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World Information

Relevance of UV disinfection methods for hospital hygiene

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Background

Approximately 400,000 to 600,000 nosocomial infections occur every year in Germany alone(1). These figures illustrate that the prevention of nosocomial infections is enormously important when it comes to patient care in hospitals. The transmission of and infection with bacteria, fungi, viruses and parasites can occur in various ways. In addition to hand and skin contact, contaminated surfaces or medical devices are also potential causes of transmission, as are contaminated drinking water and pathogens in the air. Efficient and reliably effective disinfection methods are key to the successful prevention of hospital-acquired infections, one example of which that damages microorganisms is irradiation with ultraviolet light (UV). The effectiveness of UV-C radiation in preventing microbial growth, in addition to eradicating and reducing the persistence of microorganisms was first discovered in 1877 and has been described and proven many times since(2,3). UV-C disinfection works by damaging the genetic material of microorganisms using high-energy and short-wavelength radiation of 254 nm using, e.g. a low-pressure mercury lamp(4). The further away the irradiated surface is from the light source, the less effective the disinfection and thus the damage to the potentially pathogenic agents(5). Essentially, the irradiation time and intensity must be sufficient to achieve the desired result. However, microorganisms react with varying degrees of sensitivity to UV-C radiation(6).

Fig 1: UV Disinfection System SEPALIGHT

Effectiveness and benefits of disinfection using UV radiation and possible in-hospital uses

UV radiation can be used in hospitals to disinfect surfaces and indoor air, as well as in the treatment of drinking water and wastewater systems(3). More specifically, UV-C disinfection has become an established method for the treatment and disinfection of drinking water(7,8). One advantage of the UV disinfection of drinking water compared to chemical disinfection is that it does not alter the taste or odour of the water. Further, the microorganisms in the water do not build up resistance to UV radiation. Meanwhile, UV-C radiation is also used as a disinfection method in dialysis water or in the wetted parts of dialysis machines. Concerning whether to apply UV disinfection to central ait handling units or mobile air purifiers, there are certain factors that must be carefully considered to achieve the desired disinfection performance: the specific parameters of the room size, irradiation inensity, flow velocity and, above all, the dwell time of the air. UV disinfection of the air has not yet become established in the hospital sector, compared to filtration via HEPA filters. Yet, the use of UV-C rays to disinfect surfaces has become more important. High-energy UV-C radiation not only damages potentially pathogenic germs, but exposure to UV-C radiation can also be harmful to humans, causing considerable damage to the eyes and skin. All UV rays have been classified as carcinogenic;(9) for this reason, UV disinfection processes may only be conducted if human exposure can be eliminated. One study showed a significant reduction in the number of germs on computer keyboards in patient rooms following UV-C irradiation(10). Other studies report positive effects associated with disinfectants and UV use, showing a reduction in the incidences of *Clostridioides difficile* and vancomycin-resistant *Enterococci* (VRE)(11,12).In some hospitals, autonomous UV disinfection robots are used to disinfect surfaces.

Practical use of UV surface disinfection in hospitals

Some especially important factors for ensuring successful disinfection include correct exposure times and radiation intensity, in addition to the deep cleaning process required beforehand(13). Troublesome 'shadow-forming' objects may prevent the disinfection of surfaces behind them. The varying exposure times for different microorganisms render it difficult to generalise about duration and intensity. Manufacturers specify periods between 10 and 20 minutes per room for complete disinfection.

Controlled studies on the prevention of nosocomial infections are not yet available. A UV-C system used in Switzerland as one measure for containing an outbreak of VRE was shown to have likely helped end the outbreak(5). However, it is not possible to evaluate the individual impact of UV irradiation when it is one of many hygiene measures. UV disinfection robots are always an extra measure, adopted in addition to standard room reprocessing, and they require a small number of personnel to perform the disinfection procedure. In addition, the lay-out of rooms must be recorded, or 'learned', prior to commissioning, and this process must be repeated after repositioning furniture, etc. The robot can only operate fully autonomously if the paths to the sites of operation are completely barrier-free. As such, safety features must be in place when using the robot to prevent human exposure(12). UV disinfection robots are particularly useful in sensitive areas,

