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Review

[Translated article] Surface disinfectants used in healthcare environments

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ABSTRACT

Objective: To review the most relevant aspects to consider when selecting the optimal surface disinfectant for use in healthcare settings.
Method: The review was conducted over a three-month period (January to March 2024) based on the list of healthcare surface disinfectants authorized by the Spanish Agency of Medicines and Medical Devices and those in a transitional period, with marketing allowed until their registration in the Official Biocide Register. Biocidal agents belonging to the categories of skin antiseptics and insect repellents were excluded. A total of 100 biocidal agents were selected and evenly distributed among four researchers. The review strategy involved consulting the marketing representatives of these products via email or by reviewing their technical data sheets on their respective websites. The reviewed aspects of each disinfectant included marketed presentations, declared efficacy, composition, indication, dosage and usage instructions.
Results: The total number of biocidal agents included in the study was 85. A total of 29 suppliers were consulted, covering 141 marketed presentations, 25 (29.41%) of which were sterile. Regarding the efficacy reported by suppliers, 100% (85 products) showed bactericidal, 81.18% (69) fungicidal, 78.82% (67) virucidal, 50.59% (43) yeasticidal, 20% (17) mycobactericidal/tuberculocidal, and 17.65% (15) sporicidal activity. In terms of usage instructions, 40 of the 85 biocides (47.06%) were presented in a ready-to-use dosage format, and 34 (40%) allowed for cleaning and disinfection in a single step. A total of 14 biocides (16.47%) included airborne disinfection options.
Conclusions: Selecting the most appropriate surface disinfectant is not straightforward given the wide range of marketed products, the number of factors to consider, and the fact that not all products meet every criterion. For this reason, the selection process must be accompanied by the implementation of optimized programs aimed at reducing the transmission of pathogens from surfaces to patients and healthcare personnel.
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Desinfectantes de superficies utilizados en el ámbito sanitario

Palabras clave:
Desinfectante de superficies
Biocida
Ámbito sanitario
Producto sanitario
Eficacia
Modo de empleo

RESUMEN

Objetivo: Revisar los aspectos más relevantes a considerar para seleccionar el desinfectante de superficies óptimo para su uso en el ámbito sanitario.
Método: La revisión se realizó durante un periodo de 3 meses (de enero a marzo de 2024) a partir de la relación de los desinfectantes de superficies de ámbito sanitario autorizados por la Agencia Española de Medicamentos y Productos Sanitarios y en periodo de transición, con la comercialización permitida hasta su inscripción en el Registro Oficial de Biocidas. Se excluyeron aquellos agentes biocidas pertenecientes a las categorías de antisépticos para piel sana y repelentes de insectos. Se seleccionaron un total de 100 agentes biocidas, que se distribuyeron entre 4 investigadores de manera equitativa. La estrategia de revisión consistió en realizar una consulta a los responsables de la comercialización de dichos productos a través de e-mail o bien, consultando sus fichas técnicas a través de sus páginas web. Los aspectos revisados de cada uno de los desinfectantes fueron: presentaciones comercializadas, eficacia declarada, composición, indicación, dosificación y modo de empleo.

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Resultados: El número total de agentes biocidas incluidos en el estudio fue de 85. Se consultó a un total de 29 proveedores con un total de 141 presentaciones comercializadas, 25 (29,41%) de ellas estériles. En relación a la eficacia declarada por el proveedor, el 100% (85 productos) presentaban actividad bactericida, el 81,18% (69) fungicida, el 78,82% (67) virucida, el 50,59% (43) levuricida, 20% (17) micobactericida/tuberculicida y el 17,65% (15) actividad esporicida. En cuanto al modo de empleo, 40 de los 85 biocidas (47,06%) se presentaban en un formato de dosificación listo para usar y 34 (40%) permitían aunar limpieza y desinfección en un solo paso. Un total de 14 biocidas (16,47%) contemplaban la desinfección por vía aérea.
Conclusiones: La selección del desinfectante de superficies más adecuado no es sencilla, dada la amplia gama de productos comercializados, el número de aspectos a considerar y que no todos ellos cumplen todos los aspectos. Por este motivo, es necesario acompañar el proceso de selección de la implementación de programas optimizados destinados a reducir la transmisión de patógenos desde las superficies a los pacientes y al personal sanitario.
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Introduction

Recent studies have provided evidence that contaminated healthcare environments pose a significant risk of patient colonisation and infection by multidrug-resistant pathogens.[1–5] Microorganisms have properties that enable them to survive in adverse conditions for periods ranging from a few days to several months. Bacteria, viruses, and fungi can be transmitted from inanimate surfaces to the skin of patients and healthcare staff. For this reason, it should be borne in mind that visually clean inanimate surfaces can be a significant source of pathogens. It has been shown that improved cleaning and disinfection of surfaces reduces the incidence of healthcare-associated infections that can be acquired by patients, visitors, and healthcare staff.[6]

Surface disinfectants used in healthcare settings are classified as biocides. Biocides are substances or mixtures of active substances that are designed to destroy, counteract, neutralise, or prevent the action of any harmful organism, or otherwise control it, by means other than mere physical or mechanical action. They are regulated by European Union (EU) Regulation No. 528/2012,[7] which divides them into four main groups and 22 product types according to their intended use (Fig. 1). Healthcare surface disinfectants are categorised as Product Type 2 (PT2).

Authorisation of biocidal products requires that the active substances they contain are either approved or in the process of being approved (i.e. within the transitional period), for the relevant product type at the EU level. If they are approved, the authorisation procedures set out in Regulation No. 528/2012 on biocidal products apply (see Table 1). However, if they are in a transitional period, Spanish national legislation applies instead. In Spain, this consists of Royal Decree 3349/1983[8] and Royal Decree 1054/2002.[9]

Currently, the list of PT2 healthcare disinfectants authorised in Spain can be consulted on the website of the Spanish Agency of Medicines and

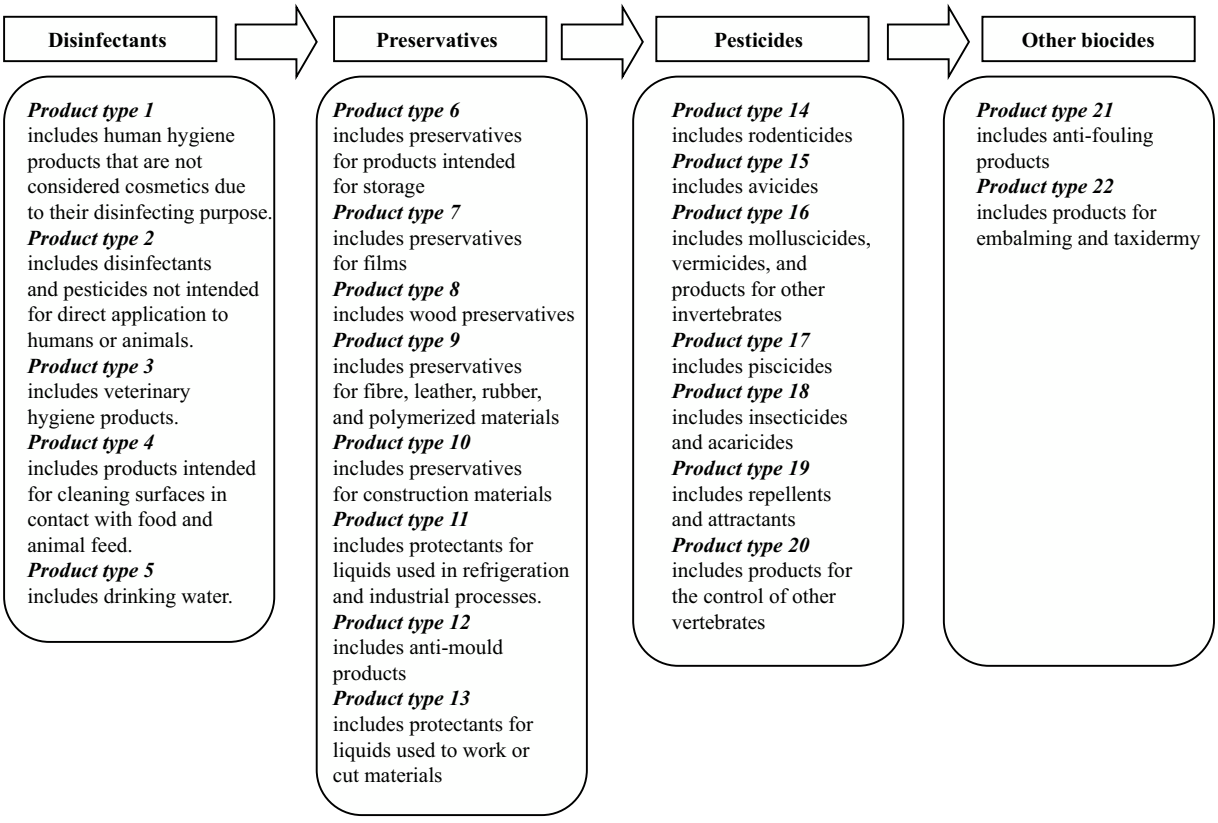

Figure 1. Groups and types of biocidal products according to Annex V of Regulation (EU) No. 528/2012.

Table 1
Main characteristics of each type of authorisation.

	Simplified authorisation	Spanish national authorisation	European Union authorisation
Application	ECHA	AC EM	ECHA
Processing	AC EM	AC EM	AC EM
Decision	AC EM	AC EM	European Commission
Which active substances are permitted?	Annex I Biocidal Products Regulation	All	Not all (see which ones are excluded from the regulation)
Decision deadlines	90 days	365 days	356 + 180 days
What needs to be done for marketing in other Member States?	Notify at least 30 days in advance and adapt the labels to the language of each state	Successive or parallel mutual recognition procedure must be conducted	Notification is not necessary as this authorisation is valid throughout the EU

MCA, Member State Competent Authority; ECHA, European Chemicals Agency; EU, European Union.

