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# Best practices for disinfection in dental settings: insights from Italian and European regulations

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*Parole chiave: Disinfezione; antisettici; sterilizzazione; ambienti odontoiatrici; odontoiatria; dispositivi medici*

**Abstract**

*Disinfection practices in dental settings are fundamental to clinical safety, playing a pivotal role in preventing cross-infections and protecting the health of patients and healthcare professionals. This article examines the key components of effective disinfection, based on evidence-based protocols developed by international organizations such as the WHO and the U.S. CDC, alongside European and Italian regulatory standards.*

*Dental instruments require stringent sterilization by autoclave or chemical methods, while high-level disinfection is essential for non-sterilizable items. Clinical surfaces require routine biocidal treatment tailored to microbial hazards and material compatibility. The European Biocidal Products Regulation and the Medical Devices Regulation provide critical oversight, ensuring product safety and effectiveness while preventing resistance. Antiseptics also play a vital role in oral care, with applications ranging from infection prevention to the treatment of periodontal disease, and are governed by strict regulatory frameworks.*

*Disinfection effectiveness is significantly affected by factors such as microbial load, presence of biofilm, pH, temperature and biocide exposure time. Preventing bacterial resistance requires appropriate germicide selection, adherence to manufacturer protocols, robust sterilization and cleaning procedures. In addition, the increased use of disinfection during public health emergencies highlights the need for adaptability to mitigate evolving risks.*

*Regular audits, biological tests, and training for healthcare personnel ensure the consistent application of these rigorous protocols. By integrating international and national standards, dental facilities achieve a uniform approach to hygiene and safety, advancing public trust and compliance. This article highlights the imperative for ongoing research and dissemination of best practices to enhance infection control in dental care environments.*

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## Introduction

Disinfection in dental facilities is a cornerstone of modern clinical practice, aimed at ensuring the safety and health of both patients and healthcare personnel. In a setting where daily operations involve close contact with blood (1), saliva, and other bodily fluids, the risk of infection transmission is particularly high (2). Consequently, the implementation of stringent disinfection and sterilization protocols is critical to prevent cross-infections and maintain a safe and hygienic environment.

Disinfection practices in dental facilities are guided by well-established protocols developed by international organizations such as the World Health Organization (WHO) (3), the U.S. Centre for Disease Control and Prevention (CDC) (4-7), and, at the national level, the Italian National Institute of Health (*Istituto Superiore di Sanità, ISS*) (8,9). These guidelines encompass standardized measures for hand hygiene, the use of Personal Protective Equipment, and the safe handling of contaminated instruments and surfaces.

Dental instruments are an important route for the transmission of infection if not handled correctly, as well as for the generation of potentially contaminated aerosols during certain dental procedures (10).

Reusable instruments must undergo rigorous sterilization processes using autoclaves, dry heat, or chemical methods to ensure the complete elimination of microorganisms, including bacteria, viruses, and spores. Instruments that cannot be sterilized require high-level disinfection to ensure maximum safety.

Clinical surfaces, such as dental chairs and workstations, must be disinfected after each patient using the most appropriate biocidal products, selected on the basis of their effectiveness against a broad spectrum of microorganisms and their compatibility with the surfaces being treated (11). In addition, routine cleaning of non-clinical and common areas is essential to maintain a hygienic environment. During public health emergencies, such as epidemics or pandemics, dental facilities must take additional measures (12), including the use of protective barriers, patient triage, and the implementation of enhanced disinfection protocols.

Disinfection procedures must be regularly monitored and reviewed to ensure their effectiveness. This includes routine internal audits of established protocols, biological testing to verify instrument sterilisation, periodic quality control of disinfected surfaces and dental unit waterline, and continuous feedback to staff (13).

By adhering to these rigorous and standardized practices, dental facilities can significantly reduce the risk of infections, safeguard the health and safety of all involved, and ensure the delivery of high-quality dental care.