such as intensive care units, operation rooms and canteens/kitchens. A field study in a dialysis unit showed that it is important to implement a cleaning step before UV application for disinfection to ensure a similar outcome as standard disinfection with an impregnated wipe(13). In response, some criteria must be considered when selecting a suitable location and the desired effect when using a UV device. These criteria include accessibility to the location, time windows during which the room will be unoccupied, the provision of additional safety measures if someone enters the room, positioning in the room or in the ventilation system and an indication of the rooms in which UV-C disinfection would be most effective. Before disinfecting with UV-C radiation, physical cleaning measures must be conducted to remove any dirt and debris, so the microorganisms are exposed and can be reached by the UV rays. As an additional safety measure for surfaces in extremely sensitive areas, such as intensive care units and surgeries where it is particularly important to minimise the number of germs, or when disinfecting water or air, UV disinfection can help to reduce germs and therefore prevent infection. As yet, there is little research on the effects of radiation on materials exposed to UV-C radiation when disinfecting surfaces. It is therefore not yet possible to determine whether frequent treatment with UV radiation causes faster wear and tear on surfaces.

Summary and key factors for successful use of UV radiation in hospitals

In conclusion, it can be said that in some high-risk areas, such as the dialysis unit, UV disinfection methods have already been in use for years; yet, there are no recommendations or guidelines from national or international agencies or medical associations regarding the use of UV disinfection as the sole method for preventing the transmission of infectious diseases. Although the efficacy of the method in damaging microorganisms is undisputed, there are still few findings or studies providing evidence that the method reduces hospital-acquired infections, especially compared with other established methods of cleaning and disinfection. It should also be noted that the durability of UV lamps and the relevant maintenance and servicing cycles would need to be considered. Before a decision is made to invest in a UV-C system, it is important to define its exact purpose and desired benefit, as well as how it relates to the other infection prevention measures in place. Ask yourself the following questions: Where and when would the machine be used? Which rooms would be available for the disinfection process and when? Isolation rooms? Intensive care units? Surgeries? What other benefits am I expecting from this system with regard to improving infection prevention? Will this system help me conserve resources and therefore possibly relieve the pressure on some departments? How will the introduction of a new form of technology affect the motivation of the staff who will be responsible for its operation? What documents/validation data am I expecting from the manufacturer, such as proof of efficacy, for example, pursuant to DIN EN 17272 (see HosCom 2024 vol.21 no.2) or field studies from other hospitals/departments? What does the manufacturer recommend for validation in the field? Is there support or training available for validation? Who will be responsible for the machine when it comes to validating its efficacy, maintenance and servicing, storage and updating the programmed rooms and spaces? What costs will be incurred in the operation of the machine and who will bear them? Who will be responsible for using the machine? It is important to clarify whether use of the machine will be organised by staff from the cleaning team, the hygiene department or the ward and which of these departments will be responsible for operating it. Sufficient resources must then be made available to these departments and staff must be trained accordingly(3).

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日本語要約

医療施設の環境衛生における紫外線照射の有効性

国際機関等からは、紫外線照射を推奨するようなガイドラインは出されていないものの、透析部門など一部の病棟で長らく使用されてきた。ある研究では、UV-C照射後にパソコンのキーボード上での細菌数が大幅に減少したと報告されている。他の研究でも肯定的な効果が示されており、*C.difficile* やVREの減少について言及されている。なかでも、微生物の数を最小限に抑えることが重要な集中治療室や手術室などの環境表面に対し、追加措置として紫外線照射を用いることが有効といえる。重要なポイントは、事前の徹底的な清掃、光を遮る物体を排除し、適切な照射時間と照度を保つ事だ。必要な照射時間は微生物によって異なるが、10～20分間の使用を推奨する機器が多い。しかしながら、これは人の目や皮膚に損傷を引き起こすため、人体への曝露がない環境下でのみ使用が可能である。導入にあたっては、次の点を主に考慮する必要がある。①いつどこで使用されるか ②コスト削減や業務の効率化など、いかなる付加価値があるか ③メーカーはどのような有効性を示しているか ④メンテナンスや、運用責任者は誰か。これらを検討し、必要なリソースを確保した上での採用と、その後の適切なトレーニングが重要である。

