbine handpiece is operated without water spray. The data presented in Figure 1 C, however, show that LPR increases at least to a distance of 30 inches from the cutting surface. The operator works well within this distance in all procedures.	aerosol and droplet nuclei
37	Holloman 2015	When evaluating the primary outcome, we did not find a statistically significant difference in aerosol and splatter reduction between the test and control groups during ultrasonic scaling (P = .25). Similarly, the study results found no statistically significant difference between the 2 groups in CFUs collected in the postexposure period. Plaque score - relationship between full-mouth plaque extent scores and CFUs collected, we found a significant positive correlation (R ² = 0.273) in the control group (P = .003), as shown in , but not in the test group (P > .05). CFU DURING/AFTER exposure. MEAN (STANDARD DEVIATION) LOG10 CFUs/mL (95% CONFIDENCE INTERVAL) Control n=25 3.61 (0.95) (0.74-3.21) / 2.00 (1.17) (0.91-1.52) Test group during scaling 3.30 (0.88) Bacteria- The most prominent type of bacteria identified was a-hemolytic streptococci, which were present in 100% of the samples. Type of bacteria and percentage present in samples - a-Hemolytic Streptococci n=50, 100 % of samples; Fusiform Bacteria n=32, 64% of samples; Black Pigmented n=13, 26% of samples; b-Hemolytic Colonies n=10, 20% of samples; Eikenella corrodens n=6 12%; Prevotella intermedia n=5, 10%; Tannerella forsythia n=2, 4%; Porphyromonas gingivalis n=1, 2% of samples	The amount of contamination taking place during ultrasonic scaling, as indicated by high bacterial counts (approximately log ₁₀ 5.0 CFUs/mL) in both groups, is of concern.	Aerosol & Splatter
97	Ireland 2003	Size found :The observed particles ranged from 2 μm up to greater than 30 μm in diameter. The shape of the particles sampled was also varied but was commonly angular and included aggregated clusters. Composition: both PM10 and PM2.5 particles are produced during enamel cleanup after orthodontic fixed appliance therapy. These	The significance of these findings to the health of the patient, operator, and staff is unknown and requires further investigation, along with an assessment of the production of	Airborne particles: PM10, PM25

		particles were consistent with the composition of the fillers and matrix of the diacrylate bonding agent and glass polyalkenoate band cement. Traces of enamel and, surprisingly, of the tungsten carbide bur were also found to be present.	particles smaller than 2 m and a comparison of particle production with other methods of enamel cleanup	
38	Ishiharma 2008	On gown 24% visible & 76% not visible. 469 visible splatter on the gown and visor mask (small 296 & 173 large), which came from 19 (76%) of 25 pts. size varied from 0 to 78 and 0 to 53 Presumptive tests for invisible bloodstains - 1,206 positive reactions, 2.57-fold greater than the visible stains, from 88% of cases. In presumptive test -no significant difference for occurrence ratio among third molar status and procedure. Largest number of stains present on right forearm =538, face shield=326 thorax= 127	High incidence of blood contamination splatter to dental surgeon during oral surgery - both visible and invisible (Imperceptible) .	blood Splatter
39	Ishiharma 2009	The ratio of positive blood presumptive test - Distance 20 cm pt mouth=76% positive staining patterns varied from small dots to spreading. A diffuse smudge pattern was observed in 23 cases (23%), remaining 53 cases (53%) had individual positive dots that could be counted (range: 1-18). Distances of 60 and 100 cm - decreased to 60% (N = 15/25) and 57% (N = 4/7) -not significantly different from the ratio at 20 cm (χ^2 -test: P = 0.1879). Categorisation - 25 slight, 23 moderate, 28 heavy. 23 diffuse smudge patterns also categorised as heavy. In the 60 cm trials, six cases (24%) showed a heavy positive reaction, while there were none categorised as heavy among the 100 cm trials. χ^2 -test showed no significant differences for occurrence ratio among the different third molar statuses. In addition, the duration of high speed instrument use had no significant effect on occurrence ratio nor on degree of positivity (KruskalWallis test, data not shown).	Risk of floating blood particles when using high speed instruments in dental procedures.	Blood contaminated aerosol
40	Janani 2018	Bacterial colony counts varied in different areas clothing: greater CFU number at the sleeve cuffs compared with the neck region CFU number varied with different minor surgical procedures: alveoloplasty/impaction procedure were greater when compared to transalveolar extraction procedure.	Dental care clothing is highly contaminated with pathogenic bacteria, It is important to use of PPE for minor surgical procedures to reduce the degree of microbial contamination and prevent cross infection in dental care setting.	aerosol, splatter, blood
41	Jawade 2016	MEAN (SD)of all sides : ((124.5 ± 30.08 CFU) . Right side; ((165.3 ±18.47). Left side (mean 128); behind the patient (mean= 79)	There is need for use of chemical agents as an adjunct to reduce the contamination from dental aerosols.	Aerosol
43	Jimson 2015	Alpha-hemolytic <i>streptococci</i> are the predominant bacterium, followed by Coagulase-negative Staphylococcus. Mean (CFU/cm2): Patient =0.433(±0.194); Surgeon= 0.468 (±0.218) Attendant= 0.448 (±0.236) Instruments trolley=0.383 (±0.168).	The bacterial load of the surgical room after operation exceeds the permissible limits. Further, the presence of few pathogenic bacteria like S.aureus, E.faecalis, and E.coli. reflects the possibility of acquiring the nosocomial infection to the patients and Surgeon.	Aerosol
42	Junevičius 2005	when no suction system had been used: the area coverage with an aerosol-form fluid from the phantom oral cavity per 100 mm ² decreased five times at the investigated distance of 27 cm to 47 cm, from 14.85 mm ² to 3.17 mm ² . largest droplets flied only within the limits 27cm-47cm. Diameter of particles decreased 5 times at the distance 27-74 cm. when only a small-size pump was used: area covered with aerosol decreased 121 times at the investigated distance of 27 cm to 74 cm, from 10.02 mm ² to 0.083 mm ² . Changes of the maximal diameter of particles occurred evenly throughout the whole investigated distance. High dispersion of particle size was not observed. when a small size pump and large-size suction pump were used together: area covered with aerosol decreased 32 times at the investigated distance of 27 cm to 74 cm from 5.028 mm ² to 0.159 mm ² . High dispersion of particle size was not observed. The average diameter of particles decreased 2.2 times at the distance 27-74cm. The number of particles and their diameter decreased while the distance increased.	The number of particles and their diameter decreased with increase of a distance. The smallest water particles fixed in the study were found evenly distributed throughout the whole investigated distance. These particles were larger (26 µm) when ineffective suction systems were used. The diameter of the smallest fixed particles (16 µm) decreased with increase of suction effectiveness. A standard small-size pump could not ensure good collection of water particles	Water droplets
44	Kaur 2014	Anaerobic (CFU mean±SD): chest (for 3 pre-rinse groups)= (358.1 ± 238.8; 238± 101.1; 179.1±64.9) / 9 feet (for 3 pre-rinse groups)= (33.3 ± 21.7; 28.7±13.7; 35.5 ± 15.1) Aerobic (CFU mean±SD): chest (for 3 pre-rinse groups)= (71.2 ± 62.7; 113.1± 56.3;	This study demonstrates that a sufficient amount of aerosol and splatter from the patient will be ejected far enough to come into contact with dental persone. The pre-rinse level of	Aerosol