This manuscript addresses the application of disinfection and sterilisation techniques for the control and prevention of transmissible infections in the dental setting, focusing on a general European context, including Italy. The authors acknowledge that this work is not exhaustive, as it does not include a detailed analysis of the regulations specific to each European country. Consequently, it does not assess the comparability of procedures and protocols currently adopted in each country. However, the authors emphasize the importance of this discussion, particularly in light of several recognized challenges: the limited awareness and dissemination of updates to Italian and European regulations, the occasional neglect of proper disinfection and sterilisation procedures, and the inadequate scheduling of refresher courses for dental professionals. These issues highlight critical gaps that may compromise infection control in the dental environment.

The aim of this manuscript is to stimulate dialogue at the European level to encourage participation and knowledge sharing both on this topic and on the standardization of environmental sampling methods (14). By promoting a more cohesive and informed approach, the authors hope to stimulate collaboration with other European countries' researchers to fill existing gaps and facilitate comparison of regulatory frameworks to jointly establish uniform and effective standards. The establishment of a common platform for research, discussion, training and standardization of protocols would be highly desirable, allowing the development of common guidelines to improve safety and best practice in the dental sector.

## Sanitization of environments and non-medical devices

According to the Italian Ministerial Decree No. 274 of 7 July 1997, which defines the technical, economic, financial and professional capacity requirements for performing cleaning, disinfection, pest control, rodent control and sanitization activities, the term "sanitization" refers to a set of procedures and operations aimed at ensuring the healthiness of certain environments (15). These operations may

include cleaning and/or disinfection and/or pest control, as well as the control and improvement of microclimatic conditions such as temperature, humidity and ventilation, or factors such as lighting and noise. Thus, sanitization may include an initial cleaning phase followed by disinfection, or it may consist of cleaning or disinfection alone, using one or more products placed on the market in accordance with specific regulatory standards.

During the cleaning phase, it is essential to use products authorized under Regulation (EC) No. 648/2004 of the European Parliament and of the Council of March 31, 2004, on detergents for environmental sanitizers, (16) or Regulation (EC) No. 1223/2009 of the European Parliament and of the Council of November 30, 2009, on cosmetic products for skin sanitizers (17). These types of products act physically or mechanically to remove unwanted residues, exerting a purely mechanical action on harmful organisms, which are removed from the treated surface. Within this function, although they provide a sanitizing effect, they do not possess disinfectant or biocidal properties and are therefore marketed as general consumer products.

Conversely, in the disinfection of environments and surfaces of objects outside the scope of Medical Devices (MD), the products used fall under the national regulatory framework for Medical-Surgical Products (*Presidi Medico Chirurgici,* PMC) or the European framework for biocides, as will be detailed in the next section. Disinfectant products labelled with terms such as "sanitizing" or "sanitizing agents" should be considered equivalent to biocides and are therefore subject to the relevant authorization regime (18).

## Regulation of biocidal products for the disinfection of environments and non-medical devices

In accordance with Regulation (EU) No. 528/2012 of the European Parliament and of the Council of May 22, 2012, concerning biocidal products (Biocidal Products Regulation, BPR), a disinfectant is defined as a biocidal product intended to destroy, eliminate, render harmless, prevent the action of, or otherwise exert control over any harmful organism by any means other than mere physical or mechanical action (19). Specifically, the regulation categorizes biocides into several groups, classifying disinfectants under the first group, "Disinfectants", which is further divided into five product types (PTs). These PTs encompass various applications, including the disinfection of surfaces, equipment, air conditioning systems, and human and veterinary hygiene.

The BPR aims to improve the functioning of the European market by harmonizing rules regarding availability and use of biocidal products while ensuring a high level of protection for human and animal health and the environment. To achieve this, biocidal active substances are subject to a review program under Article 15 of the BPR, where their effectiveness and safety are periodically reassessed. Following successful evaluation, active substances are approved and included in the Union list, which is publicly available for each specific product type on the website of the European Chemicals Agency (ECHA) (20). Subsequently, all biocidal products containing approved active substances must undergo an additional authorization process, either at the national or European level, before they can be marketed. It is essential that each final product is assessed in its entirety, even when it contains pre-approved active substances, to safeguard human health and the environment while ensuring the product's effectiveness against specific targets (e.g., bacteria, fungi, virus) as declared on the label by the manufacturer. This robust and detailed regulatory system is crucial to maintaining high safety standards and preventing potential risks associated with the use of biocidal products.