Medical Devices (AEMPS),[10] while those in the transitional period can be consulted on the Ministry of Health website.[11]

Selecting the most suitable surface disinfectant can be difficultdue to the wide variety available and the absence of public databases with consolidated and accessible information on the characteristics of authorised surface disinfectants.

To highlight the importance of proper disinfection in the healthcare sector,[12] it can be defined as a procedure that destroys metabolically active forms of microorganisms to a greater or lesser extent, although not bacterial spores. Advances in the development of disinfectants appropriate for the clinical environment have improved disinfection practices. These disinfectants are designed to meet the widely accepted criteria for effectiveness: a broad antimicrobial spectrum, rapid action, sustained residual effects, ease of application in healthcare settings, compatibility with surfaces and materials, non-toxicity, minimal irritation, and low environmental impact.

Good medicine preparation practices form part of quality assurance in hospitals. They ensure that medicines are prepared in accordance with the appropriate quality standards, which ultimately protects patients.

The Guide to Good Practice in the Preparation of Medicines in Hospital Pharmacy Services (GBPP)[13] sets out the standards that should be followed when assigning microbiological validity periods for sterile preparations made in hospital pharmacy services, according to the risk level.

Equipment and utensils used for preparing medicines must be stored in the preparation area to ensure that they are only used for this purpose. They must be cleaned and disinfected after each use to avoid cross-contamination with other preparations.

Cleaning and disinfecting agents must be free of viable microorganisms, and those used in Grade A and B rooms must be sterile and spore-free.

Prepared products must undergo the relevant microbiological control when clean rooms are not available, when batches exceed 25 units,[14] or when validity periods are assigned that are longer than those established by the GBPP according to the risk level.

For microbiological controls to be valid, all sample handling and sterility testing must be conducted under sterile conditions by qualified staff using certified equipment (e.g. laminar flow hoods, clean rooms), with the necessary environmental microbiological monitoring conducted in accordance with the relevant standards.

Furthermore, it must be emphasised that the disinfection of surgical areas is of critical importance, since operating theatres are environments where surgical procedures involving equipment and instruments are conducted. These areas must be thoroughly cleaned and disinfected daily, even if they have not been used. Sterilising surfaces, furniture, and clinical instruments is an essential step in preventing infections[15] and post-operative complications. Disinfectants should be used at concentrations sufficient to ensure the elimination of microorganisms without damaging the surgical environment.

The objective of this review was to provide a detailed description of the efficacy, composition, dilution/contact time, and method of use of authorised PT2 healthcare disinfectants in order to facilitate their selection.

Methods

The review strategy involved consulting the technical data sheets for all authorised healthcare surface disinfectants, which were obtained by either emailing the relevant marketing representatives or consulting the information on their websites.

Inclusion criteria: AEMPS-authorised healthcare surface disinfectants; AEMPS-authorised healthcare surface disinfectants with proven virucidal efficacy; and PT2 healthcare biocidal products authorised for marketing during the transitional period prior to their registration in the Official Register of Biocides.

Exclusion criteria: PT1 and PT19 biocidal agents, as they were not the subject of this review and were within the transitional period.

Fig. 2 shows the selection process for biocidal products.

Once the biocidal products for inclusion in the review had been selected, they were equally divided among a team of 4 researchers. The following variables were collected based on the information contained in each biocidal product's technical data sheet: commercial presentation, declared efficacy, composition, dilution/contact time, use, and instructions for use. The variables were selected based on the study by Rutala and Weber,[16] which evaluated the key considerations for choosing the most suitable hospital disinfectant for environmental surfaces (see Table 2).

The consultation period lasted 3 months. At the end of this period, the 4 researchers pooled their results and produced a single review document.

Results

Once the 100 biocidal products to be included in the study had been selected according to the procedure shown in Fig. 2, information on the variables under review was compiled into 2 tables. Table 3 lists AEMPS-authorised surface disinfectants for healthcare settings, including those with proven virucidal efficacy, and Table 4 lists biocidal products authorised for sale prior to their registration in the Official Register of Biocides.

Ten biocides were excluded from Table 3, leaving 58 references. Nine of these were excluded because they were discontinued, and one was excluded because it is currently registered as a Class IIa medical device. Five biocidal products were excluded from Table 4, leaving 27 references. Three of these were excluded because they were only registered for use in the food industry. Two others were excluded because they had been revoked or cancelled by the AEMPS. Thus, 85 biocides were finally analysed from the initial 100.

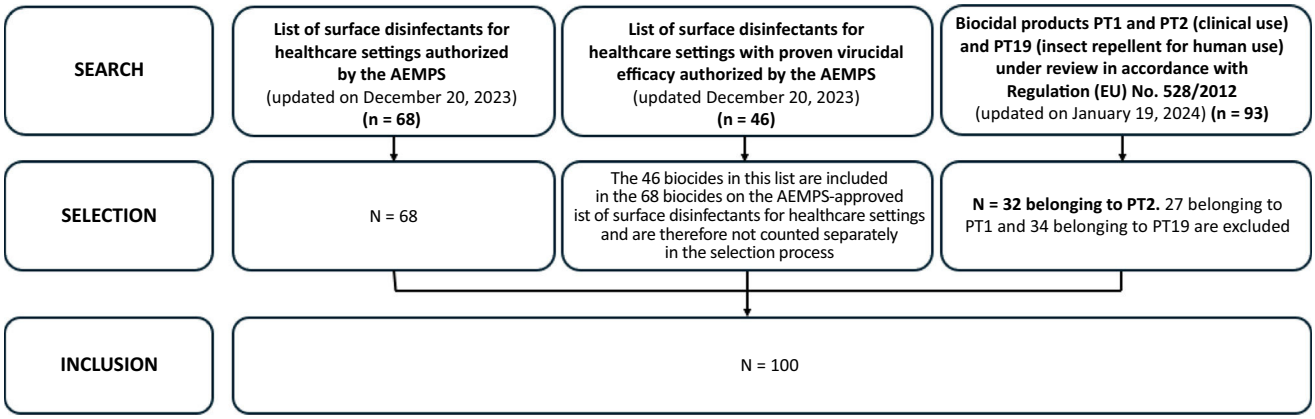

Figure 2. Selection process for healthcare biocidal products (Product Type 2).

In total, 29 suppliers were consulted, with a total of 141 marketed presentations. Of these, 25 (29.41%) were marketed as sterile: 12 in relation to the packaging and 13 in relation to both the packaging and the content.

Regarding the claimed efficacy, 100% (85) exhibited bactericidal activity, 81.18% (69) exhibited fungicidal activity, 78.82% (67) exhibited virucidal activity (11 of which claimed complete virucidal efficacy), 50.59% (43) exhibited yeasticidal activity, 20% (17) exhibited mycobactericidal/tuberculicidal activity, and 17.65% (15) exhibited sporicidal activity.

In terms of method of use, 40 of the 85 biocides reviewed (47.06%) were presented in a ready-to-use format, while 34 (40%) allowed cleaning and disinfection to be combined in one step.

A total of 14 products (16.47%) were indicated for surface disinfection via airborne delivery. Ten of these were intended solely for this purpose, whereas the remaining 4 could also be used for contact disinfection.

Discussion

In terms of the efficacy claimed by manufacturers, Rutala and Weber[16] highlighted the need to identify the main microorganisms responsible for hospital infections and outbreaks in our environment, thus enabling the efficacy of the disinfectant to be tested directly against these specific microorganisms. However, as this is not always feasible, the spectrum should at least include the vegetative bacteria known to be responsible for the majority of healthcare-associated infections (79.1%): *Staphylococcus aureus, Enterococcus, Escherichia coli, coagulase-negative* staphylococci*, Pseudomonas aeruginosa, Klebsiella, and Enterobacter*.[17,18]

Evaluations of claimed efficacy should take into account mandatory European standards, together with any additional standards required (with specific antimicrobial activities marked with an asterisk), depending on the type of disinfection, location, and microorganism to be eliminated. These are detailed below.[19,20]

Surface disinfection without mechanical action: EN 13727 (bactericidal), EN 13697 (bactericidal, yeasticidal, and fungicidal*), EN 13624 (yeasticidal and fungicidal*), EN 14348 (tuberculocidal* and mycobactericidal*), EN 14476 (virucidal*).

Surface disinfection with mechanical action: EN 13727 (bactericidal), EN 13624 (yeasticidal and fungicidal*), EN 14348 (tuberculocidal* and mycobactericidal*), and EN 14476 (virucidal*).

The EN 13727 standard specifies *Pseudomonas aeruginosa, Staphylococcus aureus* and *Enterococcus hirae* as the test organisms to determine bactericidal activity.

Table 2
Key considerations for choosing the optimal disinfectant.

Key considerations for choosing the optimal disinfectant		
Considerations	Questions	Score (from 1 to 10)
Declared efficacy	The product eliminates the most relevant pathogens, including those that cause the majority of nosocomial infections, outbreaks, or problems in your facility	
Efficacy and contact times	How quickly does the product eliminate the most common pathogens?	
	Do treated surfaces stay visibly wet for the efficacy times claimed on the label?	
Safety	Does the product have an acceptable toxicity rating?	
	Does the product have an acceptable flammability rating?	
	Does it require a minimum level of personal protection?	
	Is it compatible with the most common surfaces in your facility?	
Ease of use	Does the product have an acceptable odour?	
	Does it have an acceptable shelf life?	
	Does the product format suit the needs of your facility?	
	Is it effective in the presence of organic matter?	
	Is it water-soluble?	
	Does it clean and disinfect in one step?	
	Are the instructions for use simple and clear?	
Other factors	Does the supplier provide ongoing training, both in-person and online?	
	Does the supplier offer 24/7 support?	
	Is the total cost of the product acceptable?	
	Can the product help to standardise the products used in your facility?	

Rutala WA and Weber DJ (2014).
Consider the 5 proposed categories; give each product a score from 1 to 10 for each of the 5 aspects considered; select the product with the highest total score (maximum score: 50).