		92.2±40.4) /9 feet (for 3 pre-rinse groups)= (146 ± 89.5; 264.7± 85.6; 179.1±64.9) /Mask (for 3 pre-rinse groups)= (28.7± 18.6; 35.2± 24.4; 43.8±37.2).	CFU (CONROL ARM OF THE STUDY) was maximum at patient's chest followed by the operator's mask , then, at 9 ft in front of the patient, revealing that the number of CFU decrease as the distance from the reference point increased.	
45	King 1997	Bracket tray(mean±SD)= 45.13 ±28.9; Face shield (mean±SD) (1.22±1.53)	Aerosols may be contaminated with microorganisms and found in greatest concentration within 2 feet of the patient, where the dental health professional is usually positioned.	Aerosol
46	Kobza 2018	Multi-chair setting: Bacteria CFU/M3 concentration during the procedure = 30 (360–500); Fungi= 300 (0–330). Single-chair setting: Bacteria CFU/M3 concentration during the procedure = 490 (200–1190); Fungi= 110 (40–220). . The largest proportion of organisms in both of the dental surgeries were <u>Gram-positive cocci</u> which ranged from 74 to 100% of the sample. The remainder were <u>Gram-positive, rod-shaped bacteria</u> and those creating <u>endospores</u> as well as <u>non-porous bacteria</u> . The dominant fungi were <i>Cladosporium</i> and <i>Penicillium</i> types.	The concentration of total bacterial and fungal aerosols was similar in both dental offices, and a significant increase was observed during dental treatment.	Aerosol
47	Kritivasan 2019	CFU no. (1ft)= 86.6; (2ft)= 110.5; (3ft)= 72.0	While trimming the dental prosthesis, the amount of aerosol particle was produced more in 2ft blood agar compare to 1ft and 3 ft blood agar. It indicates there is a high risk of transmission of infection to the dentist and the lab technicians.	Aerosol
48	Labaf 2011	The greatest amount of aerosol was seen in prosthodontic treatment and the least value was shown during endodontic procedure (P<0.0001). Tthere is no significant difference in number of colonies at different distances sampling in endodontic treatment (p=0.37), periodontal treatment (p=0.31), and Prosthodontic treatment (p=0.19). Dentist chair Mean (± SD): Endodontic= 21.43(7.5) Periodontic= 124.71(7.74) Prosthodontic= 43(68./93).144. Trolley: Endodontic= 31.71(18.33) Periodontic= 42.86(21.12), Prosthodontic= 109.0(70.17); Dentist's table : Endodontic= 33.71(15.97), Periodontic= 50.43(24.57), Prosthodontic= 103.57(60.54); Sterilizing room: Endodontic= 21.29(14.28), Periodontic= 722.7(13.31), Prosthodontic= 21.29(14.28)	The number of bacterial aerosols in each dental clinic, during treatment increased significantly and consequently the risk of its transmission enhanced. The maximum number of bacterial aerosols was belonged to prosthodontic treatments and the minimum in endodontic therapies.	Aerosol
91	Larato 1966	During cavity excavations, the organism counts increased by 2,200 per cent than the counts of colonies/ft2/min grown during "dentist and patient present in the room for 10 min. without performing any procedure" . The types of organisms, including many not usually found in air, also increased. Over the next 30 min., the bacterial counts quickly fell to 250 per cent above the counts present before the cavity excavation began (Lines 9 and 4/same as above). Some circulating organisms, still present in air 30 min. after cavity excavation, generally originate in the mouth.	The results of this study demonstrate that large numbers of microorganisms are liberated into the surrounding air when an air turbine drill is used for excavating procedures. The ejected contaminated water droplets, liberated into the air by the air propellant, cause a significant percentage increase in the number of organisms per cubic foot per minute of sampled air. Many of these contaminated particles bear a physical resemblance to a "droplet nucleus," since they remain suspended for periods of up to 30 min. in the air.	Droplet nucleus
49	Logothetis 1995	CFU (Mean ±SD): 2 o'clock position (2 ft away from patient head)= 82.8 (12.8), Behind the dental chair (3ft away)= 69.3 (15.9); righ hand side to the paient (3 ft away)=56.1 (12.1). Left hand side to the paient= 43.8 (3.7), Another point at the left handside to the patient (5ft/8 inch)= 34 (3.8). Infront of the patient (6 ft and 9ft away)=27.3 (3.9).	There was no significant difference in colony-forming units between antiseptic mouthwash and water (P=.2952).	Aerosol
50	Manarte-Monteiro 2013	CFU/plate counts mean value was significantly higher for endodontic treatments (19.7 (±10.8); 17.1CFU/dm2/h) than for restorative dentistry (15.1 (±8.9); 13.9CFU/dm2/h) procedures. During both treatment types; CFU counts were significantly (p < 0.001) higher at 0.5m (restorative 19.0 (±11.5); 16.0) than at 2m (15.6 (±8.2); 13.9) and significantly higher for endodontic treatment for both distances (p = 0.001, at 0. 5m and p = 0.001 at 2m). During restorative dentistry procedures the CFU counts were significantly higher (p < 0.001) at 0.5m (16.6 (±10.4); 15.0) than at 2m (13.6 (±6.9); 12.7). Longer treatment times (≥2h)	CFU counts in aerosols are influenced by the dentistry procedures (restorative dentistry and endodontic),the operative site distance and the treatment times performed. Qualitative and quantitative composition of dental aerosols probably varies with each patient and operative site.	Aerosol