Case Study

Removing dirt and odors in a Veterinary Hospital with Sanipaster

Doc. Love Dog Animal Hospital

Address : 83/4-6 Chaeng Watthana Rd, Thung Song Hong, Lak Si, Bangkok 10210, Thailand

Doc. Love Dog Animal Hospital, located in Bangkok, has been serving the community for over 23 years. This veterinary hospital provides a wide range of services, including veterinary treatment, surgery, a pet shop, and a pet hotel. Its high level of medical expertise and exceptional cleanliness attract not only local residents but also visitors from distant areas. The hospital is also well-known for its extensive selection of dog and cat food, along with other pet-related products, leading to a loyal clientele that has been returning for many years.

Interviewee	Dr. Paiboon Rungsuriyasilp Owner of the hospital A veterinarian in a private hospital. After that, opened his own hospital for 23 years.
Product in Use	Sanipaster

Steps taken to introduce Sanipaster S(L)

Why did the hospital become interested in using Sanipaster S(L)?

The main issue for our animal hospital was unpleasant odors from pets' bodies, feces, and urine. These odors, caused by bacteria or other pathogens from waste, were noticeable in areas such as examination rooms, operating rooms, pet boarding rooms, recovery rooms, and pet bathing areas. We were drawn to use Sanipaster S(L) because it can be applied to all surfaces, including floors and pet cages. After using it, the bad odors disappeared, leaving a clean and odorless environment, which is important for any animal hospital.

Why did the hospital decide to use this product?

Due to its effectiveness in odor elimination, the absence of harsh chemical smells, and its safety. It also does not cause eye irritation or pose a risk after use. Sanipaster S(L) makes cleaning safe for people and animals that may come into direct contact with chemicals.

After the introduction of the Sanipaster S(L)

What is the feedback from the hospital staff on using Sanipaster S(L) ?

That it stands out from other disinfectants because it can be used everywhere and is safe for all staff, including housekeepers and assistants who are frequently exposed to chemicals. Its disinfecting power, combined with its lack of a strong odor and non-irritating properties, makes it the preferred choice for cleaning.

Interview date: July 19, 2024

How is Sanipaster S(L) recommended for use, and who are the users?

Sanipaster S(L) is used daily for general cleaning purposes. Veterinary assistants apply the product by spraying it on examination tables after each patient, while housekeeping staff use it to mop the floors. The dilution ratio we use is 1:100.

Where is the product used?

It is used in various areas, including examination rooms, operating rooms, recovery rooms, infectious disease rooms, labs, and general spaces. It is also used for cleaning animal cages, especially where there are feces and urine.

How did things change after using Sanipaster S(L)?

There is a greater confidence that we are successfully removing dirt and waste that could cause bad odors, such as feces and urine. The absence of chemical residue that causes eye or nasal irritation adds to the safety of the product.

Next Step

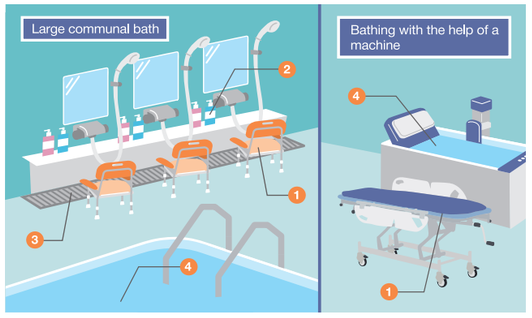
Are there any future plans for improvements in sanitation, including products and training?

We plan to organize training sessions for staff to ensure the proper and safe use of Sanipaster S(L), promoting enhanced hygiene practices in collaboration with our product supplier. Additionally, we are suggesting them to offer the product in a smaller package option so that we can even sell it to our clients.