Table 3
AEMPS-authorised surface disinfectants for healthcare settings.

Company responsible for marketing	Product name	EDS Number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
A & B laboratorios de biotecnologia	DD 445 (5-L container)	844	–		Bactericide Fungicide Limited virucidal	- Didecyldimethylammonium chloride 7% - Isopropanol 7.10%, ethoxylated alkyl alcohol, amines, N-C12–14 (even numbers) - Alkyl trimethylenediamine - Reaction products with chloroacetic acid, etalonamine, polyhexamethylene biguanide monohydrochloride: 0.50%	Dilution: Bactericide: 3%, 5 min Fungicide: 3%, 15 min Virucide: 4%, 30 min	Concentrated disinfectant detergent for healthcare surfaces	Dilute according to required effectiveness according to contact times. No rinsing required.
Aplicaciones técnicas sanosil	Sanosil S010 HC (1-L spray bottle, 10-L container)	987	–		Bactericide Fungicide Yeasticide Limited virucidal Sporicide	- Hydrogen peroxide 5% - Silver 0.005%	Ready to use	Surface disinfection by contact and airborne methods and mould removal	Disinfection by contact: Moisten a clean, sterile cloth or mop with the product and apply it to the surface to be treated. Allow the wet film to dry. Treated parts or surfaces must be thoroughly rinsed with potable water before use. Approximate amount (floors) 8–10 mL/m^2. Exposure time: 15–60 min (15 min for bactericidal and fungicidal efficacy, 60 min for sporicidal and virucidal efficacy). Ventilate the room adequately after use. Airborne disinfection: wet fog (aerosol; Sanosil easy fog; 80 mL/m^2; contact time: 15–60 min) or dry fog (nebulisation; Sanosil Q-Jet; 6–14 mL/m^3; contact time: 120–240 min). Allow treated surfaces to dry. Rinse before use.
Argaex Pirámide 2006	1DT873 (1-L spray bottle)	1316	–		Bactericide Fungicide Yeasticide Total virucide	- Ethyl alcohol (ethanol) 67.90% - Deionised water 32.10%	Ready to use (Contact time: at least 5 min)	Disinfection of washable, alcohol-resistant surfaces in healthcare settings	Evenly apply the product over the entire surface with a sterile mop or cloth, ensuring that it stays moistened with the product for at least 5 min. No rinsing required.
B. Braun Medical	Meliseptol Rapid (5-L container, 750-mL spray bottle)	507	750-mL spray bottle	–	Bactericide Fungicide Yeasticide Limited virucidal Mycobactericide	- 1-propanol 5% - Didecyldimethylammonium chloride 0.0075% - Excipients: <5% non-ionic surfactants	Ready to use Bactericide, yeasticide: 1 min Fungicide: 15 min Virucide: 10 min Mycobactericide: 30 s	Fast-acting alcohol-based disinfectant for medical equipment and alcohol-resistant surfaces	Clean the surface to be disinfected with a single-use wipe or cloth soaked with the product and leave to dry. Do not spray directly into the crevices of medical devices. No rinsing required. Wait until the contact time has elapsed.
	Meliseptol Foam Pure (5-L container, 750-mL spray bottle)	634	750-mL spray bottle	–	Bactericide Fungicide Yeasticide Limited virucidal Mycobactericide	- Propanol 1.70% - Didecyldimethylammonium chloride 0.023% - Excipients: <5% non-ionic surfactants	Ready to use Bactericide, yeasticide: 1 min (2 min in dirty conditions) Fungicide: 60 min Virucide: 5 min Mycobactericide: 1–3 min	Alcohol-based detergent and disinfectant for medical equipment and alcohol-resistant surfaces	Clean the surface to be disinfected with a single-use wipe or cloth soaked with the product and leave to dry. No rinsing required. Wait until the contact time has elapsed.

(continued on next page)

Table 3 (*continued*)

Company responsible for marketing	Product name	EDS Number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
Comercial Química Massó	Professional Aldehyde Biocide (10- and 20-L containers)	557	–		Bactericide Fungicide Virucide Sporicide	- Glutaraldehyde 6.50% - Benzalkonium chloride 2%	Dilution: 1% (10 mL/L) for at least 20 min.	Disinfectant for critical and semi-critical surfaces in healthcare settings	Dilute 10 mL/L water. Apply to the surface and leave for at least 20 min.
	Solquat Plus (1-L container, 5-L and 20-L containers)	594	5-L and 20-L containers	- Bactericide Fungicide Yeasticide		- Didecyldimethylammonium chloride 7.50% - Benzalkonium chloride 5%	Dilution: 0.20–4% depending on the type of contamination to be removed and the indicated contact time (5–15 min)	Hospital surface disinfectant	Apply the disinfectant solution using a spray bottle, mop, sponge, cloth, etc. Leave for 5 to 15 min, depending on the amount chosen, rinse with water and leave to dry. If using a wet mop system, no rinsing is required. The disinfectant solution must be prepared daily. Discard any leftover solution.
	Solquat Total (5-L container)	855	5-L container	–	Bactericide Yeasticide Fungicide Virucide	-Benzalkonium chloride 2.50% -Didecyldimethylammonium chloride 3.75%	Dilution: 0.08–5% depending on the type of contamination to eliminate and the indicated contact time (5–15 min).	Hospital surface disinfectant	Apply the chosen disinfectant solution using a spray bottle, mop, sponge, cloth, etc. Leave for 5 to 15 min, depending on the amount chosen, rinse with water and leave to dry. If using a wet mop system, no rinsing is required. The disinfectant solution must be prepared daily. Discard any leftover solution.
	Solquat Quick (5-L container, 750-mL bottles)	886	5-L container and 750-mL bottles	–	Bactericide Yeasticide Total virucide	- Didecyldimethylammonium chloride 0.75% - Alcohol	Ready to use	Disinfection of surfaces in hospitals. For rapid, intermediate, and targeted disinfection	Apply using a spray bottle. Wet a large area, dry with a clean cloth, or clean with a mop soaked in the product and leave to dry. No rinsing required.
	Solquat Premium (5-L container)	963	5-L container	–	Bactericide Fungicide Yeasticide Mycobactericide Sporicide Virucide	- Didecyldimethylammonium chloride 6.50% - Triamines 5.30%	Choose the appropriate dilution depending on the level of contamination	Disinfection of hard surfaces in all types of healthcare facilities. For all types of critical and subcritical areas	Spread the product with a moist mop, flat mop, or cloth. Waxed or polished floors must be rinsed. In other cases, it can be rinsed or left to air dry. The fresh disinfectant solution should be freshly prepared daily or more often if it becomes visibly dirty or diluted.
Davant Beauté	Chlor-Clean Tablets	1238	–		Bactericide Fungicide Total virucide Mycobactericide Sporicide	- Organic chlorine in the form of 1.70 g sodium dichloroisocyanurate - Detergent	Each tablet produces 1000 ppm of free available chlorine when added to 1 L of water. Contact time: 5 min	Detergent-disinfectant for healthcare surfaces	1. Use ordinary cold tap water. 2. Measure the litres of water required for the disinfectant solution. For normal use, add 1 Chlor-Clean tablet/L water (1000 ppm). 3. Without shaking vigorously, gently turn the container upside down 2 or 3 times. 4. Apply using a cloth or wipe (pour the contents into a bucket, immerse the cloth, and wring it out); use a mop or flat mop for the floor (pour the contents into the mop bucket); or apply as a spray to surfaces and then wipe with a chamois or wipe.

								5. No rinsing or drying required. Disinfects in 5 min. 6. Discard any remaining solution after use.
Diversey España	Tasky Sprint H-200 (5-L container)	427	–	Bactericide Fungicide Limited virucidal	- Alkyl dimethyl benzylammonium chloride-N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine	Dilution: 0.25–1.50% Bactericide: 0.50%, 5 min Fungicide: 1.50%, 15 min Virucide: 0.50%, 15 min	Detergent-disinfectant for floors and surfaces in healthcare settings	• Application WITHOUT rinsing: use a mop, cloth, or wipe using the 'double bucket' technique. First, completely saturate the surface with the contents of the first bucket. Wring out the cleaning material. Second, disinfect the surface using the contents of the second bucket. Ensure that the surface stays wet with the product for at least 15 min. No rinsing required. • Application WITH rinsing: Use a clean or sterile mop, cloth, or wipe using the 'double bucket' technique. First, completely saturate the surface with the contents of the first bucket. Wring out the cleaning material. Second, disinfect the surface using the contents of the second bucket. Ensure that the surface stays wet for at least 15 min. Rinse thoroughly with water to remove any product residue. For greater safety and effectiveness, do not enter the disinfected area for at least 1.
	Oxivir H + (5-L container)	800	–	Bactericide Fungicide Limited virucidal	- Hydrogen peroxide: 6.36% - Salicylic acid: 2.50% - Alkylbenzenesulfonic acid - Excipients	Dilution: 3.50% (35 mL/L) Bactericide and virucide: 5 min Fungicide: 15 min	Ready-to-use detergent-disinfectant for hard, nonporous surfaces in healthcare settings	Cleaning and disinfection with spray: 1. Remove loose dirt 2. Spray onto surfaces 3. Clean with a clean cloth, previously soaked in the product 4. Spray again and leave the surface moist for at least 5 min for a bactericidal and virucidal effect, or for 15 min for a fungicidal effect. Leave to dry. Cleaning and disinfection with a bucket: 1. Remove loose dirt 2. Apply the solution with a mop or cloth 3. Leave the surface wet for at least 5 min for a bactericidal and virucidal effect, or 15 min for a fungicidal effect. 4. Allow to air dry; contact surfaces can be dried with a dry mop
	Oxivir H + spray (750-mL spray bottle)	801	–	Bactericide Fungicide Limited virucidal	- Hydrogen peroxide: 0.28% - Salicylic acid: 0.11% - Excipients	Ready to use Bactericide and virucide: 5 min Fungicide: 15 min	Ready-to-use disinfectant detergent for nonporous hard surfaces in healthcare settings	Spray onto surfaces. Clean with a clean cloth previously soaked with the product. Leave the surface wet for the required contact time. Leave to dry.
	Oxivir H + JFLEX (1.5-L spray bottle)	814	–	Bactericide Fungicide Limited virucidal	- Hydrogen peroxide: 6.36% - Salicylic acid: 2.50% - Excipients	Ready to use. The J-Flex dosing system ensures complete control of consumption	Concentrated liquid detergent-disinfectant for cleaning and disinfecting all water-resistant hard	Turn the selector to the high- or low-dilution setting (icon indicating lower or higher spray density) and fill the spray bottle or bucket with the J-Flex