Due to the ongoing nature of the review programme, the EU regulatory framework is currently in a prolonged and complex transitional phase in which both authorized active substances and those still under evaluation (BPR review) coexist. At present, the latter can be placed on the Italian market as PMC, provided they are authorized by the Ministry of Health after evaluation by the Italian National Institute of Health. This authorization process is governed by Italian Presidential Decree No. 392 of 6 October 1998 ("Regulation on the simplification of procedures for the authorization of the production and marketing of medical-surgical devices pursuant to Article 20, paragraph 8, of Law No. 59 of 15 March 1997") (21) and Italian Ministerial Decree of 5 February 1999 ("Approval of the requirements for applications and related documentation to be submitted for the authorization of marketing and for the modification of previously granted authorizations for medical-surgical devices") (22).

## Regulation of products used for the disinfection of medical devices

The disinfection of medical devices (MDs) through the use of disinfectants is governed by Regulation (EU) 2017/745 of the European Parliament and of the Council of April 5, 2017, on medical devices (Medical Device Regulation, MDR) (23). This regulation amends Directive 2001/83/EC, Regulation (EC) No. 178/2002, and Regulation (EC) No. 1223/2009, and repeals Council Directives 90/385/EEC and 93/42/EEC. Specifically, this regulation applies to:

- all devices intended for the disinfection or sterilization of non-invasive MDs;
- disinfectant solutions or washing and disinfecting devices intended for the disinfection of invasive MDs after treatment;
- all devices designed for the disinfection, cleaning, rinsing, or hydration of contact lenses.

In this context, "invasive" is defined as any device that penetrates partially or entirely into the body through a body orifice or the body surface.

Disinfectants mentioned in point 1 are classified under Class II.a of the MDR, which encompasses medium to low-risk devices, while those mentioned in points 2 and 3 are classified under Class II.b, which includes medium to high-risk devices. Consequently, the disinfectants used in the disinfection of MDs are themselves considered MDs, intended to ensure the absence of pathogenic microorganisms before the treated MDs are used. Specifically, these disinfectants must meet the essential safety and performance requirements outlined in the MDR, including biological safety, disinfection effectiveness, and compatibility with the materials of the treated MDs.

The conformity assessment of disinfectants used for MDs disinfection with regulatory requirements necessarily involves a Notified Body, which conducts an independent external evaluation. Once authorized, these disinfectants must bear the CE marking, certifying their compliance with EU regulations and their eligibility for unrestricted commercialization in the European market.

## Antiseptics for dental use

Antisepsis encompasses a set of procedures aimed at inhibiting the growth of microorganisms on living tissues or destroying them through the use of chemical substances known as "antiseptics." Antiseptics are generally defined as germicidal agents applied to living tissues, which must possess both microbicidal activity and compatibility with, and non-toxicity for, the tissues to which they are applied.

Dental antiseptics are chemical agents specifically designed to reduce or eliminate pathogenic microorganisms in the oral cavity and on dental surfaces. These products play a fundamental role in the prevention of post-operative oral infections, the treatment of gingivitis and periodontitis, the disinfection of oral cavities and the maintenance of oral hygiene. Their effectiveness and safety are critical in the context of dental practice.

Antiseptics intended for disinfecting damaged skin (e.g., wound disinfection) or intact skin prior to a medical procedure are classified as medicinal products (24) and must be authorized accordingly under the Italian Legislative Decree No. 219 of April 24, 2006 "Implementation of Directive 2001/83/EC and subsequent amending directives on a Community code concerning medicinal products for human use, as well as Directive 2003/94/EC", known as the "Medicines Code" (25), which transposes Directive 2001/83/EC of the European Parliament and Council of November 6, 2001, into Italian law. This classification necessitates a rigorous evaluation process by the Italian Medicines Agency (*Agenzia Italiana del Farmaco, AIFA*) to ensure their safety, effectiveness, and quality. Products meeting all the regulatory requirements are granted Marketing Authorization (*Autorizzazione all'Immissione in Commercio*, *AIC*).