Infection control in the bathroom

Bathrooms at healthcare and nursing facilities are used by many people. Therefore, it tends to be moist for long periods of time, making it an environment conducive to the proliferation of gram-negative bacteria and mold[1,2]. Furthermore, dead skin cells and sebum washed away from body may remain on the environmental surface, and this dirt and moisture may become a breeding ground for microorganisms. If these microorganisms enter through mucous membranes or wounds through contact or splashing water, they can cause infections in people with weak resistance, such as the elderly. There have been cases in nursing facilities where residents have died after being infected by bathwater contaminated with Legionella, a gram-negative bacteria[3]. In this opportunity, why don't you think about the bathroom hygiene and infection control?

Potential infection risk areas



1 Shower stools and stretchers

The underside of a shower stool tends to stay wet, often overlooked in cleaning, and can easily harbour dirt and molds.[2] In addition, the sponge-like material often used in bath products such as shower stools, wheelchairs and stretchers have a porous structure, making it difficult to clean and disinfect thoroughly, and prone to the proliferation of microorganisms.[1,2,4]

2 Body soap and shampoo

Adding liquid to the bottle may cause the growth of gram-negative bacteria.

3 Drains

Hair, soap scum, and dirt tend to accumulate in drains, and they are difficult to clean and dry. This situation is leading to the proliferation of microorganisms and odors.[2]

4 Bathtubs

Bathtubs with uneven surfaces or structures are difficult to clean and disinfect, and are prone to slime formation and the proliferation of *Legionella*[4].

Hygiene and infection control methods

Here are some examples of hygiene and infection control methods for bathrooms. Please take into consideration the characteristics of the bathroom in your facility and carry out appropriate management.

Daily environmental maintenance

Clean the bathroom floors, walls, and other environmental surfaces every day using detergents and cleaning tools[1, 5, 6]. The fat components of soap react with the metal in tap water or sebum, and adhere to the environmental surfaces. The longer they are left, the harder they become to remove, so be sure to clean frequently[2]. To prevent the proliferation and establishment of microorganisms, be careful not to leave any slime behind when cleaning[3,4,6]. It has been reported that brush cleaning with detergents is effective for removing slime during daily cleaning[4]. Amphoteric surfactants that can be used for cleaning and disinfection are recommended[2]. When the last use of the day is completed, remove dirt from the drain and clean it[1]. Regular ventilation and drying of the bathroom are also important to prevent the proliferation of microorganisms. If ventilation is difficult, use a dry towel to wipe off the water after cleaning[2].

Bathwater management

In Japan, bathwater is disinfected with chlorine-based chemicals, and the residual chlorine concentration in the bathwater is usually kept at about 0.4 mg/L[3-5]. The bathwater should always be kept full in a bathtub, to allow overflowing hot water to wash away any floating debris on the surface. As a general rule, the bathwater should be drained, cleaned, and replaced every day after use.

Item management

Body soap and shampoo should be disposable. If refilled, the bottles should be washed and dried, and managed appropriately. Bath products such as shower stools/wheelchairs and stretchers should avoid sponge-like materials[1,2], and after use, they should be washed, disinfected, and dried with a cleaning agent[1]. Keep the number of items in the bathroom to a minimum to allow undisturbed cleaning and drying[2].

Beware of slimy "biofilms" in the bathroom

Biofilm is slimy substance formed when microorganisms and extracellular substances such as glycoproteins attach to solid surfaces[7,8]. The attached microorganisms begin to grow on the solid surface, forming microcolonies of several cells that grow further to form biofilms. The pink slimy substance in bathrooms and other wet areas is biofilm[8,9,10]. It is formed by bacteria such as *Serratia*, *Methylobacterium*, and yeast called *Rhodotorula*[11,12]. In addition, various microorganisms such as *Legionella*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* form biofilms[8,10]. Physical cleaning such as brush cleaning is said to be effective for cleaning and removing biofilms, and chemical cleaning using alkaline cleaning agents, especially sodium hypochlorite solution with high bactericidal efficacy, and surfactants is also recommended[9].