(continued on next page)

Table 3 (*continued*)

Company responsible for marketing	Product name	EDS Number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
							through automatic dilution, guaranteeing the correct amount to be applied. Bactericide and virucide: 5 min Fungicide: 15 min	surfaces and the majority of delicate furniture in healthcare settings.	bottle. Both settings deliver the same dilution to ensure disinfection and correct dosing. Cleaning and disinfection with spray: 1. Remove loose dirt. 2. Spray onto a clean cloth and wipe the surface, or spray directly onto the surface. 3. Leave the surface wet for at least 5 min for a bactericidal and virucidal effect, or 15 min for a fungicidal effect. 4. After the contact time, wipe again with the cloth or leave to air dry. Cleaning and disinfection with a bucket: 1. Remove loose dirt. 2. Apply the solution with a mop or cloth. 3. Leave the surface wet for at least 5 min for a bactericidal and virucidal effect or 15 min for a fungicidal effect.
Ecolab Hispano-Portuguesa	Surfanios Premium (1-L auto-dispenser, 5-L container)	943	–		Bactericide Yeasticide Tuberculocide Limited virucidal	- N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine (51 mg/g) - Didecyldimethylammonium chloride (25 mg/g) - Excipients	Dilution: 0.25% (2.5 mL/L) Bactericide: 15 min Yeasticide: 30 min Tuberculicide: 60 min Virucide: 5 min	Detergent and disinfectant for floors and walls	Dilute to 0.25% (20 mL/8 L water at room temperature). Apply the diluted product with a sterile mop or cloth. Leave for the indicated amount of time to achieve the desired level of antimicrobial activity. No rinsing required.
	Aniospray Quick (1-L spray bottle, 5-L bottle)	997	–		Bactericide Yeasticide Fungicide Tuberculocide Mycobactericide Limited virucidal	Hydroalcoholic solution of 55% ethanol, quaternary ammonium propionate, perfume	Ready to use Contact time: between 30 s and 5 min, depending on the required level of effectiveness.	Alcohol-based disinfectant for surfaces, medical equipment, and furniture	Spray onto the areas to be treated until they are completely wet. Leave for between 30 s and 5 min, depending on the desired level of antimicrobial activity. No rinsing required.
	Surfa'Safe Premium (750-mL spray bottle)	1017	–		Bactericide Yeasticide Fungicide Tuberculocide Limited virucidal	- Didecylmethylammonium chloride 0.30% - N-(3-Aminopropyl)-N dodedylpropane-1,3-diamine	Ready to use (Contact time: between 2 and 30 min, depending on the required level of effectiveness)	Surface detergent and disinfectant	Apply the disinfectant detergent foam to the area to be treated or, preferably, to a nonwoven material. Spread the product evenly. Leave for between 2 and 30 min, depending on the desired level of antimicrobial activity. No rinsing required. If the medical device comes into contact with skin or mucous membranes, rinse with water.
Expert Lab Europe	DS 100 Rapid (750-mL spray bottle, 5-L container)	1383	–		Bactericide Yeasticide Fungicide Limited virucidal	- 2-Propanol 31% - Ethanol 19% - Benzalkonium chloride 0.26%	Ready to use. Bactericide, fungicide, and virucide in 1 min Fungicide in 5 min	Detergent-disinfectant for alcohol-resistant surfaces in healthcare settings	Spray the product directly onto the surface to be disinfected from a distance of 30 cm, using the recommended amount of 8 pumps (10 mL/m^2),

								ensuring an even coating. Leave at room temperature for 5 min. Then use a sterile mop or cloth to dry the surface. No rinsing required. Adequately ventilate disinfected areas. Do not enter the disinfected area for at least 3 h
	DS 200 (5-L container)	1513	–	Bactericide Yeasticide Fungicide Limited virucidal	- 2-propanol 4.30% - Didecyldimethylammonium chloride 2.54%	Dilution: Bactericide, Yeasticide, and Virucide: 20%, 5 min Fungicide: 50%, 15 min	Concentrated disinfectant for washable surfaces in healthcare settings	Apply the diluted product to the surface at room temperature using a sterile mop or cloth, according to the contact times. Treated or exposed surfaces must be rinsed with potable water. No drying required. Do not enter the disinfected area for at least 1 h, ensure adequate ventilation before entering. Prevent unauthorised persons from entering.
Filtración Y Químicos Spain	Virol-Oxy (1-kg container and 6-kg buckets, powder)	1162	–	Bactericide Yeasticide Limited virucidal	- Potassium monopersulphate 51% - Hydrogen peroxide 30% - Titanium oxyhydrate 1% - Sodium chloride 18%	Dilution: 1% (10 g powder/L)	Healthcare surface detergent-disinfectant for contact and airborne application	Disinfection by contact: 1%; dilute 10 g powder in 1 L of water. The solution stays active for as long as it remains pink (approximately 5 days). When it fades, discard it and prepare more. Work surfaces: apply a 1% disinfectant solution by spraying finely onto all types of surfaces, or by wiping with a cloth moistened in the solution. Floors: apply a 1% disinfectant solution using a double bucket system or a mop system. Airborne disinfection (fogging): 1%; dilute 10 g powder in 1 L of water. Safety period: 3 h. Fog the disinfectant solution into the air using cold ultra-low volume (ULV) equipment.
Francisco Hurtado Portela	Rely + ON Virkon (500-g container and 5-kg drum, powder)	363	–	Bactericide Fungicide Mycobactericide Total virucide Sporicide	Triple inorganic salt: - Potassium monopersulphate - Potassium hydrogen sulphate - Potassium sulphate - Excipients Its microbicidal activity is based on a buffered and stabilised peroxygen system, which contains a surfactant. Ultimately, this system produces nascent oxygen, which specifically targets the nucleic acids of microorganisms, rendering them inactive	Dilution: 1% (10 g powder/L) Apply for 5–15 min, depending on the required efficacy	Healthcare surface detergent-disinfectant for contact and airborne application	Disinfection by contact: 1%; dilute 10 g powder in 1 L of water. The solution stays active for as long as it remains pink (approximately 5 days). When it fades, discard it and prepare more. Work surfaces: apply a 1% disinfectant solution by spraying finely onto all types of surfaces, or by wiping with a cloth moistened in the solution. Floors: apply 1% disinfectant solution with a clean mop or cloth. Airborne disinfection (fogging): 0.20%; dilute 10 g powder in 5 L of water. Safety period: 3 h. Fog the disinfectant solution into the air using a backpack or mechanical sprayer.

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Table 3 (*continued*)

Company responsible for marketing	Product name	EDS Number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
José Collado	Limoseptol (5-L container with optional dispensing valve, 50-mL sachets, 1-L auto-dispenser)	47	5-L container with dispensing valve		Bactericide Fungicide	- Glyoxal 3.40% - Glutaraldehyde 1.25% - Benzalkonium chloride 5% - Excipients	Dilution: 1% (10 mL/L) (Contact time: 5–15 min)	Detergent-disinfectant for surfaces in critical areas	Dilute 100 mL (4 pumps/2 sachets) in 10 L of water. Apply using a bucket/double bucket system, or scrub manually with a sterile cloth or pre-soaked mop. Leave for 5–15 min
	Limoseptol Plus (5-L container with optional dispensing valve, 1-L auto-dispenser)	650	–		Bactericide Fungicide Limited virucidal	- Didecyldimethylammonium chloride 4.50% - Excipients	Dilution: 1% (10 mL/L)	Detergent-disinfectant for surfaces in critical areas. Medical devices and noninvasive healthcare products	Dilute 100 mL (4 pumps) in 10 L of water. Apply using a bucket/double bucket system, or by manually scrubbing with a sterile cloth or pre-soaked mop.
	Limoseptol (5-L container with optional dispensing valve)	838	5-L container with dispensing valve		Bactericide, fungicide Limited virucidal	- Didecyldimethylammonium chloride 5% - N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine 2.50% - Excipients	Dilution: 0.50–2% Bactericide: 0.50%, 5 min Yeasticide, fungicide: 0.50%, 15 min Virucide: 2%, 5 min	Detergent-disinfectant for surfaces in critical areas. Medical devices and noninvasive healthcare products	Dilute 50–200 mL (2–8 pumps) in 10 L of water. Apply using a bucket/double bucket system, or by manually scrubbing with a sterile cloth or pre-soaked mop.
	F-66 (10-L container)	853	10-L container		Bactericide	- Benzalkonium chloride 0.25% - Excipients	Ready to use. Set the Aerobrumer for 6–10 min per 100 m^3 of the volume to be treated(if using several devices, divide the total time between them).	Hot-air disinfectant for routine disinfection of facilities.	Apply using the H-type Aerobrumer thermomicrodiffuser in dry aerosol form when no people are present. Safety period: 3 h
	CR-36 Advanced (750-mL spray bottle, 5-L container)	1005	Sprayable 750 mL		Bactericide Fungicide Limited virucidal Mycobactericide	- Didecyldimethylammonium chloride 0.11%, - Isopropanol 41% - Excipients	Ready to use Bactericide: 5 min Yeasticide, fungicide: 15 min Virucide: 5–15 min Mycobactericide: 5 min	Disinfection of surfaces in critical areas	Apply directly to the surface of the medical device to be treated. Spread evenly with a clean cloth.
	Limoseptol Advanced (5-L container with optional dispensing valve, 1-L auto-doser)	1167	5-L container with dispensing valve		Bactericide Fungicide Yeasticide Total virucide	- Didecyldimethylammonium chloride 13.80% - 2-Phenoxyethanol 2.50% - Excipients	Dilution: 1–2% Bactericide: 1%, 5 min Yeasticide and fungicide: 2%, 5–15 min Virucide: 2%, 15 min	Detergent-disinfectant for surfaces in critical areas	Dilute 100–200 mL (4–8 pumps/2–4 sachets) in 10 L of water Apply using a bucket/double bucket system, or scrub manually with a sterile cloth or pre-soaked mop. Leave according to the efficacy requirement.
	Limoseptic Advanced (5-L container with optional dispensing valve, 1-L self-dosing device)	1401	5-L container with dispensing valve		Bactericide Yeasticide Fungicide Limited virucidal	- Hydrogen peroxide 7.50% - Ethanol 9% - Excipients	Dilution: 3%, (30 mL/L) Bactericide and yeast killer: 3%, 5 min Fungicide and virucide: 3%, 15 min	Detergent-disinfectant for surfaces in critical areas	Dilute 150 mL (6 pumps) in 5 L of water. Apply using a bucket/double bucket system, or scrub manually with a sterile cloth or pre-soaked mop. Leave according to the efficacy requirement.