Conversely, antiseptics intended exclusively for application on intact skin for general preventive purposes fall under Product Type 1 of biocides and are regulated by the Biocidal Products Regulation (BPR) or national legislation governing PMC. These are primarily disinfectant products for hand hygiene, which may also include the disinfection of the wrist and forearm.

## Bacterial resistance to disinfection procedures

Bacterial resistance, which can occur in both intrinsic and acquired forms, is one of the most critical factors affecting the effectiveness of disinfection. Microorganisms naturally possess various intrinsic mechanisms that limit the action of germicidal agents. Among these, bacterial spores have the highest innate resistance to chemical germicides after prions, due to the presence of a specialized coating and cortex that act as barriers. They are followed by coccidia, mycobacteria (which have a waxy cell

wall that inhibits the penetration and absorption of germicidal agents), small non-lipid-enveloped viruses, parasites, Gram-negative bacteria (characterized by an outer membrane that inhibits the penetration and absorption of antimicrobial agents), fungi, large non-lipid-enveloped viruses, Gram-positive bacteria and vegetative forms, and finally medium-sized lipid-enveloped viruses. The innate resistance of Gram-positive and Gram-negative bacteria is generally similar, with some exceptions (e.g. *Pseudomonas aeruginosa* is more resistant to certain disinfectants). In contrast, acquired bacterial resistance refers to the ability of a microbial population to adapt and survive in the presence of a disinfectant. Over time, these bacteria develop mechanisms that confer resistance to the disinfectant, allowing them to survive even at progressively higher concentrations. This issue frequently arises with disinfectants used at extremely low dilutions, as insufficient dosages can:

• promote the genetic selection of mutant microbial strains resistant to the biocide;

• facilitate the expulsion of the biocide from cells via molecular efflux pumps, which are typically used to prevent the accumulation of toxic substances within bacterial cells;

• trigger bacterial chemical stress adaptation responses, activating specific defence mechanisms such as the production of enzymes that degrade the biocide and/or reducing the permeability of cellular membranes to the biocide;

• prevent the biocide from penetrating physical and chemical barriers formed by microbial community structures, known as biofilm, due to local consumption by external cells and limited diffusion within these structures.

For instance, high bacterial loads have been detected within containers of diluted disinfectants. This type of resistance typically regresses spontaneously if the bacterial population is not exposed to the disinfectant for a sufficient period of time.

When selecting a disinfectant, careful consideration must be given not only to its actual germicidal activity, but also to the risk of developing bacterial resistance as a result of its use. This concern is particularly relevant when the same disinfectant is used repeatedly at low concentrations, such as in water systems.

## Equipment and surfaces as potential infection sources in dental settings

The CDC guidelines (26) specify disinfection requirements for surfaces and medical devices (MDs), categorizing them based on the potential risk of infection associated with their specific use. For this purpose, the widely adopted classification by Earle Spaulding, recently updated by the Robert Koch Institute, is utilized. This classification divides instruments and surfaces into critical, semi-critical, and non-critical categories, each requiring different levels of disinfection (26-31). Specifically:

• critical instruments are those that penetrate tissues or the vascular system;

• semi-critical instruments come into contact with mucous membranes or non-intact skin;

• non-critical instruments come into contact with intact skin but not mucous membranes.

For critical items, absolute sterility is mandatory, necessitating sterilization procedures using physical methods, such as steam autoclaving.

For semi-critical items, absolute sterility is recommended whenever possible, and at minimum, high-level disinfection is required. Specifically, for instruments made of heat-sensitive materials, steam sterilization may cause irreversible damage. In such cases, low-temperature sterilization methods, including gas plasma or ethylene oxide autoclaves, or cold sterilization using high-level disinfectants with extended contact times (up to 10 hours), are advised.

For non-critical instruments, given the lower risk of cross-infection, medium- to low-level disinfection or, in some cases, simple cleaning procedures are sufficient.

