ISSUE 02/2021

DISINFACTS

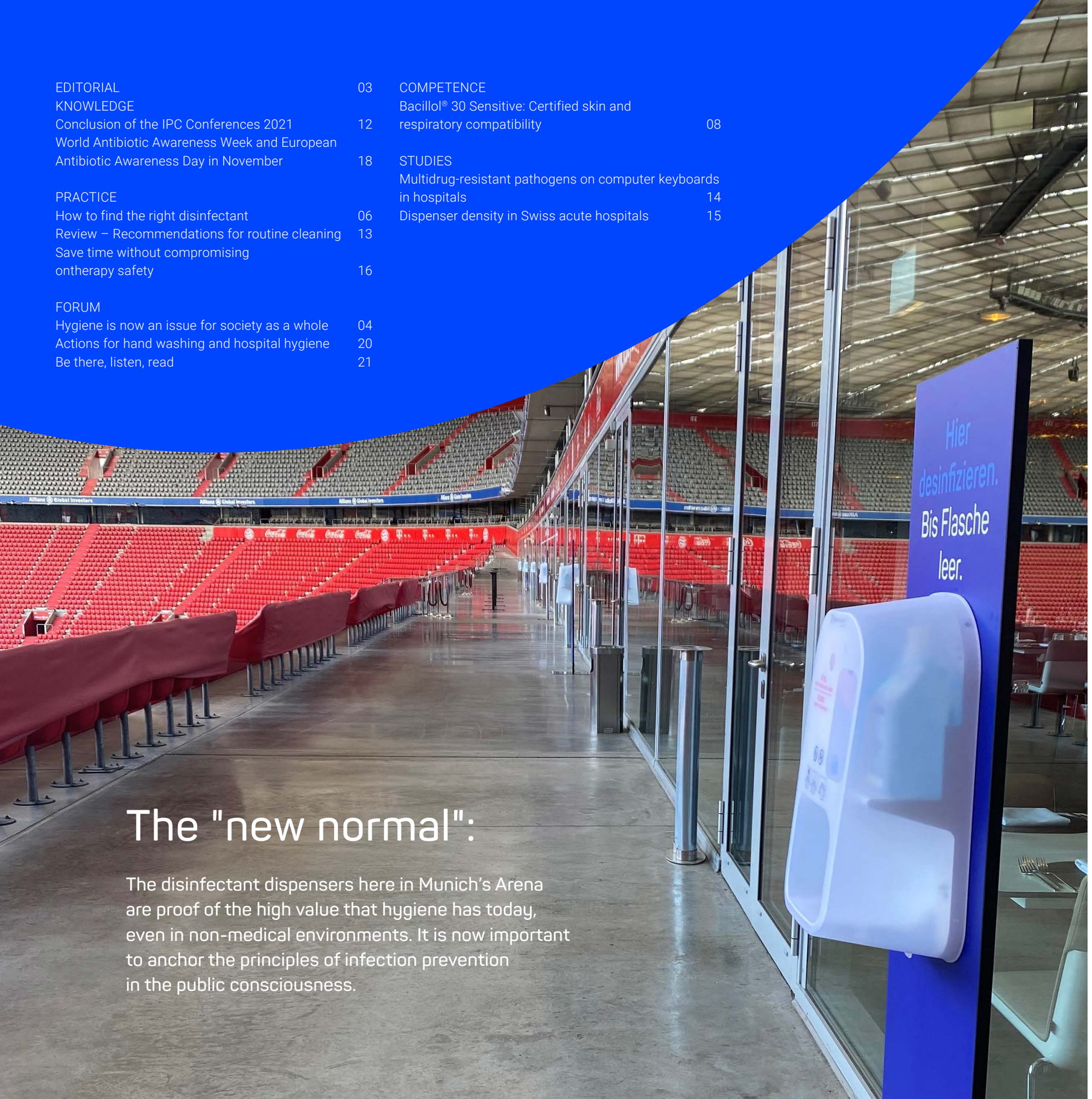
From the clinic to the stadium:

Hygiene is now an issue for the whole society. What's next?