Laboratorios Bilper	Hospimedic B-1 (5-L container, 750-mL spray bottle)	573	–		Bactericide Fungicide	- Didecyldimethylammonium chloride 1% - Ethanol 10% - Propanol 50%	Ready to use (Contact time: 1–3 min)	Rapid disinfectant for tools and surfaces in healthcare settings	Apply to the surface to be disinfected and leave for 1–3 min. No rinsing required. Disinfection of premises: safety period: 1 h
	Hospimedic BP-1 (750-mL spray bottle)	1384	750-mL spray bottle	–	Bactericide, Fungicide Limited virucidal	- 75% ethanol - Didecyldimethylammonium chloride 0.75%	Ready to use (Contact time: 5 min)	Neutral surface disinfectant for direct use in healthcare settings	Apply to the surface to be disinfected, ensuring it stays moist for 5 min. Then allow to air dry or remove the excess after the contact time with a sterile cloth or mop. The area should not be entered for at least 3 h following adequate ventilation.
	Hospimedic B6 (750-mL container)	749	–		Bactericide Fungicide Yeasticide	- Didecylmethylammonium chloride 6% - Bis (3-aminopropyl)-dodecylamine 5.50% - Water and excipients	Dilution: 4% (40 mL/L) 15 min	Detergent-disinfectant for tools and critical surfaces in healthcare settings	Dilute 200 mL in 5 L of water. Surfaces: apply with a sterile cloth or mop and leave for 15 min. Dry with a sterile cloth or mop. Equipment: immerse for 15 min. Dry with a sterile cloth or mop. Discard the solution after use.
	Hospimedic BP7 (5-L container)	923	5-L container	–	Bactericide, Fungicide Limited virucidal	- Didecylmethylammonium chloride 4.50% - Monoethanolamine 4.50%	Dilution: 5% (50 mL/L) 15 min	Disinfectant for surfaces in healthcare settings	Dilute 50 mL in 1 L of water. Using a clean, sterile mop or cloth, spread the solution over the entire surface, ensuring it stays moist for the indicated time (15 min). The disinfected area should not be entered for at least 1 h following adequte ventilation.
	Hospimedic BP4 (5-L container)	924	5-L container	–	Bactericide Fungicide Limited virucidal	- Didecylmethylammonium chloride 5% - Benzalkonium chloride 5% - Monoethanolamine 4.95% No aldehydes or formaldehyde	Dilution: 1.50–5% 15 min	Disinfectant for surfaces in healthcare settings	Using a clean, sterile mop or cloth, spread the solution over the entire surface, ensuring it stays moist for the indicated time (15 min). The disinfected area should not be entered for at least 1 h following adequte ventilation.
	Hospimedic BP6 (5-L container)	1013	5-L container	–	Bactericide Fungicide	- N-N-didecyl-N-N-dimethylammonium chloride 6% - Bis (3-aminopropyl)-dodecylamine 5.50%	Dilution: 4% (40 mL/L) Bactericide: 1–4% 5 min Fungicide: 4% 15 min	Disinfectant for surfaces, equipment, and materials in healthcare settings	After dilution, spray onto the surfaces and/or materials to be disinfected. Use an antiseptic cloth or mop to spread the product. Leave to dry
Lohmann & Rauscher International	L + R Surfacedisinfect Alcohol Maxi Wipes (dispenser with 110 wet wipes, 38 × 20 cm)	958	–		Bactericide Yeasticide Tuberculocide Mycobactericide, limited virucidal	- Ethanol 25 g - 1-Propanol 24 g (per 100 g of solution)	Ready to use. Disinfectable area: 1 m^2 per wipe Bactericide, yeasticide, and tuberculocide/ mycobactericide: 1 min Virucide: 30 s	Disinfectant for alcohol-resistant surfaces and noninvasive medical devices	Not suitable for alcohol-sensitive surfaces. Apply to the surface to be disinfected and leave. Leaves no residue. Seal the container after use to prevent drying out .

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Table 3 (*continued*)

Company responsible for marketing	Product name	EDS Number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
	L + R Surfacedisinfect Alcohol Wipes (pack of 60 wet wipes 20 × 18 cm)	957	Ready to use. Disinfectable area: 0.5 m^2 per wipe						
	L + R Surfacedisinfect Alcohol Tissues (canister of 100 wet wipes, 22.5 × 13.8 cm)	955	Ready to use Disinfectable area: 0.20 m^2 per wipe						
	L + R Surfacedisinfect Alcohol (1-L bottle)	959	Ready to use						
	L + R Surfacedisinfect Universal Maxi Wipes (dispenser 110 wipes 38 × 20 cm)	951	–		Bactericidal Yeasticidal Limited virucidal	- Alkyl (C12–16) dimethylbenzylammonium chloride 0.40 g - Didecyldimethylammonium chloride 0.40 g (per 100 g of solution)	Ready to use Disinfectable area: 1 m^2 per wipe Bactericide, yeasticide: 1 min Virucide: 30 s (norovirus) - 1 min (polyomavirus)	Disinfectant for surfaces and noninvasive medical devices	Suitable for alcohol-sensitive surfaces. Apply to the surface to be disinfected and leave. Leaves no residue. Seal the container after use to prevent drying out
	L + R Surfacedisinfect Universal Wipes (pack of 60 wipes 20 × 18 cm)	954	Ready to use Disinfectable area: 0.50 m^2 per wipe						
	L + R Surfacedisinfect Universal Tissues (canister of 100 wipes, 22.5 × 13.8 cm)	956	Ready to use Disinfectable area: 0.2 m^2 per wipe						
Químicas Quimxel	Micosan (5-L container)	792	–		Bactericide Fungicide Yeasticide Virucide Tuberculocide Sporicide	- Isopropyl alcohol 11.40% - Glutaraldehyde 11.20% - Didecyldimethylammonium chloride 4% - Benzalkonium chloride 5.30% - Adjuvants and solvents	Dilution: 0.50–2.50%. Low level of disinfection: 1% (15 min) Medium level: 2.50% (60 min)	Disinfectant for all types of washable surfaces in healthcare settings	Clean beforehand and work at room temperature. No people should be present. Apply with a mop or aseptic cloth using the 'double bucket' technique, with or without final rinsing and air drying. Safety period: 3 h (1 h if rinsed with water), ventilating before entering. Discard the solution after each use.