		were associated with higher CFU count ($p < 0.005$) in restorative dentistry ($p < 0.004$) and in endodontic treatments ($p < 0.002$) procedures, for both growth plate distances, at 0.5m and at 2m. No significant differences were found in CFU/plate counts formed during the restorative dentistry or the endodontic treatments procedures, considering the use or no turbine use and the short time (≤ 30 min) or the longer time (> 30 min) of turbine use.		
89	Micik 1969	<p>* Oral examination (Median of CFU/min=3) and use of hand instruments (Median of CFU/min=1) produced aerosols with bacterial concentrations of approximately first-order magnitude and were equivalent to a patient speaking or breathing.</p> <p>* A prophylaxis handpiece used with a pumice cup and pumice to clean teeth (Median of CFU/min=42), an air turbine handpiece with air coolant (Median of CFU/min=58), and air spray from a three-way syringe (Median of CFU/min=72) produced numbers of bacteria comparable to those resulting from coughing.</p> <p>*An air turbine handpiece, when used with air-water spray coolant (Median of CFU/min=1000), atomized 20 times greater numbers of bacteria than with air spray alone. This concentration was numerically equivalent to the aerosols produced during most oral activities, including sneezing. * The air-water sprays (Median of CFU/min=37000) also produced aerosols with the greatest percentage of particles 5 μm or less in diameter.</p> <p>* The rotary action of the bristle disk during polishing procedures (Median of CFU/min=2300) and the use of the air-water spray from the three-way syringe produced bacterial aerosols equal to or exceeding those produced during all oral activities studied, including those considered unsanitary when at close range.</p>	Dental procedures incorporating the use of water sprays or rotary instruments generated aerosols with significantly greater numbers of bacteria than were produced by all the oral activities surveyed. It appears appropriate to modify certain dental procedures or to use devices or techniques such as special high velocity air suction, that will reduce microbial aerosol production or dispersion during those procedures to levels comparable to those produced by group 1 oral activities such as breathing or speaking.	Aerosol
51	Miller 1971	The bulk of any pathogens contained in blood being aerosolised, splattered and splashed by powered dental instruments is likely to be distributed in the splash and splatter. The significance of the aerosolised blood lies in their potential to remain airborne through their 35 minute - 17 hour half lives, and to carry plasma-borne pathogens e.g. HBV, from an infected patient to the respiratory system of anyone exposed to the aerosols.	The plasma aerosols generated by powered dental instruments from whole blood support the hypothesis for airborne route of HBV infection in dental professionals. Passage of 15-83% of plasma particles through nine different types of surgical masks demonstrated. The continued use of inefficient surgical masks for the protection from occupational infection is ill-founded and antithetical to the barrier concept.	Aerosol
90	Miller 1995	Dental procedures were divided into three tiers in accordance to the CFU/FT2 concentration: 1) High (10,000 and more) : Wash teeth (air- 5 water spray); Polish restoration (bristle disk); Cavity preparation (air turbine handpiece-air water coolant). 2) Moderate (1000-10,000) : Dry teeth (air only); Prophylaxis (pumice cup). 3) Moderate-low (100-1000) Prophylaxis (ultrasonic-curette), Cavity preparation (air turbine handpiece air coolant only). 4) Low Speak (10-100) : Wash teeth (water only).	Reduction of splatter can be achieved by eliminating or altering of the procedure that produces splatter, eg, eliminate the use of the bristle disk when polishing and use air or water alone, rather than a combined air-water spray, protection of the operator and assistant by use of protective masks and eye glasses, and use of a shield to intercept splatter particles as they leave the patient's mouth.	Splatter
52	Mohan 2016	The results of this study showed that a rinse with chlorhexidine mouth rinse statistically decreases colony forming units during the oral prophylaxis procedure. The bacterial load was reduced by 93% following the use of chlorhexidine mouth wash when compared to the saline.	N/A	Aerosol
53	Muzzin 1999	Mean + SD CFU 12 inches from patient mouth with aerosol reducing device: 20.1 sd53.9; without: 148 sd145. Mean + SD CFU hygienist face mask with aerosol reducing device: 8.8 sd15.1; without: 40.9 sd33.8	our investigation found that the aerosolreduction device resulted in 86percent fewer CFUs on platesplaced 12 inches from the sub-ject's mouth during air polishingand 79 percent fewer CFUs onthe face mask plates. Aerosol particles smaller than 5 microme-ters, such as those generated during air polishing, can penetrate the face mask and may be inhaled. The results of this investigation suggest that the aerosol reduction device attached to the airpolisher is effective in reducing the	Aerosol

			amount of microbially con-taminated aerosol and spatterthat are generated during airpolishing. When using air polishers, clinicians should use appropriate infection control measures in addition to an aerosol reduction device to protect themselves from potential health hazards.	
54	Narayana 2016	Baseline data with no pre-procedural rinse and no HVE: scaling led to 100.73 sd89.34 CFUs	The bioaerosols generated during dental procedures pose a potential risk for the spread of infections to dental personnel and individuals. The control of these contaminated bioaerosols has not been emphasized enough in dental infection control protocol.	Bioaerosol
55	Nejatidanesh 2013	The areas lateral to ala and inner corner of eye were more contaminated than the other areas, but there was only a significant difference between these areas and cheeks (P < 0.05). There was no significant difference between right and left side of the face (P = 0.415). Contamination values of periodontists' face were significantly more than prosthodontists' faces (P < 0.05).	The central areas of face are at high-risk of contamination during dental practice. • Periodontists are more at risk of face contamination compared to prosthodontists. • Both sides of the face are equally contaminated during dental procedures.	Splashes
56	Oliveira 2018	Filamentous fungi and yeasts were isolated in 81.2% of the samples collected in clinics 1 and 2, with clinic 2 presenting the highest contamination index (73.4%). The most frequent species were <i>Curvularia clavata</i> (14.3%), <i>Aspergillus niger</i> , <i>Phialemonium obovatum</i> (both with 8.3%), <i>Curvularia geniculata</i> , <i>Scopulariopsis koningii</i> , <i>Paecilomyces lilacinus</i> , and <i>Penicillium citrinum</i> (both with 6.1%) as shown in Table 1. At the two evaluated clinics, fungal growth was observed in 100% of the plates placed in front of the chair and in 75% of the plates placed in the other collection sites.	This study suggests the adoption of a minimum safety distance of more than 2 m between dental chairs ... as a measure to decrease the dispersion of fungi aerosols in these environments.	Aerosol
59	Prospero 2003	restorative procedures - mask: median = 0.0312 CFU cm ² /min; mobile tray: median = 0.0048 CFU cm ² /min; spitoon: median = 0.0098CFU cm ² /min; lamp: median = 0.0096 CFU cm ² /min oral hygiene procedures - mask: median = 0.0676 CFU cm ² /min; mobile tray: median = 0.0029 CFU cm ² /min; spitoon: median = 0.0101 CFU cm ² /min; lamp: median = 0.0166 CFU cm ² /min	These results show that a large number of microbesreach healthcare workers' faces during restorative den-tistr y and oral hygiene work, suggesting the same for anyblood-borne pathogens present in the patient's mouth. The surfaces that showed the highest levels of conta-mination were, in decreasing order, dental healthcareworkers' surgical masks, lamps, areas near spittoons, andmobile trays, which were furthest from patients' mouthsduring both types of dental procedures.	Aerosol
60	Purohit 2009	Ultrasonic scaler use: patient chest mean CFU=102.4 sd4.5, operator chest mean CFU=72.4 sd5.7, 12 inches from operating area mean CFU=40.3 sd2.4, 24 inches from operating area mean CFU=25.7 sd4.1 high speed handpiece use: patient chest mean CFU=72.2 sd3.7, operator chest mean CFU=49.3 sd6.5, 12 inches from operating area mean CFU=53.4 sd4.5, 24 inches from operating area man CFU=24.6 sd5.0	Aerosol contamination was more during scaling procedures than during the use of a high speed air turbine handpiece. This increase in microbial contamination can probably be attributed to dental plaque, both supragingival and subgingival, which are the major sources of pathogenic organisms. During both the procedures, the highest number of colonies was seen on the plates positioned on the patient's chest area, and this is in conformity with a study conductedby Cochran et al (1989) who concluded that the larger salivary droplets generated during dental procedures settle down rapidly from the air with heavy contamination of a patient's chest area. This was followed by the contamination on the operator' chest area and 12 inches from the operating area. The least colonies were formed 24 inches away from the operating area, which is also consistent with the study by Logothetis and Martinez-Welles (1995) where a 10-minute waiting period before air polishing was obviously an important factor in the reduction of aerosol contamination.	Aerosol
61	Ramesh 2015	patient rinsed their mouth with saline: Mean of CFU at operator side = 12.80; patien chest 12.60; assistant side 11.80.	In this pilot study, the patient's chest area was exposed to a greater number of microorganisms, followed by the operator and the assistant sides.	Aerosol