SCIENCE CENTER HARTMANN

Research for infection protection

HARTMANN



The "new normal":

The disinfectant dispensers here in Munich's Arena are proof of the high value that hygiene has today, even in non-medical environments. It is now important to anchor the principles of infection prevention in the public consciousness.

Editorial


Dr. Heide Niesalla


Dr. Henning Mallwitz

Dear reader,

You have probably already had this experience: friends and relatives have started asking you about hygiene. Disinfecting hands, handles and tables is now an issue that is much more present in the private and public spheres. One could also say that hygiene has finally arrived at the core of society! What is still missing in many places is well-founded knowledge and adapted, targeted hygiene concepts. It is now up to us professionals to change this. You will find suggestions for this in this issue of DISINFACTS.

In this context, for example Laura, a colleague from our team of experts in the HARTMANN SCIENCE CENTER, explains how to select the right antimicrobial activity in each case.

We at HARTMANN are also committed to infection prevention with new formats: As part of the "Mission: Infection Prevention" (M: IP®) initiative that we launched in September 2020, there is now a podcast series and a series of events. The new series of events "Safety first – Infection prevention" is aimed at professionals from healthcare facilities. The first event, which took place on 11.11.2021 purely digital and in German only, addressed relevant topics around basic hygiene. As off next year, we will introduce an international format. Stay in touch!

Yours sincerely,

Heide Niesalla

Dr. Heide Niesalla
Head of
HARTMANN SCIENCE CENTER

Henning Mallwitz

Dr. Henning Mallwitz
Director
Research & Development

Hygiene is now an issue for society as a whole

An everyday task for everyone!

Out of the niche: The COVID-19 pandemic has made hygiene a high priority in non-medical environments. It is now a challenge to anchor the principles of infection prevention in the public consciousness.

The Coronavirus pandemic has made hygiene a topic that interests (as it should!) many: sports and concert promoters, theatres, discotheques, restaurants, nightclubs, schools and day-care centres. They all now need a hygiene concept. The most visible sign of the requirements for infection prevention now set by politics and society: in the toilet areas of many venues and public facilities one can find not only soap dispensers but also, increasingly – as in hospitals and medical facilities – disinfectant dispensers.

An example of the extended scope of work of hygiene professionals: Since the start of the current football season, HARTMANN has been the official hygiene partner of the Allianz Arena in Munich. The stadium of Germany's largest football club, which seats more than 70,000 people, was completely equipped with Sterillium® disinfectant dispensers to ensure a safe and hygienic visit to the arena for all spectators. And the dispensers are just the beginning: together with HARTMANN, the arena management is continuously working on a holistic hygiene concept that will offer fans the highest level of safety and hygiene when visiting the stadium.

Bernhard Graf, Vice President Marketing of Paul Hartmann Germany and Jürgen Muth, Managing Director of the Allianz Arena.

The experience gained at this prominent location will be transferable to many venues: they can set an example for the future.

Hygiene at home and in everyday life

The International Scientific Forum on Home Hygiene (IFH) has also taken into account the increased importance of hygiene measures in non-medical environments in the course of the pandemic: Hygiene at home and in everyday life – in the area of "HEDL" (homes and everyday lives) – played a decisive role in containing the Coronavirus pandemic, according to a white paper published by the professional organisation in July [1]. And this HEDL hygiene, considered less important in the past, is of paramount importance in combating future pandemics and the spread of multidrug resistant pathogens. This requires management approaches adapted to the respective circumstances with pragmatic, implementable solutions. The key word here is "targeted hygiene". According to the IFH, the prerequisite for this must be, among other things, the willingness to invest in measures to change hygiene behaviour and to "educate" the public with clear and consistent statements.