	Fresc San (5-L container)	821	–	Bactericide, Fungicide Limited virucidal	- Didecyldimethylammonium chloride 2.10% - Excipients	Dilution: 4–6% (40 to 60 mL/L) Virucide: 5%	Detergent-disinfectant for healthcare surfaces	Apply with a sterile mop or cloth using the 'double bucket' technique; dilution 40–60 mL/L of water. No rinsing required. Discard the solution after 24 h and after each use.
	Unisan (5-L container)	976	–	Bactericide Fungicide Yeasticide Total virucide Mycobactericide Tuberculocide Sporicide	- Didecyldimethylammonium chloride 6.40% - N-(3-Aminopropyl)-N-dodecylpropane-1,3-diamine 5.40% - 2-Amoniethanol - Ethoxylated fatty alcohol - Isopropanol - Adjuvants and water	Dilution: 0.50–7% Bactericide: 5% 5 min Yeasticide: 0.25% 5 min Mycobactericide/ tuberculocide: 2% 10 min Limited virucidal: 0.50%, 5 min Fungicide, total virucide, sporicide: 7% 60 min	Disinfectant for surfaces in healthcare settings	1 pump = 30 mL Use without prior cleaning, except for disinfecting critical areas, which should be cleaned beforehand. Work at room temperature when no people are present. Apply with a mop or cloth in clean or aseptic conditions using the 'double bucket' technique. No rinsing required. The disinfected area should not be entered for at least 3 h (1 h if rinsed). Discard the product solution after 24 h and after each use.
Proder	Sanit P20 (5-L container)	564	–	Bactericide, Fungicide Limited virucidal	- Didecyldimethylammonium chloride 4.50% - Monoethanolamine 8% - Excipients	Dilution: Bactericide: 2% Fungicide: 3% Coronavirus: 2% (30 s)	Concentrated disinfectant for critical surfaces in healthcare settings	Dilute the product to the appropriate amount. Apply the product manually using a sterile mop or cloth.
	Sanit Complet (750-mL spray bottle)	583	–	Bactericide Fungicide Limited virucidal	- Benzalkonium chloride 0.72% - Propanol 50% - Alcohols and excipients	Ready to use	No-rinse disinfectant for healthcare surfaces	Spray onto the surface to be disinfected, leave for 5–15 min, and wipe with a cloth until dry. No rinsing required.
	Sanit Bio (5-L container, 50-mL sachets)	588	–	Bactericide Fungicide Yeasticide Limited virucidal	- Benzyl C12, C18 alkyl dimethyl ammonium chloride 1.60% - Didecyl dimethyl ammonium chloride 1.60% - Benzyl C12, C14 alkyl dimethyl ammonium chloride 1.60% - Surfactants (<5%)	Dilution: Bactericide: 0.50–2% Fungicide: 0.50% Yeasticide: 2.50% Coronavirus: 2.50% (60 s)	Biodegradable disinfectant for healthcare surfaces	Dilute the product to the appropriate amount. Apply manually using a sterile microfibre cloth or flat mop system with a double bucket. Specifically for cleaning with microfibres
	Sanit Surfa Plus (750-mL spray bottle)	764	–	Bactericide Fungicide	- Dimethyldidecylammonium chloride 0.30% - Propanol 0.12%	Ready to use (Contact time: 5 min)	Detergent-disinfectant for noninvasive healthcare equipment, products, and surfaces	Spray onto the surface to be disinfected and leave for 5 min. No rinsing required.
Sallo Kyra	Bacclinic (750-mL spray bottle, 5-L container)	665	–	Bactericide Fungicide Yeasticide Limited virucidal Sporicide Mycobactericide	- Ethanol 4.80% - Propanol 2.60% - Quaternary ammonium propionate 0.075% - Water and excipients	Ready to use Bactericide and yeast killer: 1 min Fungicide, virucide, and mycobactericide: 3 min Sporicide: 15 min	Rapid disinfectant for healthcare surfaces	Pre-clean with a damp cloth. Spray the undiluted product evenly over the entire surface, ensuring it stays moist for at least 3 min, allowing the product to take effect. Wipe with a clean cloth until it evaporates.
Soro Global	Solum Pro (5-kg container, 20-kg container)	936	–	Bactericide Yeasticide	- Alkyl dimethyl benzylammonium chloride 2.40%	Dilution: 2% (20 mL/L) 5 min	Disinfection of surfaces in clinical settings.	Surface cleaning: 1. Dilute the product in water at the indicated ratio. 2. Apply with a sterile cloth. 3. Leave for 5 min at a temperature of 20 °C. 4. Rinse. Floor cleaning: dilute the product in water at the indicated ratio and clean the floor using a mop.

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Table 3 (*continued*)

Company responsible for marketing	Product name	EDS Number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
									Can be used on any washable surface. No rinsing required.
Tecymain	Bac-Tec Clinic (1-kg bottle, 5-, 10-, and 25-kg containers)	1341	–		Bactericide Fungicide Yeasticide Limited virucidal	Quaternary ammonium Alcohol	Dilution: 0.50–2% Virucide: 25–50%)	Clinical surface disinfectant	Apply by spraying, washing, flushing, or immersion using a sterile flat mop, mop, or cloth, with or without subsequent rinsing. Leave the solution in contact with the surfaces for at least 5 min.
Tesis Galicia	Hidrosan Surface (100-, 250-, 500-, and 750-mL bottles, 1-L bottles, and 5-L containers)	1071	–		Bactericide, Fungicide Limited virucidal	- Ethanol 70% - 2-phenoxyethanol 2.10% - Didecyl dimethyl ammonium chloride 0.35% - Excipients	Ready to use (Contact time: 1/5/15 min, depending on required efficacy)	Hydroalcoholic disinfectant for healthcare surfaces	Spray directly onto the surface to be treated. Keep the product in contact with the surface for 1/5/15 min, depending on the desired effect. For very dirty surfaces, clean beforehand. Rub and dry with a clean, sterile cloth. Discard the solution after each use. Do not mix with any other chemical product. Incompatible with oxidising agents, organic matter, anionic detergents, ammonia derivatives, and hypochlorites. Incompatible with chromium, lead, aluminium, tin, zinc, and their alloys.
	Surgisoft (500- and 750-mL bottles, 1-L bottles, 5-, 10-, 20-, and 25-L containers)	1146	–		Bactericide Yeasticide Fungicide Limited virucidal	- Didecyl dimethyl ammonium chloride 0.35% - Excipients	Ready to use (Contact time: 1/5/15 min, depending on required efficacy)	Disinfectant detergent for washable, compatible surfaces in healthcare settings	Spray directly onto the surface to be treated. Apply by rubbing with a damp cloth or wipe soaked with a solution, or apply without rubbing. Leave on the surface for 1, 5, or 15 min, depending on the desired effect.
	Optysan (5-L container)	1241	–		Bactericide Yeasticide Fungicide Total virucide	- Benzalkonium chloride: 5% - Didecyldimethylammonium chloride: 5%	Dilution: 1.50–5% Bactericide, yeasticide: 1.50% 5 min Fungicide, virucide: 5% 15 min	Concentrated disinfectant for compatible surfaces in healthcare environments with indirect contact with patients	Apply diluted in water using a sterile mop or cloth. Rinse with clean potable water using the double bucket technique. Dry with a sterile flat mop, mop or cloth.
	Surgisan RTU (bottles with cap or spray container: 500 and 750 mL, bottle with cap: 1- and 1.5-L, 5-L container)	1519	–		Bactericide Yeasticide Fungicide Limited virucidal	- Didecyldimethylammonium chloride: 0.44% - Isopropyl alcohol: 4.06%	Ready to use Bactericide, yeasticide, virucide: 5 min Fungicide: 15 min	Disinfectant for compatible surfaces in healthcare environments with indirect patient contact	Spray the product evenly (30–40 mL/m^2) onto the surface at room temperature, ensuring that it is thoroughly moist. Allow to air dry or remove excess with a sterile mop or cloth according to the specified contact times.
	Surgisan Q (bottle with cap: 1- and 1.5-L, 5-L container)	1520	–		Bactericide Yeasticide Fungicide Limited virucidal	- Didecyldimethylammonium chloride: 2.54% - Isopropyl alcohol: 4.30%	Dilution: 15–20% Bactericide and yeast killer: 15% 5 min Virucide: 20%, 5 min	Concentrated disinfectant for compatible surfaces in healthcare environments with indirect contact with	Apply diluted in water using a sterile mop or cloth. Rinse with clean potable water using the double bucket technique. Dry with a sterile flat mop,

Vesismin	NDP Air Conditioning Plus (10-L container)	469	–	Bactericide Fungicide Limited virucidal	- Didecyldimethylammonium chloride 70%: 0.46% - 2-Phenoxyethanol 0.10% - Cinnamaldehyde 0.02% - Excipients	Ready to use Bactericide: 5 min Fungicide: 15 min Virucide: 1–15 min	patients Disinfection of surfaces by air (fogging), contact surfaces (direct application), and air conditioning equipment and ducts (including in hospitals)	mop or cloth. Surface disinfection: Apply the product to the surface using a cloth to ensure thorough coverage. Leave for 5–15 min, then rinse. Environmental disinfection: by microdiffusion or fogging. Apply 1 L for every 150 m3 to be disinfected. A safety period of 3 h is recommended, with no people present. The area should be adequately ventilated prior to entry. Air conditioning disinfection: 1) Cleaning: fan units, ducts, supply grills, return grills, and condensate tray. 2) Disinfection - Ducts: 9 L/150 m^2, every 3 months between applications - Filters: the optimum application is 300–500 mL per m^2 of filter every 1–3 months. - Air conditioners: amount according to the surface area of the machines until they are completely soaked, every 3 months. 3) Ventilation: after applying the product, introduce clean air and start up the ventilation system, recycling clean air for 1 h. EDS, European disinfectant standard.

Table 4
Biocidal products authorised for sale prior to their registration in the Official Register of Biocides.

Company responsible for marketing	Product name	EDS number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
Americo Govantes Burguete (marketing permitted until 13 October, 2024)	Desintop SF (10-L container)	94	–		Bactericide Fungicide	- Glutaraldehyde 2% - Solvents and excipients	Ready to use	Airborne disinfectant for critical surfaces in healthcare settings	Apply undiluted using the electrothermal microdiffuser when no people are present. Apply at a rate of 10 min per 100 m^3. Safety period: 24 h (ventilate the disinfected area after use)
Aquactiva Solutions Keep windows and doors closed during fogging and contact time (60 min) Ventilate the room and re-enter without waiting for a safety interval. Recommended amount: 2 L/ 100 m^3	Aquactiva Protect FOG (clinical setting) (5-, 10-, and 20-L containers)	1382	–		Bactericide Yeasticide Fungicide Limited virucidal	- Sodium chloride 0.10% - Hypochlorous acid 0.03% - Water 99.87% Active ingredient: Active chlorine generated from hypochlorous acid	Ready to use	Clinical surface disinfectant for aerial application via cold fogging	Environmental disinfection by fogging: apply the solution using a ULV cold fogger H05, H10, or H15 in mode 2–3 (droplet size <25 µm) to obtain a dry mist.
	Aquactiva Protect (healthcare/ clinical setting) (1-L spray bottles, 5-, 10-, and 20-L containers)	1379	Ready to use Bactericide, yeasticide: 5 min Virucide: 1 min Fungicide: 30 min	Clinical surface disinfectant	Contact disinfection: Spray or cloth disinfection: apply evenly over the entire surface and on clean objects until a uniform, moist film is formed.				
Spray or wipe the entire surface with a mop/cloth, then allow to act until the required efficacy is achieved. No rinsing required									
Comercial Noble	Nieves N Clinic-81 (5-L container)	895	–		Bactericide Fungicide	- Sodium hypochlorite (active chlorine) 5.52% - Excipients	Dilution: Bactericide: 0.50–1% 5 min (1–2% in dirty conditions) Fungicide: 0.50–1% 15 min (1–5% in dirty conditions)	Disinfectant detergent for surfaces in healthcare settings that are resistant to sodium hypochlorite	Surface disinfection: 1. Clean the area to be disinfected beforehand. 2. Prepare an aqueous solution suitable for the area to be treated. Use this solution only once. 3. Moisten a sterile cloth with the solution and clean