## Selection of the most appropriate disinfectant

An ideal disinfectant should possess the following characteristics: broad-spectrum antimicrobial activity, rapid action, persistent effect, absence of toxicity and harmful environmental effects, compatibility with various treated materials, chemical stability, ease of use, cost-effectiveness.

Unfortunately, no single product fulfils all these requirements. Therefore, it is necessary to evaluate the specific needs of each situation to identify the product that offers the best compromise between effectiveness and potential drawbacks, prioritizing hygiene objectives, the required disinfection level, and compatibility with treated materials.

Based on their mechanism of action, disinfectants can be classified as bacteriostatic, which inhibits microbial reproduction, or bactericidal, virucidal

or fungicidal, which are capable of destroying microorganisms. According to Block's classification, disinfectants are divided into three levels of activity (32-34):

- low-level disinfectants, which are effective against many vegetative forms of bacteria, some fungi and certain viruses, but not against resistant microorganisms such as spores and *Mycobacterium* spp. (minimum contact time: 10 minutes);
- intermediate disinfectants, which are effective against a wider range of micro-organisms (e.g. *Mycobacterium tuberculosis*, most viruses and fungi) but not spores (minimum contact time: 5-10 minutes);
- high-level disinfectants, which are effective against almost all types of micro-organisms except certain spores, especially at high concentrations (minimum contact time: 20-45 minutes).

Some high level disinfectants can also kill spores when used at appropriate concentrations and for longer contact times (6-10 hours). In such cases, they are considered disinfectants/sterilisers and are suitable for 'cold sterilization', a process used for heat-sensitive items that cannot be physically sterilized in an autoclave without damage.

Table 1 provides a brief overview of the main active ingredients found in disinfectants and antiseptics used in dentistry, highlighting their commonly used concentrations, levels of activity and potential risks associated with their use (32,34).

Table 1 - Active ingredients in disinfectants and antiseptics for dental applications.

| Active Ingredient | Concentration (%) | Action time (min) | Level of activity | Precautions and limitations |
|---|---|---|---|---|
| Glutaraldehyde or Orthophthalaldehyde | 0.55 | 5-10 | High (less effective against spores) | Volatile, irritant |
| Hydrogen Peroxide | 10, 3, 0.1 | 60, >20, >30 | High (including spores), Intermediate, Low | Corrosive, irritant, unstable, organic materials may reduce effectiveness |
| Peracetic Acid | 1 | 10 | High (including spores) | Corrosive |
| Tetraacetylethylenediamine + Sodium Perborate | 2 | 10 | High (including spores) | Irritant, limited effectiveness in the presence of reducing agents |
| Chlorine derivatives as $Cl_2$ | 0.5, 0.1, 0.01 | 20, 10, 20 | High (including spores), Intermediate, Low | Irritant, inactivated by organic substances, activity reduced by organic material |
| Iodophors as $I_2$ | 0.003-0.015 | 10 | Intermediate | Corrosive, stains, inactivated by organic substances |
| Iodine + alcohol | 0.5 + 70 | 10 | Intermediate | Corrosive, irritant, stains, inactivated by organic substances |
| Alcohols | 70 | 10 | Intermediate | Flammable, irritant, inactivated by organic substances |
| Phenols | 0.5-3 | 10 | Intermediate | Corrosive, irritant, toxicity and environmental risks limit use |
| Quaternary Ammonium Compounds | 0.1 | 10 | Low | Irritant, easily contaminated, inactivated by soap and anionics |
| Amphoteric | 2 | 20 | Intermediate/Low | Low toxicity |
| Chlorhexidine | 0.2 | 10 | Low | Easily contaminated |

## Factors influencing disinfectant effectiveness and speed of action

The real effectiveness and speed of action of a disinfectant depend on several factors, including:

• *Microbial load and biofilm*

A high microbial load requires longer contact times to ensure effective germicidal action. Additionally, microbial cell aggregates, such as biofilms, have demonstrated increased resistance to disinfection. Thorough cleaning of instruments before disinfection is essential to mitigate these issues.

• *Product concentration*

For solutions requiring preparation, adhering to the concentrations specified by the manufacturer is crucial. Product concentration also impacts the speed of action.