62	Rao 2015	The highest number of colonies was found on blood agar plate positioned at the patient's chest area followed by the doctors (data presented using error plot graphs and table)	The use of ultrasonic scaler increases the risk of aerosol contamination	Aerosol, splatter
63	Rautemaa 2006	The facial masks became equally contaminated during the use of high-speed rotating instruments and a notable difference was found in the facial contamination between the two dental teams (dentist+nurse) who performed the procedures. Gram-positive cocci, namely viridans streptococci and staphylococci.	These results show that a dental procedure is potential hospital infection risk if the extent and nature of microbial aerosols created by high-speed rotating instruments is underestimated.	Aerosols
64	Reddy 2012	The mean CFU for the patients who rinsed their mouth with sterile water before ultrasonic scaling Mean(\pm SD)= 114.7 (\pm 9.14) (at 4ft and no particular position was stated).	The aerosols produced by the ultrasonic devices are heavily contaminated by these microorganisms which pose a serious health threat to the clinician and his surrounding in the form of systemic conditions like common cold, influenza, tuberculosis, HBV, HIV, legionellosis.	Aerosols
65	Retamal-valdes 2017	Proportions of DNA probe counts of the 40 subgingival species evaluated by Checkerboard DNA-DNA Hybridization technique showed that aerosols/splatters from <u>no rinsing</u> and <u>Water groups</u> (51.1% and 47.1%, respectively).	No details about the control arm of the trial.	Aerosol and splatter
66	Rivera-Hidalgo 1999	The standard ultrasonic insert (S) used without the aerosol reduction device produced a mean of 98.5 contaminated squares. The (F) type = 106.8	Ultrasonic insert (S) and (F) produce copious amounts of aerosol contamination.	Aerosol and splatter
69	Sadun 2020	Prior to rinsing, 20 microorganisms were isolated from saliva samples of the Caries and Periodontitis treatment groups; Eleven of the microbes were fungi and yeasts and other nine microorganisms found present in the saliva include bacteria of several genera. For the control arm the number of bioaerosol colonies were higher for periodontitis treatment group (1.32) compared to caries & periodontitis group (1.23) and then caries treatment group (1.13) (data presented using graphs and tables). Higher number of counts was recorded at distance nearest to the treatment point while the degree of contamination showed a decrease moving away from the point of treatment.	The study shows difference in the microbiological load and profile between patients with caries, periodontitis and both caries & periodontitis with a higher microbiological concentration in area closest to the treatment point.	Aerosol, bioaerosol, splatter
70	Saini 2015	The numbers of CFUs were the highest at (patient's chest) and the lowest at (6 o'clock position). Mean (\pm SD) for each position for the control group (patient rinsed their mouth in water before the procedure): patient's chest= 90.6(\pm 2.84); 1 ft from the reference point (Operator position)= 90.37(\pm 2.72); 1 ft from the reference point (Assistant position)= 88.56(\pm 3.36) ; 2 ft from the reference point (12 o'clock position)= 71.51(\pm 3.30); 8 ft from the reference point (6 o'clock position)= 54.35(\pm 3.13)	This study demonstrated that a sufficient amount of aerosol and spatter from the patient is ejected far enough to come in contact with the dental personnel performing the treatment.	Aerosol, splatter
88	Samaranayake 1989	mean (\pm SE) of CFU AT (1 meter)= 11.5 (\pm 4.9); (2meter)= 3.9 (\pm 0.8); (3 meter)= 1.6 (\pm 0.3)	There was not key messages per say as the study was really short (4 pages). however, the authors highlighted in the discussion section that the inhalation of aerosolized microbes could perhaps be considered as an intrinsic hazard of dental practice. For instance, it is known that episodes of airborne infection and tuberculosis occur more often in dentists than in persons engaged in other occupations, and more dental students contract tuberculosis than do medical students.	"atmospheric bacterial pollution"
71	Sawhney 2015	Verbatim not available: For the control group that used water rinse and when suction was not in use, an 80% bacterial growth was noted (data presented in fig 11). Also, a number of bacterial groups and species including (Mixed group of microbes predominantly Streptococci, Aerobic spore forming bacilli, Staphylococci species and Pseudomonas species) were identified(data presented in table/fig 7).	This study demonstrated that ultrasonic scaling generates sufficient aerosol to contaminate the dental environment. Analysis of the bacterial colonies showed presence of different bacterial groups	Aerosol, splatter, droplet nuclei
72	Serban 2013	"The mean total number of bacteria the group that rinsed with sterile water (M=121.35CFU/m ³) t(78)=-5.37, p<0.001 and size effect ϵ =0.26." "The mean number of hemolytic bacteria on the mask attached Petri plate for the group that rinsed with sterile water (M=15.78CFU/m ³) t(78)=-6.75, p<0.001 and size effect ϵ =0.36 is considered large according to Cohen.	There is a risk of infection through aerosolisation of hemolytic bacteria during ultrasonic cleaning procedure	Splatter , aerosol