Table 4 (*continued*)

Company responsible for marketing	Product name	EDS number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
									the walls from top to bottom. Then clean the horizontal surfaces. Finish by mopping the floors using the double-bucket technique. Mop in a zig-zag pattern, ensuring that the surfaces stay wet for at least 15 min. Leave to dry without rinsing. Apply when no people are present. Safety period: 3 h (ventilate the disinfected area after use).
Diversey España	Oxivir Excel H + (5-L container)	911	–		Bactericide Yeasticide Total virucide	- Hydrogen peroxide: 7.20% - Alkylbenzenesulfonic acid 19.40% - Excipients	Dilution: Bactericide and yeast killer: 1.50% 5 min Virucide: 2%, 5 min	Disinfectant detergent for disinfecting hard surfaces in hospital environments	Disinfection with a cloth and a bucket: 1. Remove loose dirt. 2. Apply the product to the surface 3. Leave the product for the required contact time.
	Oxivir Excel Foam H + (750-mL spray bottle)	914	–		Bactericide Yeasticide Total virucide	- Hydrogen peroxide 0.36% - Excipients	Ready to use Bactericide and yeasticide, 5 min Virucide, 30 s	Detergent-disinfectant for surfaces and noninvasive medical devices	1. Remove loose dirt. 2. Apply to surfaces using a clean cloth and wipe the surface, or spray directly onto the surfaces. 3. After the required contact time, wipe again with a cloth or leave to air dry.
	Tasky Sprint H-100 (5-L container)	482	–		Bactericide Fungicide Limited virucidal Sporicide	- Sodium hypochlorite - C12–14 alkyl dimethylamines - N-oxides	Dilution: - Low/medium risk areas; 2–4 pumps (60–120 mL) in 10 L of water - Critical areas: 4–8 pumps (120–240 mL) in 10 L of water For fungicidal/virucidal activity, increase the amount to 5% (4450 ppm Cl_2)	Chlorinated detergent-disinfectant for healthcare surfaces	Use a clean or sterile mop, cloth, or wipe using the 'double bucket' technique. Dilute the product according to the recommended amount to be applied. First, completely saturate the surface with the contents of the first bucket. Wring out the cleaning material. Second, disinfect the surface using the contents of the second bucket. Ensure that the surface stays wet for at least 15 min. No rinsing required.
Ecolab Hispano Portuguesa	Instrunet Aseptanios AD (5-L container)	944	–		Bactericide Fungicide Virucide Sporicide	- Stabilised solution of peracetic acid (±1200 ppm) and hydrogen peroxide	Ready to use 7 mL/m3	Hot-air disinfectant for routine disinfection of facilities.	Apply by thermal fogging at 55 °C. 1. Insert the bottle into the Aerosept 500 2. Place in the corner of a previously cleaned room

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Table 4 (*continued*)

Company responsible for marketing	Product name	EDS number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
									3. Adjust the settings by calculating the volume to be treated 4. Activate the equipment and leave the room 5. Wear an FFP3 mask to enter the room and ventilate before using it again
Jose Collado	Daroclor-80 (5-L container with optional dispensing valve)	48	5-L container with dispensing valve		Bactericide Fungicide Yeasticide Limited virucidal Sporicide	- 80 g/L of available chlorine - Excipients	Dilution: Bactericide: 1–2% 5 min Yeasticide and fungicide: 1% 15 min Virucide: 3%, 15 min Sporicide: 1% 30–60 min	Detergent-disinfectant for surfaces in critical areas	Dilute 50–300 mL (2–12 pumps) in 10 L of water. Apply using a bucket/double bucket system, or by manually scrubbing with a sterile cloth or pre-soaked mop.
	F-66 SR (5-L container)	620	5-L container		Bactericide Fungicide Limited virucidal Sporicide Mycobactericide	- Hydrogen peroxide 8% - Excipients	Ready to use. Set 18 min (Aeroturbex)/ 36 min (Nouvair) per 100 m^3 to be treated (if using several devices, divide the total time between them).	Cold airborne disinfectant for routine disinfection of facilities.	Apply with the Aeroturbex molecular and pneumatic microdiffuser (large volumes) or the Nouvair (small volumes), when no people are present. Safety period: 3 h.
	R-410 (10-L container)	42	10-L container		Bactericide	- Chlorocresol 0.50% - Excipients	Ready to use. Set 10 min for every 100 m^3 to be treated in Aerobrumer (if using several devices, divide the total time between them).	Airborne disinfectant for routine disinfection of facilities	Apply using the H-type Aerobrumer thermomicrodiffuser in dry aerosol form when no people are present. Safety period: 3 h
	Terminal Forte SR 5-L container (A) + booster (B)	619	5-L container		Bactericide Fungicide Yeasticide Sporicide, Mycobactericide Limited virucidal	- Solution A: 8.50% hydrogen peroxide, 10.50% isopropyl alcohol, excipients. - Solution B: 5% peracetic acid, 20% hydrogen peroxide, 10% acetic acid, excipients. Mixture A + B: hydrogen peroxide 9%, peracetic acid 0.25%, excipients.	Ready to use. Set 18 min (Aeroturbex)/ 36 min (Nouvair) per 100 m^3 to be treated (if using several devices, divide the total time between them).	Cold airborne disinfectant for routine disinfection of facilities.	Mix A + B and apply with the Aeroturbex molecular and pneumatic microdiffuser (large volumes) or the Nouvair (small volumes), when no people are present. Safety period: 4 h. Stability of activated mixture A + B: 30 days
	Total Shock SF (10-L container)	613	10-L container		Bactericide Fungicide Total virucide	- Glutaraldehyde 2.50% - Excipients	Ready to use. Set 12 min for every 100 m^3 to be treated with the Aerobrumer (if using several devices, divide the total time between them).	Hot-air disinfectant for routine disinfection of facilities.	Apply using the H-type Aerobrumer thermomicrodiffuser in dry aerosol form when no people are present. Safety period: 6 h
	Total Shock SR (Nouvair: 2-L container/ Aeroturbex: 10-L container)	532	2- and 10-L container		Bactericide Fungicide	- Glutaraldehyde 2.50% - Excipients	Ready to use. Set 12 min (Aeroturbex)/ 24 min (Nouvair) for every 100 m^3 to be treated (if	Cold airborne disinfectant for routine disinfection of facilities.	Apply with the Aeroturbex molecular and pneumatic microdiffuser (large volumes) or the Nouvair (small

Table 4 (*continued*)

Company responsible for marketing	Product name	EDS number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
							using several devices, divide the total time between them).		volumes), when no people are present. Safety period: 12 h
Laboratorios Bilper	Bacterisan Clorado (5-L container)	784	–		Bactericide Fungicide Virucide	- Hypochlorite 5% (60 g/L active chlorine) - Sodium hydroxide 2.50% - Dimethylmyristylamine oxide - Solvents and excipients	Dilution: 5% (50 mL/L)	Chlorinated detergent-disinfectant for healthcare surfaces	Dilute with water, then apply manually and by spraying, using a sterile cloth, mop or flat mop to ensure that the product is spread evenly. Leave to dry (no rinsing required).
Laboratorios Vaza	Visclean hypochlorous (500-mL spray bottle)	1340	–		Bactericidal Yeasticidal Limited virucidal	- Active chlorine released from hypochlorous acid by electrolysis 0.02% - Excipients	Ready to use	Hospital surface disinfectant	Apply using a trigger sprayer or electrostatic sprayer with a capacity of up to 1-L or apply the pure product using a cloth according to the recommended contact times. Thorough cleaning must be carried out before applying the product. Rinse treated or exposed surfaces that will come into contact with people with drinking water. Ensure adequate ventilation after carrying out the disinfection treatment. Do not mix with other chemicals. Incompatible with strong acids and bases
Prominent Chemical	Net Clor (1-L container, 5-L container)	981	–		Bactericide Fungicide	- Sodium hypochlorite (active chlorine): 14% - Excipients	Dilution: Bactericide: 6% 5 min Fungicide: 10% 15 min	Chlorinated surface disinfectant detergent	Contact disinfection: manual (cloth or mop), spraying and immersion with the product diluted in water. Do not mix with any other chemical product. Incompatible with acids, nitrogen compounds, and metals
Químicas Quimxel	Clorsan (1-L container, 5-L container)	787	–		Bactericide Fungicide Virucide Sporicide	- Sodium hypochlorite 5% (50 g/L active chlorine) - Sodium hydroxide 0.35% - Adjuvants and water	Dilution: Bactericide and fungicide: 2%, 5 min Virucide: 1.50%, 15 min Sporicide: 2.50% 60 min 5-L dosing dispenser: 30 mL	Chlorinated detergent-disinfectant for all types of washable surfaces in healthcare settings	Work at room temperature when no people are present. Apply with a mop or cloth in clean or sterile conditions using the 'double bucket' technique and leave for recommended

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Table 4 (*continued*)