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For hygiene and infection control in the bathroom

Sanipaster

18kg B.I.B. (Eco-Friendly, Volume-reduction bottle) | 5kg (Eco-Friendly, Volume-reduction bottle) | 480mL with pump

Squeeze bottle 600mL (Empty bottle) | 500m L Foam Spray bottle (Empty bottle, Foam)

Saraya Foaming Zia Cleaner

9kg B.I.B. (Eco-Friendly, Volume-reduction bottle) | 4.8kg (Eco-Friendly, Volume-reduction bottle) | 500m L Foam Spray bottle (Empty bottle, Foam)

For daily bathroom cleaning

- **Excellent detergency**
  Excellent detergency against various types of dirt.
- **Excellent bactericidal effect**
  Quaternary ammonium salts provide excellent bactericidal effect. Show a wide antibacterial spectrum against both gram-negative and gram-positive bacteria.
- **Bactericidal effect can be expected even in the presence of organic contamination.**
  Even when proteinaceous dirt coexists, there is no significant decrease in bactericidal effect.
- **Low corrosivity to metals**
- **Almost odorless**

For removing dirt and mold from the bathroom

- **Rich foam wraps dirt, effectively disinfecting and bleaching it**
- **No dilution required, ready to use whenever needed**
  Just fill the undiluted solution directly into a dedicated spray bottle and you can use it.
- **Thick foam can be sprayed precisely on contaminated areas**
  Non-scattering foam wraps the targeted dirt.
  Suitable for: Plastic products, wood/bamboo products, glass products, ceramics, stainless steel products
  Not suitable for: Metal containers/utensils such as copper/aluminum, lacquerware, colored/printed textile products, brushes made from animal hair, melamine tableware, marble, products and places that cannot be washed with water

Bathroom Cleaning Manual

Products

Sanipaster

Dilute the solution with water before use.
(Example of diluting 50 times in a dedicated spray bottle).

Measure out 10mL of the solution.

Pour the solution into a dedicated spray bottle and pour water up to the top of the bottle.

Saraya Foaming Zia Cleaner

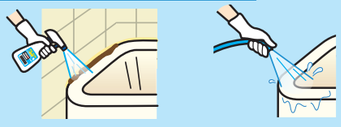
Pour the undiluted solution directly into a dedicated spray bottle.

Cleaning Procedure

Daily cleaning

1. Rinse thoroughly with running water.
2. Spray Sanipaster diluted 50 times onto bathtubs, walls, floors, bath products, etc., then clean with a sponge.
3. Rinse thoroughly with running water and dry or wipe off the water.

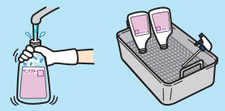
Weekly or occasional cleaning



4. Spray Saraya Foaming Zia Cleaner directly onto the dirt or mold, and leave it for about 5 minutes.
5. Rinse thoroughly with running water and dry or wipe off the water.

Bottle Management

Rinse the bottle thoroughly with water and dry it.



Notice

Be sure to wear gloves.

Be sure to disinfect your hands after cleaning is completed.

The unique matching technology of disinfectants and moisturizers: The development history of Hibiscohol A <2>

Dr. Koji Kihara, SARAYA Co., Ltd.

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Cumulative efficacy of the disinfectant of Hibiscohol A

Hibiscohol A is an alcohol-based, quick-drying hand disinfectant containing chlorhexidine gluconate (CHG), as well as the emollients, diisobutyl adipate (DIBA) and PEG-7 glyceryl cocoate (GC). The outstanding feature of this product is that the emollients (DIBA and GC), which are formulated to reduce roughness on the skin, significantly enhance the bactericidal effect of CHG remaining on the skin after the alcohol in the solution evaporates. Here, we introduce an example study showing that when Hibiscohol A is used frequently, the emollient enhances the bactericidal effect of CHG after the alcohol evaporates.

Hibiscohol A
(Also known as Alsoft Liquid Hand Disinfectant A)

Hibiscohol A was applied to palms contaminated with *Escherichia coli*, and the *E. coli* remaining on the skin was sampled using the glove juice method. Log reduction in the number of bacteria according to the number of applications of the solution was compared with that achieved by an ethanol disinfectant solution containing CHG but not an emollient, CHG-EtOH (Table 1 and Fig. 1).[1] CHG-EtOH tended to decrease the number of viable bacteria after one to five applications. However, there was no significant difference in the reduced bacterial count depending on the number of applications. On the other hand, Hibiscohol A, showed a remarkable decrease of viable bacteria as the number of application increases. This cumulative effect is expected to further enhance the persistent antimicrobial activity of Hibiscohol A over the repeated use in the healthcare settings.