• *Contact methods and application time*

Effective disinfection requires that all surfaces come into contact with the disinfectant for the required time. Instruments with complex shapes, crevices, or cavities must be disassembled to allow the disinfectant to penetrate all parts of the object.

• *pH*

The antimicrobial activity of a disinfectant may be influenced by pH, which can alter the disinfectant's composition or the molecular structure of microbial cell surfaces. For example, an increased pH enhances the antimicrobial effectiveness of some disinfectants, such as glutaraldehyde and quaternary ammonium compounds (QACs), but reduces the effectiveness of others, such as phenols, hypochlorite, and iodine.

• *Temperature*

The effectiveness of some disinfectants is temperature dependent. In general, most disinfectants are more effective at higher temperatures.

• *Presence of inactivating substrates*

Certain substances can neutralize the effect of disinfectants, including detergents, hard water, and organic material. For example, hard water containing magnesium and calcium reduces the germicidal activity of some disinfectants by forming insoluble precipitates. Organic material (e.g., serum, blood, pus, faeces) can interfere with disinfection by chemically reacting with the germicide, reducing the active product available, or by serving as a physical barrier that shields microorganisms from the disinfectant. These factors highlight the importance of thorough cleaning before disinfection or sterilization procedures.

• *Product stability during storage*

Not all disinfectants retain their properties over time, especially when diluted. Adhering strictly to the manufacturer's instructions for preparation, use, and storage is essential.

• *Material compatibility*

When selecting a disinfectant for surface or medical device sanitization, it is critical to consider the compatibility of the product's components with the materials to be treated. Disinfectants containing acids, alkalis, electrolytes, or hypochlorite may corrode metallic parts, while those containing organic solvents may degrade plastics and rubber.

## Manufacturer information and safety protocols

Comprehensive understanding of the conditions for using each disinfectant product, including operator safety protocols and appropriate disposal procedures, is essential to ensure safe and effective application. This critical information is typically provided in the product label, technical data sheet, and Safety Data Sheet (SDS) issued by the manufacturer:

• *Product label*

The label must comply with Regulation (EC) No. 1272/2008 (CLP Regulation: Classification, Labelling, and Packaging), providing all necessary information for the lawful marketing of disinfectant products (35). This includes specific indications, such as "for professional use only" for products requiring specialized training, and instructions for the mandatory use of Personal Protective Equipment (PPE).

• *Technical Data Sheet*

The technical data sheet offers supplemental details beyond those on the label, such as the spectrum of target organisms, recommended contact times, and optimal product concentrations.

• *Safety Data Sheet*

For hazardous disinfectants or non-classified products containing hazardous substances in significant concentrations, the SDS outlines essential safety measures. These include information on chemical composition, associated hazards, first aid measures, accidental release management, handling and storage recommendations, and PPE requirements for exposure control.

Furthermore, strict adherence to the operational instructions provided by the manufacturers of instruments and equipment is imperative to maintain both safety and effectiveness in disinfection procedures.

## Conclusions

Disinfection practices in dental settings are an essential element of clinical safety, serving as a cornerstone for preventing cross-infection and ensuring a hygienic environment for both patients and healthcare professionals. This manuscript has provided an in-depth analysis of the complex aspects of disinfection, drawing on international guidelines,

European regulatory frameworks and Italian legislation to highlight the key protocols and practices required in modern dental facilities. The effective integration of international and national standards is essential to achieve consistency in disinfection practices. Guidelines issued by WHO and the CDC, alongside the ISS guidelines, provide a solid foundation for infection control. These standards ensure the implementation of evidence-based practices that include hand hygiene, dental instrument sterilisation and surface disinfection.

The proper management of dental instruments and clinical surfaces is critical for minimizing microbial risks. The sterilization of reusable instruments using validated methods, including autoclaves and chemical disinfectants, ensures the elimination of pathogens, while surface disinfection protocols tailored to the specific requirements of dental facilities further mitigate infection risks. Regulatory compliance with frameworks such as the BPR and the MDR guarantees the safety, effectiveness, and environmental compatibility of the disinfectant products employed.