73	Sethi 2019	"In Group III, mean \pm SD scores of CFUs formed at the chest, right side, and left side of the patients were 1396.0 \pm 214.93, 1064.05 \pm 26.69, and 1009.85 \pm 23.29 (mean \pm SD), respectively"	CFU counts were highest on the blood agar plates placed at the patient's chest area followed by the patient's right side and left side, respectively when using distilled water as ultrasonic coolant)	Aerosol, splatter
74	Shetty 2013	Verbatim not available. Comparison of mean CFU's in distilled water (controlled group) showed 131.15 CFUs at ONL: Operator's nose level; 120.85 CFUs at DNL: Dental assistant's nose level and 50.75 CFUs at 12" from Pt chest level (described using information presented in graph 1)	CFUs produced by aerosol significantly decreases as the distance increases. CFU count is highest at 6 inches from operators nose level, than dental assistant's nose level and is lowest at 12 inches from the patient's chest level	Aerosol
76	Singh 2016	Aerosols contaminated with microorganisms and found in greatest concentration within 2 feet of the patient. An increase in the CFUs during the treatment procedure is noted. Gram staining, catalase, and coagulase showed presence of <i>Staphylococcus aureus</i> , <i>Staphylococcus epidermidis</i> , and <i>streptococci bacterias</i> in high numbers.	A number of bacterial colonies are found in aerosols produced during ultrasonic scaling procedure	Aerosol
96	Stevens 1963	it is readily seen that each patient had a heavy bacterial flora and that the highest bacterial counts were found through the use of the air turbine and water, with or without evacuation, and without the rubber dam.	This preliminary study demonstrated the existence of a spray contaminated with microorganisms in the area of operation with the use of the air turbine handpiece. It further demonstrated that if patients possess pathogens in their bacterial flora, the operating dentist is exposed to a degree that may be a menace to his health.	air contamination with microorganisms
78	Swaminathan 2014	Although the CFU is reduced to 99.91% in saliva, the reduction is not proportionate in the aerosol produced among the same group.	Preprocedural rinse has a definite benefit in the treatment perspective but as aimed, the reduction in the bacterial load in saliva has not proportionately decrease the bacterial load in the aerosol.	Aerosol
94	Tag El-Din 1997	Patient chest contamination(Highest contaminated area amongst the other examined spots): highest level associated with restoring (upper anterior) tooth with composite. followed by LL6, RL6, LU6,RU6. Right side: Highest level RU6, RL6 then, LU6=LL6=upper anterior. left side: Highest CFU number is associated with LU6, RL6, upper anterior, RU6, LL6. Behind head: highest at LU6, upper anterior, RU6, RL6, LL6. Contamination level reduction at <u>1 meter</u> was 98.8% when a rubber dam was used (control:procedure without rubber dam). Bacterial contamination almost disappeared when rubber dam was used at <u>2 meter</u> distance.	During conservative procedure without rubber dam, the airborne bacterial load increased from 8.8 to 25.1 CFUs. This means that the patient, dentist, assistant and the surfaces and objects in the clinic are at a risk of exposure to airborne contamination 2.5 times greater than the norm. Airborne bacteria after the procedure persisted at a higher level than the initial one (8.8 to 13.5 CFU). The contamination may become worse if using a high-speed handpiece in infected pulp containing variable species of anaerobic and aerobic bacteria. The spatter radiates outward from the patient's mouth towards the chest and to the same side of the procedure. There was a different distribution of bacterial contamination when the procedure was performed in the maxillary teeth. Thus, the distribution may be influenced by many factors: such as the type of procedure, the position of the tooth in the mouth, the position of the operator relative to the patient, the position of the patient in the dental chair, whether high-volume evacuation was used and the level of microorganisms in the patient's mouth.	spatter
80	Timmerman 2004	The mean colony forming units (CFU) before treatment never exceeded 0.6 colonies per plate (room had been vacant for 15 hours and locked). At 40 cm, the mean CFU, when considering a period of 40 min, was 8.0 for HVE and 17.0 for CDS. The mean CFU at 150 cm during this period was 8.1 with HVE and 10.3 with the CDS.	As is shown, the number of CFU seems to be comparable for the two distances when using the high volume device. With the conventional suction, the number of airborne bacteria tends to be larger at the 40 cm distance. The condition was considered good when extrapolated to 60 mins (the time period for the Air Microbial Index), the number of CFU ranges from 0 to 25.	aerosols
81	Toroğlu 2001	Aim (1): mean (\pm SD) for the control(orthodontic work without using high-speed handpiece): 11.2 (\pm 5.88); debonding group with using high-speed handpiece: 60.43 (\pm 56.56)/ Sig. difference was found (Wilcoxon matched pairs-ranks test)= 0.0016 (THESE RESULTS WERE NOT SPECIFIED TO AN AREA OR HOW IT WAS CALCULATED). The study	*The use of high-speed air turbines with coolant water during the removal of adhesive material significantly increases the amount of aerosol contamination in and around the operatory area;	Aerosol

		also measured CFU number for the room when it was empty and it was found that there was a sig. increase of CFU between empty room and the control measurement (P= 0.01) (the latter finding may be more relating to environment rather procedure). Aim (2): mean (\pm SD) of CFU per plate: Orthodontist 33.31(\pm 28.31); Assistant= 38.69 (\pm 21.80); Dental chair=25.16 (\pm 26.55).		
82	Toroğlu 2003	blood was found in all the aerosol and excess fluid samples. HBsAg and HBV-DNA were detected in serum samples of patients who were hepatitis B carriers. HBsAg was detected in excess fluid samples of the two of these patients, whereas HBV-DNA was detected only in one of the sample. HBsAg and HBV-DNA were detected in aerosol sample of only one hepatitis B carrier.	There is a possibility of exposure to blood (hence blood- borne disease) in orthodontic practice whenever the use of a high-speed instrument is required	blood and blood
95	Travaglini 1966	Complex cavity preparations tended to give high organism counts, since the amount of time during which the spray was emitted was longer in performing the operation.	The results of this study demonstrated that large numbers of living micro- organisms found in the oral cavity were propelled into the face of both the patient and dentist during routine operative procedures when high-speed drills with an air- water spray were used.	Organism-bearing droplets
83	Veena 2015	Number of contaminated squares for each position (1ft): 12 o'clock= 50; 2 o'clock= 42; 4 o'clock= 83; 6 o'clock= 72; 8 o'clock= 5; 10 o'clock positions= 21. (2 ft): 12 o'clock= nil; 2 o'clock= nil; 4 o'clock= 12; 6 o'clock= nil; 8 o'clock= 2; 10 o'clock=14. (4ft)= 2 O'clock= 4 squares were found.	Maximum contamination was found on the right arm of the operator and left arm of the assistant. Contamination was also found on the head, chest and inner surface of the face mask of the operator and of the assistant. The aerosol was found to remain in the air up to 30 min after scaling.	aerosol and splatter,
84	Wada 2010	Key findings specific to our outcome of interest (excluding environmental cross contamination) "Forty samples from the light arm and bracket table arm were collected from 20 cases. Of the 20 samples from the light arm, 16 (80%) showed positive results for the blood presumptive test. In addition, of the 20 samples from the bracket table arm, 15 (75%) were positive. Only three cases displayed no positive reactions to the blood detection test on either surface."	Splatter and aerosol generated during oral surgery contaminates the dental environment	Splatter, Aerosol
85	Watanabe 2013	"The ATP values (median, IQR) on the operators' mask (672.0, 448.0-938.6), dental goggles (1106.8, 657.4-1580.3), chest (672.0, 448.0-938.6) and gowned right arm (761.0, 670.8-914.3), and on the patients' dental goggles (1519.5, 913.5-1866.7) increased significantly after the dental treatments (P<0.001)". "Gram-positive oral streptococci were distinguished and classified from all samples; it was surmised that they were derived from the patients' dental plaque and saliva (data not shown)."	The high ATP measurements from samples after dental treatments indicated constant and extensive exposure of surfaces of the mask, chest, right arm and goggles of operators to high levels of aerosol and splatter generated. "oral streptococci were detected on all surfaces tested, including goggles" "the ATP values of goggles were greatly reduced after wiping the surfaces with cotton containing 70% alcohol. It was confirmed that bacterial contamination generated n dental treatments was cleaned from the surface of the goggles"	Aerosol, splatter
87	Yamada 2011	Mean numbers of positive reaction dots on the test filter per time unit were 0.87/min for third molar surgery, 0.15/min for crown preparation, 0.14/min for inlay preparation, and 0.17/min for scaling at a distance of 50 cm (Fig 6). Differences in the numbers of positive dots among procedures were recognized (P < .0001, one-way ANOVA), and the number for third molar surgery was significantly larger than that for the other procedures (P < .0001 vs crown preparation, inlay preparation, and scaling, Scheffé post hoc test). At a distance of 100 cm, mean number of positive dots on the test filter significantly decreased to 0.28/min for third molar surgery (P < .0001, Student t test). In other procedures, there was no significant difference of the mean numbers of positive dots per time unit between at distances 50 and 100 cm. Also The dentists identified 46 cases with bleeding in crown and inlay preparation and detected no bleeding for 62 cases. However, presumptive test revealed blood from 32% (20/62) of invisible bleeding cases.	This study showed that blood-contaminated aerosols can be suspended in air, even in general dental settings, where crown preparations and scaling are performed, although the amount of blood-contaminated aerosols are less than those during third molar extraction.	Aerosol, particle mist, splatter

Appendix 5. Table of intra-study procedure comparisons

Table 1: **overview of the studies that compared the generated contamination level and spread between two or more procedures.** Studies in bold text indicate that an air sampling technique (aerosol) was used, studies in italics used settle plates to collect samples. Greyed out boxes show duplication of fields not completed to avoid double counting or where the same procedure crosses over. N/A (not available) shows where there was no direct comparison was reported. There were no comparisons for studies with slow-speed or air polishing. Two studies (Ishiharma 2008, Wada 2010) included high speed air-rotors with slow-speed handpieces. However, they were not included as no separate data were provided. Day 2008 compared composition of particulate matter following orthodontic adhesive removal and not contamination extent so was excluded. Polishing amalgam restorations using a slow-speed handpiece and bristle brush was excluded as the procedure is no longer used.