Table 1. Composition of two alcoholic preparations tested

Ingredient	Composition: Hibischol A		Composition: CHG-EtOH	
Ethanol	80	v/v%	80	v/v%
Chlorhexidine digluconate	0.2	w/v%	0.2	w/v/%
Diisobutyl adipate	0.25	w/v%		
PEG-7 glyceryl cocoate	0.1	w/v%		
Allantoin	0.05	w/v%		

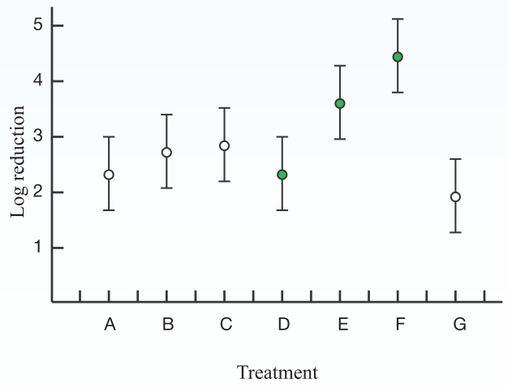

Fig 1. Survival of contaminated *E.coli* on the disinfected hands by the two preparations.

Log reduction = log (total viable bacterial counts contaminated)
-log (viable bacterial counts recover)
A: CHG-EtOH (one disinfection and contaminations)
B: CHG-EtOH (three disinfection and contaminations)
C: CHG-EtOH (five disinfection and contaminations)
D: Hibiscohol A (one disinfection and contaminations)
E: Hibiscohol A (three disinfection and contaminations)
F: Hibiscohol A (five disinfection and contaminations)
G: base line (no disinfection and contaminations)
: 95% confidence interval: ±0.73

Skin moisturizing effect of Hibiscohol A

Frequent use of alcohol-based hand disinfectant among healthcare workers can lead to dryness and roughness of the skin. In general, it is said that rough skin is closely related to the water-holding capacity of the stratum corneum, the most superficial layer of the epidermis.[2] The effect of Hibiscohol A on the water-holding capacity was compared with that of disinfectant ethanol (Solution A); two types of commercially available alcohol-based hand disinfectants, 0.2w/v% benzalkonium chloride preparation (Solution C) and 0.5w/v% povidone-iodine preparation (Solution D); and disinfectant ethanol containing 0.5w/v% CHG (Solution E) (Fig. 2).[3] Hibiscohol A was superior in retaining the water-holding capacity of the stratum corneum compared with Solutions A and E, which do not contain emollient ingredients. From this result, it can be inferred that workers who need to disinfect their hands frequently—particularly healthcare workers—should use a hand disinfectant, such as Hibiscohol A, that retains the high water-holding capacity of the stratum corneum and can significantly reduce rough skin.

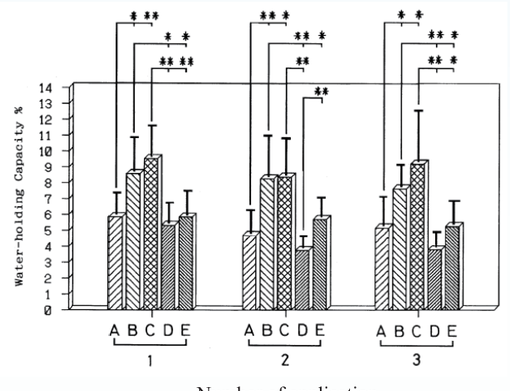

Fig 2. Comparison of Skin Water-holding Capacity after Topical Applications of Various Alcoholic Disinfectants onto the Flexor Surface of the Forearms

A; ehthanol for disinfection
B; Hibiscohol A
C; alcoholic 0.2w/v% benzalkonium chloride
D; alcoholic 0.5w/v% povidone iodine
E; alcoholic 0.5w/v% chlorhexidine.
Bar represent 95% condifence interval. * ; $p<0.05$, ** ; $p<0.01$.