Company responsible for marketing	Product name	EDS number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
							Dosing cap for 1 L container: 20 mL		contact time. No rinsing required. Clean beforehand. Do not enter the premises for at least 3 h. Discard the solution after each use.
Proder	Sanit Desinfect (5-L container)	563	–		Bactericide Fungicide Virucide	- Sodium hypochlorite 7% (80 g/L active chlorine) - Sodium hydroxide 1% - Surfactants and sequestrants	Dilution: 0.25–6.50% depending on required efficacy	Chlorinated detergent-disinfectant for healthcare surfaces	Apply the diluted product with a cloth or mop and leave. No rinsing required.
	Sanit Total DVF (5-L container)	629	–		Bactericide, fungicide, sporicide	- Glutaraldehyde 2.50% - Isopropyl alcohol 5%	Ready to use	Airborne disinfectant for cold fogging of critical and semi-critical areas	Apply undiluted using a FORTEXAIR cold fogger. Start the device and set the cubic metres of the room to be treated on the display. The device will automatically dispense at a rate of 1 L/h. For other cold foggers that operate by time, apply for 12–18 min per 100 m^3. No rinsing required.
S.Q. Futurquimica	Clorosol Gel (5-L container)	577	–		Bactericide Fungicide Yeasticide Total virucide Sporicide	- Sodium hypochlorite 7.50%	Dilution: Bactericide: 3%, 5 min Fungicide: 8% 5 min Yeasticide: 2%, 5 min Virucide: 3%, 15 min Sporicide: 5% 60 min	Chlorinated alkaline detergent-disinfectant for healthcare surfaces	Apply to the surface to be cleaned and disinfected, leave for the recommended contact time, rinse with water. For sporicidal and virucidal action, pre-clean the surface to be disinfected and leave it for the specified time. If using a wet mop system, no rinsing is required.
Soro Global	Clorgel (2- and 5-L containers)	551	–		Bactericide Fungicide Virucide	- Sodium hypochlorite solution 4.18% - Sodium hydroxide <3% - N,N-dimethyltetradecylamine N-oxide <2.50%	Dilution: 2% (20 mL/L)	Chlorinated detergent-disinfectant for floors and sanitary surfaces in clinical settings	Depending on dirt levels, add 50–200 mL to a 10-L bucket of water and spread over the surface to be cleaned with a mop, cloth or brush. The normal temperature for use is 20 °C, but it can be increased to 60 °C without loss of properties.
Suministros Científico Técnicos	Aquagen SDF Clinic (5-L container)	719	–		Bactericide Fungicide	- Sodium hypochlorite 7.80% (active chlorine) - Excipients	Dilution: Bactericide and fungicide: 1% 15 min	Chlorinated disinfectant for washable surfaces in healthcare settings	Dilute 10 mL/L water. Surfaces: apply with a damp cloth and leave for the recommended contact time. Rinse with water and dry. Floors: use a

Table 4 (*continued*)

Company responsible for marketing	Product name	EDS number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
									microfibre mop, rinse with water, and dry. Solution stability: 8 h Apply when no people are present. Safety period: 1 h
Tesis Galicia	Gut-Saniclor (1-L bottles, 5- and 25-L containers)	912	–		Bactericide Fungicide	- Sodium hypochlorite 5.20% - Excipients	Dilution: Bactericide: 3.50% 5 min Fungicide: 3.50% 15 min	Chlorinated disinfectant detergent for compatible surfaces in healthcare settings	Add 35–45 mL per litre of water (3.50–4.50%). Apply with a clean, sterile mop or cloth. Keep the product in contact with the surface for 5–15 min, depending on the desired effect. Pre-clean very dirty surfaces. Leave to dry. No rinsing required. Ventilate adequately. Discard the solution after use
	I-210 (1-L bottles, 5- and 25-L containers)	913	–		Bactericide Fungicide	- Sodium hypochlorite 5.20% - Excipients	Dilution: Bactericide: 3.50% 5 min Fungicide: 3.50% 15 min	Chlorinated disinfectant detergent for compatible surfaces in healthcare settings	Add 35–45 mL per litre of water (3.50–4.50%). Apply with a clean, sterile mop or cloth. Keep the product in contact with the surface for 5–15 min, depending on the desired effect. Pre-clean very dirty surfaces. Leave to dry. No rinsing required. Ventilate adequately. Discard the solution after use.
	APX-S 10 (1-L bottle, 5-L and 25-L container)	942	–		Bactericide Yeasticide Fungicide Limited virucidal	- Peracetic acid 0.95% - Hydrogen peroxide	Dilution: Bactericide: 5% 5 min Yeasticide: 0.50%, 15 min Fungicide: 15% 15 min Virucide: 1%, 5 min	High-level disinfectant for all types of compatible and washable surfaces in healthcare settings	Dilute 50 mL in 1 L of water (5%) at room temperature. Use a clean, sterile mop or cloth to disinfect surfaces. Keep the product in contact with the surface for 5–15 min, depending on the desired effect. Other antimicrobial effects may vary between 100 and 10,000 ppm, with an action time of between 5 and 60 min by direct contact. Pre-clean very dirty surfaces. Ensure adequate ventilation of disinfected areas and do not enter for at least 1 h. Discard the solution after each use.

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Table 4 (*continued*)

Company responsible for marketing	Product name	EDS number	Sterile presentation		Declared efficacy	Composition	Dilution/contact time	Use	Method of use
			Container	Contents					
Vestilab CRC (now Alsico Iberia)	Dec-Spore 300 Plus	940	–		Bactericide Fungicide	- Peroxyacetic acid 5.13% - Hydrogen peroxide 21.70% - Excipients	Dilution 1:200 5–15 min	Disinfection of surfaces in healthcare settings	Prepare the disinfectant solution by adding 100 mL to 20 L of potable water, or use the equivalent dilution (1:200). Apply with a clean, sterile mop or cloth. Keep the product in contact with the surface for 5–15 min, depending on the desired effect. Rinse with sterile water. EDS, European disinfectant standard.

The EN 13697 standard specifies 4 bacteria—*P. aeruginosa, Escherichia coli, S. aureus and E. hirae*—as the minimum spectrum of test microorganisms required to determine bactericidal activity, and 2 fungi—*C. albicans* and *Aspergillus brasiliensis*—to determine fungicidal activity. Yeasticidal activity can also be determined using *C. albicans* alone.

The EN 13624 standard specifies *A. brasiliensis* and *C. albicans* to determine the spectrum of fungicidal activity, and *C. albicans* to determine the spectrum of yeasticidal activity.

The EN 14348 standard specifies 2 microorganisms—*Mycobacterium avium and M. terrae*—to determine mycobactericidal activity, and 1 organism—*M. terrae*—to determine tuberculocidal activity.

In terms of virucidal activity, it is important to consider whether the surface disinfectant has complete or limited virucidal efficacy. Disinfectants are tested according to the EN 14476 standard using 3 viruses: poliovirus type 1, adenovirus type 5, and murine norovirus. If the product demonstrates virucidal efficacy against these 3 viruses, it can claim complete virucidal activity, indicating effectiveness against all types of viruses. However, if the product passes the tests only for norovirus and adenovirus, but not for poliovirus, it can claim limited virucidal activity, meaning it is effective against all enveloped viruses, as well as adenovirus, norovirus, and rotavirus. There is also the option of testing against encapsulated viruses (e.g. vaccinia virus Ankara, human immunodeficiency virus, influenza A virus subtype H1N1 virus), which allows only limited virucidal activity against enveloped viruses to be claimed. According to EN 14476, products with complete, limited, or limited-enveloped virucidal activity are effective against encapsulated viruses, including all Coronaviruses and specifically SARS-CoV-2.

The majority of the authorised or transitional biocidal products reviewed in this study claim bactericidal, virucidal, and fungicidal activity. However, only 20% exhibit mycobactericidal, tuberculocidal, or sporicidal activity, which may restrict the choice of disinfectant or necessitate the use of more than 1 biocidal agent to cover the desired spectrum. Furthermore, when selecting a biocidal agent, it is important to ask the supplier for the relevant efficacy test results in accordance with the UNE-EN standards described, as not all technical data sheets include this information.

Rutala and Weber[12,16] highlight the importance of contact time to ensure the efficacy claimed by the manufacturer and achieve complete surface disinfection. Short contact times ensure that the desired effect is achieved before the product dries or is removed. Contact times must always be shorter than drying times, which depend on the size of the treated surface and the formulation of the product: aqueous solutions and the inclusion of surfactants lengthen drying times, whereas solutions containing alcohol shorten them.

Regarding the method of use, the authors recommend taking the following aspects into account: odour, stability of the concentrate and dilution, solubility, ease of use, availability in different formats, as well as formulations with cleaning properties that allow cleaning and disinfection to be combined in a single step. In this regard, the ready-to-use biocidal agents reviewed in this study facilitate proper application, while those with claimed additional detergent action alongside disinfectant activity allow the use of supplementary products to be avoided when dirt levels are not excessive. However, it should be noted that when dirt levels are excessive, cleaning is always required prior to disinfection, as the presence of organic matter can chemically inhibit the full effectiveness of the disinfectant.

When purchasing a biocidal agent, users should also consider the training and technical support offered by the supplier, as well as the total costs—both direct and indirect (including reduction of nosocomial infections)—and the potential for standardisation. The fewer different formulations that are available at the centre, the lower the risk of confusion and the more likely it is that the manufacturer's instructions will be followed.

A limitation of this study is that safety was not taken into account as a key factor when selecting the ideal surface disinfectant. Therefore, readers should consult the product safety data sheet and choose products that are as safe as possible for users, patients, and visitors, have the lowest possible flammability, require the least amount of personal protective equipment for handling purposes, and are fully compatible with the surfaces to be disinfected.

Despite the large number of authorised, approved, or transitional biocidal agents, selecting the most suitable surface disinfectant is not simple, as not all of them comply with all the aspects mentioned in this review. For this reason, it is recommended to prioritise aspects related to efficacy, safety, and ease of use. The selection process should also be accompanied by the implementation of optimised programmes aimed at reducing the transmission of pathogens from surfaces to patients and healthcare staff.

Ethical responsibilities

All named authors have followed the instructions for submitting manuscripts and have met the requirements for authorship and ethical responsibilities. They also declare that they have no conflicts of interest.

All signatories accept their responsibilities as defined by the International Committee of Medical Journal Editors (available at http://www.icmje.org/ and in *Farmacia Hospitalaria*).

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Isabel Romero Crespo: Writing – original draft, Validation, Supervision, Methodology, Formal analysis. **Maria Luisa Gaspar Carreño:** Writing – original draft, Validation, Supervision, Project administration, Methodology, Data curation. **Maria Cristina Muñoz Contreras:** Validation, Methodology, Conceptualisation.

Conflicts of interest

None declared.

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