Procedures compared	Ultra-sonic scaler (n=44)	High Speed with water (n=31 studies in total; 9 included intra-study procedure comparisons)	Oral surgery (n=11 studies in total; 2 included intra-study procedure comparisons)	Air-water syringe (n=4 studies in total; 4 included intra-study procedure comparisons)	Prophylaxis (pumice/paste+ rubber cap) (n=2 studies in total; 2 included intra-study procedure comparisons)	Hand scaling (n=3 studies in total; 2 included intra-study procedure comparisons)
USS		n=9 Hillier 2010, Grenier 1995, Yamada 2011 <i>Bentley 1994, Labaf 2011, Miller 1971, Nejatidanesh 2013, Prospero 2003, Purohit 2010</i>	n=2 Hallier 2010 Yamada 2011	n=1 Miller 1971 (A) (W)(AW)*	n=1 Miller 1971	N/A
High Speed			n= 2 Hallier 2010 Yamada 2011	n=4 Micik 1969 (A)(W)(AW)* Miller 1995 (A)(W)(AW)* <i>Miller 1971 (A)(W)(AW)* Belting 1964 (AW)*</i>	n=2 Micik, 1969 <i>Miller 1971</i>	n=2 Micik 1969 <i>Rautemaa 2006</i>
Oral surgery				N/A	N/A	N/A
Air-water syringe					n=2 Micik 1969 (A)(W)(AW)* <i>Miller 1971 (A)(W) (AW)*</i>	n=1 Micik 1969 (A)(W) (AW)*
Prophylaxis (pumice/rubber cup)						n=1 Micik 1969

*A - Air alone; W - Water alone; AW Air and water spray used.

Table 2. Outcomes and contamination levels for studies where more than one procedure was carried out (n=13). Grey cells show no comparison was available; red is where the contamination levels are higher, orange where they are moderate and green where they are lower.

Study & Unique ID	Type of study	Droplet/ Aerosol	Ultrasonic	High speed	Slow-speed	Oral surgery	Air-water syringe - air & water (spray)	Air-water syringe - air only	Air-water syringe - water only	Hand instrument scaling and orthodontics *	Prophylaxis with pumice
Belting ⁹³	Clinical	Settle plate		10 Mycobacterium tuberculosis colonies			14 Mycobacterium tuberculosis colonies				
Bentley 1994 ⁸	Clinical and Simulation (2 parts)	Settle plate	1 - 66 CFUs around patient. 4-77 CFUs on operator mask. 0-242 on patient chest	0-42 CFU around patient. From 1-270 CFU on operator mask. 228-282 on patient chest							
Grenier 1995 ²⁹	Clinical	Air sampling	216 6 75 CFU/m ³	75 6 22 CFU/m ³							
Hallier 2010 ³²	Clinical	Air sampling	41.9 CFU/m ³ and 70.9 CFU/m ³ (p = 0.01)	23.9 CFU/m ³ and 105.1 CFU/m ³ (p = 0.02)		9.1 CFU/m ³ and 66.1 CFU/m ³ (p = 0.01) * includes surgical					
Labaf 2011 ⁴⁸	Clinical	Settle plate	<i>CFU mean (SD)</i> Dentists chair= 124.71 (7.74) Trolley=42.86 (21.12) Dentists table=50.43 (24.57) Sterilising room=722.7 (13.31)	<i>CFU mean (SD)</i> Access for endodontics Dentist's chair= 21.43 (7.5) Trolley=31.71 (18.33) Dentist's table=33.71 (15.97) Sterilising room=21.29 (14.28) Preparation of tooth Dentist's chair= 43 Trolley=109.0 (70.17)							

				Dentist's table=103.57 (60.54) Sterilising room=21.29 (14.28)							
Micik et al. 1969 ⁸⁹	Simulation	Air sampling		Median of CFU/min=1000			Median CFU/min=128,000	Median CFU/min=37,000	Median CFU/min=32		Median CFU/min=270
Miller 1995 ⁵¹	Simulation	Air sampling		µl blood per min mean:0.40			µl blood per min mean= 1.7	µl blood per min mean=0.7	µl blood per min mean=0.02		
Miller et al. 1971 ⁹⁰	Clinical	Settle plate	100-1000 CFU/ft ²	10,0000 (or more) CFU/ft ²			>10,0000 CFU/ft ²	1,000-10,000 CFU/ft ²	10-100 CFU/ft ²		100-1000 CFU/ft ²
Neijatidanesh 2013		Visual inspection	9.84 (±7.68)*	10.01 (±8.77)							
Prospero, 2003 ⁵⁹	Clinical	Settle plate	Mask: median = 0.0676 CFU cm ² /min; Mobile tray: median = 0.0029 CFU cm ² /min; Spittoon: median = 0.0101 CFU cm ² /min; Lamp: median = 0.0166 CFU cm ² /min	Mask: median = 0.0312 CFU cm ² /min; Mobile tray: median = 0.0048 CFU cm ² /min; Spittoon: median = 0.0098 CFU cm ² /min; Lamp: median = 0.0096 CFU cm ² /min							
Purohit, 2010 ⁶⁰	Clinical	Settle plate	patient chest mean CFU=102.4 sd4.5, operator chest mean CFU=72.4 sd5.7, 12 inches from operating area mean	patient chest mean CFU=72.2 sd3.7, operator chest mean CFU=49.3 sd6.5, 12 inches from operating area mean CFU=53.4 sd4.5, 24 inches from operating area mean CFU=24.6 sd5.0							

			CFU=40.3 sd2.4, 24 inches from operating area mean CFU=25.7 sd4.1								
Rautemaa 2006	Clinical	Settle plate		Mean 1120 CFU/m ² /h at>1.5m from the patient						598 CFU/ m ² / hr at >1.5 m from patient*	
Yamada 2011	Clinical	Air sampling	mean positive reaction 0.17/min for scaling	mean positive reaction dots 0.15/min for crown preparation, 0.14/min for inlay preparation		mean positive reaction dots 0.87/min					

*Periodontal and Orthodontic treatment where rotating and ultrasonic instruments were not used.