Antiseptics play a vital role in dental practice, particularly in the prevention of oral infections and the management of conditions such as gingivitis and periodontitis. The regulation of these products under Italian and European laws ensures their safe and effective use in clinical settings, contributing significantly to oral health. However, the potential for bacterial resistance, both intrinsic and acquired, underscores the need for careful selection and correct application of germicides. Avoiding suboptimal concentrations and ensuring proper cleaning prior to disinfection are critical strategies for mitigating resistance risks.

The selection of disinfectants must balance a range of considerations, including antimicrobial effectiveness, compatibility with treated materials, and safety for both operators and the environment. Factors such as microbial load, pH, temperature, and the presence of inactivating substrates significantly influence the effectiveness of disinfection procedures, requiring careful adherence to established protocols and manufacturer instructions. Furthermore, in public health emergencies such as pandemics, the adoption of enhanced disinfection measures, patient triage systems, and protective barriers becomes imperative to manage increased infection risks.

To ensure the safety and effectiveness of disinfection practices, holistic training of healthcare workers is needed, starting with students in specialist training (36,37) supported by detailed technical and safety information provided by manufacturers. The use of PPE and compliance with waste disposal protocols are essential components of a safe and effective disinfection strategy. Regular monitoring, internal audits, and biological verification tests further enhance the reliability and consistency of disinfection procedures. Continuous feedback and the periodic update of protocols based on emerging scientific evidence are equally important for maintaining high standards of hygiene and safety.

By adhering to these rigorous and evidence-based practices, dental facilities can effectively safeguard the health of both patients and healthcare providers, fostering trust and compliance within the community. Moreover, the findings presented in this work underscore the importance of ongoing research and dissemination of best practices, which remain critical for advancing public health in the context of dental care.

**Riassunto**

***Le migliori pratiche di disinfezione in ambito odontoiatrico: approfondimenti dalle normative italiane ed europee***

Le pratiche di disinfezione negli ambienti odontoiatrici sono fondamentali per la sicurezza clinica, svolgendo un ruolo cruciale nella prevenzione delle infezioni crociate e nella protezione della salute di pazienti e operatori sanitari. Questo articolo analizza i componenti chiave di una disinfezione efficace, basandosi su protocolli scientificamente validati sviluppati da organizzazioni internazionali come l'OMS e il CDC statunitense, insieme a standard normativi europei e italiani.

Gli strumenti odontoiatrici richiedono una rigorosa sterilizzazione tramite autoclavi o metodi chimici, mentre per gli strumenti non sterilizzabili è essenziale una disinfezione di alto livello. Le superfici cliniche necessitano di trattamenti biocidi regolari, adeguati alle minacce microbiche e compatibili con i materiali trattati. Il Regolamento europeo sui prodotti biocidi e il Regolamento sui dispositivi medici offrono un controllo critico, garantendo la sicurezza e l'efficacia dei prodotti e prevenendo la resistenza. Gli antisettici, inoltre, svolgono un ruolo vitale nella cura orale, con applicazioni che spaziano dalla prevenzione delle infezioni al trattamento delle malattie parodontali, regolamentate da rigidi quadri normativi.

Fattori come la carica microbica, la presenza di biofilm, il pH, la temperatura e il tempo di esposizione del biocida influenzano significativamente l'efficacia della disinfezione. La prevenzione della resistenza batterica richiede una selezione appropriata dei germicidi, l'aderenza ai protocolli e alle procedure di sterilizzazione, pulizia energiche. Inoltre, misure di disinfezione potenziate durante le emergenze sanitarie pubbliche sottolineano l'adattabilità necessaria per mitigare i rischi emergenti.

Audit regolari, test biologici e formazione del personale sanitario garantiscono l'applicazione coerente di questi protocolli rigorosi. Integrando standard internazionali e nazionali, le strutture odontoiatriche raggiungono un approccio uniforme all'igiene e alla sicurezza,

promuovendo la fiducia e la conformità del pubblico. Questo articolo evidenzia l'importanza di una ricerca continua e della diffusione delle migliori pratiche per il controllo delle infezioni negli ambienti odontoiatrici.

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