Hibiscohol A patent acquisition

Alcohol-based hand rubs (ABHR) in general are highly convenient as disinfectant that is both fast-acting and quick-drying. However, after the alcohol evaporates, not only does the disinfecting effect disappear, but there is also concern that dry skin can cause rough hands. To solve these problems, ABHR was formulated with antibacterial agents that have a residual effect and emollients to prevent rough skin. However, in many cases, the antibacterial activity of CHG and cationic antibacterial agents is reduced by coexisting organic matter, such as emollients. Therefore, we have been searching for an emollient that prevents rough skin without reducing the antibacterial activity of CHG remaining on the skin after ethanol evaporates. As a result, we have surprisingly discovered that DIBA and GC enhance this antibacterial activity and have obtained patents in the United States and Japan.[4–6] These patents served as the foundation for the subsequent development and expansion of Hibiscohol-related products.

References

1. Taro Furuta, Koji Kihara, Makoto Takechi, Hirofumi Ogase, and Isamu Nagai, "Comparative study of the antimicrobial effect of two alcoholic preparations containing chlorhexidine digluconate on the normal flora and the artificial contaminations of the hands", Antibacterial and Antifungal Agents, 15, 505-510 (1987).
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3. Koji Kihara, Yuji Murata, Taro Furuta, and Nobuhiko Higashi, "Effect of various alcoholic hand disinfectants on water content of skin surface", Skin Research,36(3), 349-353 (1994).
4. Disinfection composition for medical use, US Patent 5017617 (1991).
5. Disinfection composition, Kokoku (examined patent publication) No. 4-33226 (1992).
6. Disinfection composition, Kokoku (examined patent publication) No. 5-63446 (1993).

SARAYA

Liquid Hand Disinfectant A

Alcohol-based, quick-drying hand disinfectant containing chlorhexidine gluconate, and long-lasting effects can be expected

A formula that considers the balance of active ingredients and moisturizers

Alsoft

Alsoft Liquid Hand Disinfectant A

Rapid Acting Hand Disinfectant

Alcohol-based, fragrance-free hand disinfectant, for hand hygiene and surgical disinfection. Alsoft Liquid Hand Disinfectant A contains Ethanol and Chlorhexidine Gluconate for quick-drying disinfection that leaves the skin feeling clean and healthy. Dermatologically tested. Recommended for hand disinfection for users with sensitive skin.

Product Features

Formulation
Quick drying hand disinfectant containing Chlorhexidine gluconate as the active ingredient and ethanol.

Fast-acting antimicrobial agent
- Hygienic handrub within 30 seconds
- Surgical handrub within 3 minutes

Effective against a broad spectrum of microorganisms
Kills most common bacteria and viruses.

Gel-free formula
Does not contain any gelling agents which can cause clogging and leave a sticky after-feel on the skin.

Contains moisturizers
Moisturizers with excellent skin feel (clean and smooth)

Product Data

Composition
- Active ingredients: Chlorhexidine Gluconate 0.2 w/v%
- Inactive ingredients: Solvent, Emollients, Stabilizer

Physical and chemical properties
Appearance: Clear, colorless liquid
Odor: Characteristic (alcohol) odor

Area of Application

- Hygienic hand disinfection
- Surgical hand disinfection

Product Testing

Bactericidal Activity: prEN13727 15s
- *Escherichia coli*
- *Pseudomonas aeruginosa*
- *Staphylococcus aureus*
- *Enterococcus hirae*

Hygienic Handrub: EN 1500 30s
Surgical Handrub: EN 12791 3.0min

Viruses (DVV & RKI Guideline)
- *Vacciniavirus*
- *Bovine viral diarrhea virus* (BVDV)
- *Bovine coronavirus* (BCV) (SARS surrogate)
- *Influenzavirus* Type A (H1N1)
- *Avian Influenzavirus* Type A (H5N1)
- *Herpes-simplex virus* Type 1 (HSV-1)
- *Human immunodeficiency virus* Type 1 (HIV-1)

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