Appendix 6. Study quality assessment/ Risk of Bias and detection of sensitivity of contamination assessment tool (overall and then by procedure)

Quality of studies and sensitivity scores overall

Study Quality Assessment (n=83)

Across all 83 studies, quality assessments were carried out across seven domains and allocated to a traffic light schema using green where quality was scored high, amber for moderate and red for low. Sample size and outcome reporting were of the lowest quality domains while control reporting was the highest:

- *Was the study industry funded?* **Green** n=19 studies (23%), **Amber** n=53 (64%), **Red** n=11 (13%)
- *Was there a conflict of interest?* **Green** n=29 studies (35%), **Amber** n=47 (57%), **Red** n=7 (8%)
- *Procedure description* **Green** n=19 studies (23%), **Amber** n=39 (47%), **Red** n=25 (30%)
- *Equipment use reporting* **Green** n=18 studies (22%), **Amber** n=25 (30%), **Red** n=40 (48%)
- *Sample size* **Green** n=4 studies (5%), **Amber** n=10 (12%), **Red** n=69 (83%)
- *Controls* **Green** n=40 studies (48%), **Amber** n=1 (1%), **Red** n=20 (24%), **N/A** n=22 (27%)
- *Outcome* **Green** n=7 studies (8%), **Amber** n=53 (64%), **Red** n=23 (28%)

Study sensitivity scores for methodologies to measure contamination (n=83)

Across all 83 studies, the sensitivity scores were High for 11/83 (13%), Moderate for 11/83 (13%), Low for 59/83 (71%) and uncategorized for 2/83 (3%).

- **High sensitivity** (n=11) Study unique IDs: 98, 4, 14, 15, 29, 30, 37, 97, 38, ,80, 82
- **Moderate sensitivity** (n=11) Study unique IDs: 13, 16, 20, 28, 35, 39, 51, 55, 65, 84, 87
- **Low sensitivity** (n=59) Study unique IDs: 2, 3, 5, 6, 93, 8, 9, 10, 92, 17, 18, 21 , 23, 24, 25, 31, 32, 34, 33, 36, 40, 41, 43, 42, 44, 45, 46, 47, 48, 91, 49, 50, 89, 90, 52, 53, 54, 56, 59, 60, 61, 62, 63, 64, 66, 69, 70, 88, 71, 72, 73, 74, 76, 96, 78, 94, 81, 95, 83
- **Uncategorized sensitivity** (n=2) Study unique IDs: 22, 85

Table 6a **Detection of sensitivity of contamination assessment for studies investigating ultrasonic scalers (n=44)**. Studies were assessed according to whether they measured microbial, blood, or other (non-blood / non-microbial) types of contamination See protocol for full description in Appendix 1). There is summation across fields to give an overall sensitivity assessment rating of high (n=3), moderate (n=5) or low (n=36).

Studies using microbial measures of contamination					
Bacterial					
Sampling method	Included studies (First author year)	Blood agar used?	Incubation environment	Incubation duration (days)	Overall sensitivity assessment
Settle plates	Bentley 1994	Yes	NS	2	Low
	Choi 2018	No	NS	2	Low
	Chuang 2014	No	NS	2	Low
	Devker 2012	Yes	Aerobic	2	Low
	Feres 2010	Yes	Anaerobic	3	Moderate
	Gupta 2014	Yes	Aerobic	2	Low
	Holloman 2015	Yes	Anaerobic	7	High
	Jawade 2016	Yes	NS	2	Low
	Kaur 2014	Yes	Aerobic and Anaerobic.	2 for both	Low
	King 1997	Yes	NS	3	Low
	Labaf 2011	Yes	Aerobic	2	Low
	Miller 1971	Yes	NS	2	Low
	Mohan 2016	Yes	NS	1	Low
	Narayana 2016	Yes	Aerobic	2	Low
	Prospero 2003	Yes	NS	1-2	Low
Purohit 2009	Yes	Aerobic	1	Low	

	Ramesh 2015	Yes	Aerobic	2	Low
	Rao 2015	Yes	Aerobic	2	Low
	Reddy 2012	Yes	NS	2	Low
	Retamal-Valdes 2017	Yes	Anaerobic	3	Moderate
	Sadun 2020	Yes	Aerobic	1	Low
	Saini 2015	Yes	NS	2	Low
	Sawhney 2015	Yes	Aerobic	1	Low
	Serban 2013	Yes	NS	1	Low
	Sethi 2019	Yes	Aerobic	2	Low
	Shetty 2013	No	Aerobic	1	Low
	Singh 2016	Yes	Aerobic	3	Low
	Swaminathan 2014	Yes	Aerobic	1	Low
	Timmerman 2004	Yes	Both	Anaerobic 7; Aerobic 3	High
	Watanabe 2013		Anaerobic	5	N/A (looked for streptococci only)
Air sampling	Fine 1992	Yes	Anaerobic	1	N/A (looked for ampicillin-resistant streptococci only)
	Fine 1993 a	yes	Aerobic	1-7	Low
	Fine 1993 b	Yes	Aerobic	1-3	Low
	Grenier 1995	Yes	Anaerobic	7	High
	Hallier 2010	Yes	Aerobic	2	Low
Studies using blood to measure of contamination					

Sampling method	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used e.g. PCR	Overall sensitivity assessment
Air sampling	Barnes 1998	Yes	-----	-----	Low
	Yamada 2011	-----	Yes	-----	Moderate
Studies using other methods to measure contamination (non-microbial / non-blood based)					
Sampling method	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used e.g. SEM.	Overall sensitivity assessment
Settle plates	Veena 2015	Yes	-----	-----	Low
Air sampling	Harrel 1996	Yes	-----	-----	Low
Visual Inspection	Balcos 2019	Yes	-----	-----	Low
	Graetz 2014	Yes	-----	-----	Low
	Harrel 1998	Yes	-----	-----	Low
	Nejatidanesh 2013	-----	Yes	-----	Moderate
	Rivera-Hidalho 1999	Yes	-----	-----	Low

Table 6b **Detection of sensitivity of contamination assessment for studies investigating high speed air-rotor handpieces (n=31)**. Studies were assessed according to whether they measured microbial, blood, or other (non-blood / non-microbial) types of contamination (See protocol for full description in Appendix 1). There is summation across fields to give an overall sensitivity assessment rating of (n=21), moderate (n=6), and high (n=4)

Studies using microbial measures of contamination					
Bacterial					
Sampling method	Included studies (First author year)	Blood agar?	Incubation environment	Incubation duration (days)	Overall sensitivity assessment
Settle plates	Al-Amad 2017	No	Aerobic	1	Low
	Belting 1964	Yes	Aerobic	2	Low
	Bentley 1994	Yes	NS	2	Low
	Cochrane 1989	Yes	NS	5	Moderate
	Earnest 1991	No	Anaerobic	5-7	Moderate
	Greco 2008	Yes	Anaerobic	4	Moderate
	Labaf 2011	Yes	Aerobic	2	Low
	Manarte-Monteriro 2013	Yes	NS	2	Low
	Miller 1971	Yes	NS	2	Low
	Prospero 2003	Yes	NS	1-2	Low
	Purohit 2009	Yes	NS	1	Low
	Rautemaa 2006	Yes	NS	2	Low
	Samaranayake 1989	Yes	Aerobic	2	Low
	Stevens 1963	Yes	NS	2	Low

	Tag El-din 1997	Yes	Aerobic	2	Low
	Toroglu 2001	Yes	NS	3	Low
	Travaglini 1966	Yes	NS	1	Low
Air sampling	Grenier 1995	Yes	Anaerobic	7	High
	Hallier 2010	Yes	Aerobic	2	Low
	Hausler 1966	No	NS	NS	Low
	Larato 1966	Yes	NS	1	Low
	Micik 1969	Yes	NS	2	Low
Fungal					
Settle plates	Oliverira 2018	No	NS	NS	Low
Viral					
	Toroglu 2003**	----	----	----	High**
Studies using blood to measure of contamination					
Air sampling	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used e.g. PCR	Overall sensitivity assessment
	Miller 1995	----	Yes	----	Moderate
	Toroglu 2003**	----	----	Yes	High**
	Yamada 2011	----	Yes	----	Moderate
Studies using other methods to measure contamination (non-microbial / non-blood based)					
	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used e.g. SEM.	Overall sensitivity assessment

	Settle plates	Bentley 1994 (experimental part)	----	Yes	----	Moderate
	Air sampling	Day 2008	-----	-----	Yes	High
		Grundy 1967	-----	-----	Yes	High
	Visual inspection	Dahlke 2012	-----	Yes	-----	Moderate
		Nejatidanesh 2013	-----	Yes		Moderate
		Junevicius 2005	Yes	-----	-----	Low

*NS: Not stated

**Toroglu 2003 was scored twice as there were two separate outcomes

Table 6c **Detection of sensitivity of contamination assessment for studies investigating oral surgery procedures (n=11)**. Studies were assessed according to whether they measured microbial, blood, or other (non-blood / non-microbial) types of contamination See protocol (Appendix 1) for full description. There is summation across fields to give an overall sensitivity assessment rating (n=6), moderate (n=2), and high (n=3).

Studies using microbial measures of contamination					
Bacterial					
Sampling method	Included studies (First author year)	Blood agar?	Incubation environment	Incubation duration (days)	Overall sensitivity assessment
Settle plates	Divya 2019	No	Ns	1	Low
	Janani 2018	Yes	Microaerophilic conditions (5% CO2)	1	Low
	Jimson 2015	Yes	aerobic	1	Low
Air sampling	Hallier 2010	Yes	Aerobic	2	Low
	Kobza 2018**	No	NS	NS	Low**
Fungal					
Settle plates	Kobza 2018**	No	NS	NS	Low**
Studies using blood to measure of contamination					
	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used	Overall sensitivity assessment
Visual inspection	Ishiharma 2009	-----	Yes	-----	Moderate
	Yamada 2011	Yes	-----	-----	Low
	Aguilar-Duran	Yes	-----	Yes	High
	Al-Eid 2018	Yes	-----	Yes	High
	Wada 2010	-----	Yes	-----	Moderate
	Ishiharma 2008	Yes	-----	Yes	High

Table 6d **Detection of sensitivity of contamination assessment for studies investigating slow-speed handpieces (n=5)**. Studies were assessed according to whether they measured microbial, blood, or other (non-blood / non-microbial) types of contamination See protocol for full description in Appendix 1). There is summation across fields to give an overall sensitivity assessment rating of low (n=2), (n=nil), and high (n=3).

Studies using microbial measures of contamination					
Bacterial					
Sampling method	Included studies (First author year)	Blood agar used?	Incubation environment	Incubation duration (days)	Overall sensitivity assessment
Settle plates	Agostinho 2004	No	Aerobic & anaerobic	2	Low
	Kritivasan 2019	Yes	NS	1	Low
Air sampling	Dawson 2016	Yes	Anaerobic	7	High
Studies using other methods to measure contamination (non-microbial / non-blood based)					
Study	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used e.g. SEM.	Overall sensitivity assessment
Air sampling	Day 2008	-----	-----	Yes	High
	Ireland 2003	-----	-----	Yes	High

*NS: Not stated

Table 6e Detection of sensitivity of contamination assessment for studies investigating air/water (triple) syringe (n=4). Studies were assessed according to whether they measured microbial, blood, or other (non-blood / non-microbial) types of contamination (See protocol for full description in Appendix 1). There is summation across fields to give an overall sensitivity assessment rating of (n=3), moderate (n=1), and high (n=nil).

Studies using microbial measures of contamination						
Bacterial						
Sampling methods	Included studies (First author year)	Blood agar?	Incubation environment	Incubation duration (days)	Overall sensitivity assessment	
Settle plates	Belting 1964	Yes	Aerobic	2	Low	
	Miller 1971	Yes	NS	2	Low	
Air sampling	Micik 1969	Yes	NS	2	Low	
Studies using blood to measure of contamination						
Air sampling	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used e.g. PCR	Overall sensitivity assessment	
	Miller 1995	-----	Yes	-----	Moderate	

*NS: Not stated

Table 6f Detection of sensitivity of contamination assessment for studies investigating air polishing (n=4). Studies were assessed according to whether they measured microbial, blood, or other (non-blood / non-microbial) types of contamination See protocol (Appendix 1) for full description. There is summation across fields to give an overall sensitivity assessment rating of low (n=3), moderate (n=1), and high (n=nil).

Studies using microbial measures of contamination					
Bacterial					
Sampling method	Included studies (First author year)	Blood agar?	Incubation environment	Incubation duration (days)	Overall sensitivity assessment
Settle plates	Dos Santos 2014	No	Aerobic	2	Low
	Logothetis 1995	Yes	Anaerobic	2	Low
	Muzzin 1999	Yes	Aerobic	3	Low
Studies using other methods to measure contamination (non-microbial / non-blood based)					
	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used e.g. SEM.	Overall sensitivity assessment
	Harrel 1999	-----	Yes	-----	Moderate

*NS: Not stated

Table 6g Detection of sensitivity of contamination assessment for studies investigating prophylaxis procedures (n=2). Studies were assessed according to whether they measured microbial, blood, or other (non-blood / non-microbial) types of contamination See protocol (Appendix 1) for full description. There is summation across fields to give an overall sensitivity assessment rating of low (n=2), moderate (n=nil), and high (n=nil).

Studies using microbial measures of contamination					
Bacterial					
Sampling methods	Included studies (First author year)	Blood agar?	Incubation environment	Incubation duration (days)	Overall sensitivity assessment
Settle plates	Miller 1971	Yes	NS	2	Low
Air sampling	Micik 1969	Yes	NS	2	Low

Table 6h Detection of sensitivity of contamination assessment for studies investigating hand instrument scaling (n=4). Studies were assessed according to whether they measured microbial, blood, or other (non-blood / non-microbial) types of contamination See protocol (Appendix 1) for full description. There is summation across fields to give an overall sensitivity assessment rating of low (n=3), moderate (n=nil), and high (n=nil).

Studies using microbial measures of contamination					
Bacterial					
Sampling method	Included studies (First author year)	Blood agar used?	Incubation environment	Incubation duration (days)	Overall sensitivity assessment
Settle plates	Micik 1969	Yes	NS	2	Low
	Rautemaa 2006	Yes	NS	2	Low
Studies using other methods to measure contamination (non-microbial / non-blood based)					
Sampling method	Included studies (First author year)	Visible inspection alone	Visible inspection with enhancers	Highly sensitive equipment used e.g. SEM.	Overall sensitivity assessment
Visual inspection	Harrel 1998	Yes	-----	-----	Low

*NS: Not stated