Education and well-founded knowledge

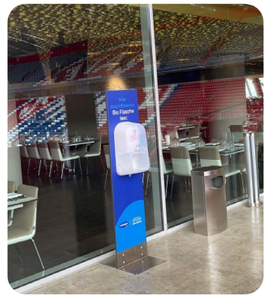
A lot of education is still needed until hygiene becomes a natural part of many. According to a survey published in the same paper in 23 European countries, many people do not know what exactly "hygiene" is and how it differs from "cleanliness". On the occasion of this year's "World Hand Hygiene Day", we at HARTMANN SCIENCE CENTER have, for example, developed an information leaflet that clearly explains to laypersons in which everyday situations disinfecting hands is useful and in which ones washing hands with soap is sufficient [2]. Materials like this one – downloadable and easy to reproduce – help many people on their way to the new post-Coronavirus normality with its ubiquitous hygiene requirements.

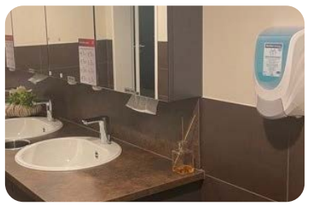
The IFH white paper as PDF.
Click here to download:
ifh-homehygiene.org/review/developing-and-promoting-home-and-everyday-life-hygiene-meet-21st-century-needs-what-can-we

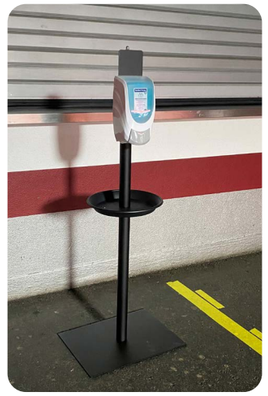
Hygiene knowledge for everyday life:
PDF Hand washing vs. hand disinfection:
bode-science-center.com/fileadmin/user_upload/download-en/2021-Poster-Hand-Washing-Day.pdf

Dispenser location

Preview







Sources:
1. International Scientific Forum on Home Hygiene (IFH). Developing and promoting hygiene in home and everyday life to meet 21st century needs; what can we learn from the COVID-19 pandemic? (Review)
2. HARTMANN SCIENCE CENTER. Infographic (PDF). World Hand Hygiene Day on 5.5.2021. Your focus. Hand washing vs. hand disinfection – which makes the most sense in common everyday situations? (Link: https://www.bode-science-center.com/fileadmin/user_upload/download-en/2021-WHHD-Infographic-Professionals-EN.pdf)

How to find the right disinfectant

Efficacy & co.

Unfortunately, there is no ONE disinfectant for all cases. Many aspects can play a role in choosing one. We will help you find the product that best suits your needs.

Laura Stirnberg,
Expert Infection Prevention
HARTMANN SCIENCE CENTER

The more insight customers give us into their everyday lives and tell us what requirements they have for a disinfectant, the easier it is to work with them to find a suitable product. The pathogen is crucial: is it a virus, a fungus or a bacterium? If you know the pathogen, you don't have to take the 'hammer' straight away and go for the product with the broadest spectrum of activity. And aspects such as exposure time, material compatibility or ease of use should also be taken into account. Basically, it is an interplay of infection and patient protection as well as occupational safety. Of course, the area of application also plays a role: What should be disinfected, the hands, skin, surfaces or instruments? Especially with instruments, it depends on how they have to be reprocessed. Can they be inserted? Do they have to be sterilised?

> "You don't have to take the 'hammer' straight away"

We often receive questions about the virucidal spectrum of action. This is due to the irritating fact that viruses without an envelope are more difficult to inactivate by disinfectants than those with an envelope. These envelopes offer viruses many advantages. But when it comes to disinfection, they are a weak point. There is also often some confusion about sporicides. It is easy to think of fungal spores. In fact, sporicidal disinfectants refer exclusively to spore-forming bacteria. Fungicidal agents are recommended for fungal spores.

Classification according to pathogens: the spectrum of activity of disinfectants

fungicidal
against all fungi and fungal spores: Dermatophytes, moulds & yeasts

yeasticidal
against yeasts, e.g. *Candida albicans*

virucidal
against all viruses (enveloped and non-enveloped viruses!): e.g., SARS-CoV-2, HIV, polioviruses, adenoviruses, noroviruses and rotaviruses

limited spectrum of virucidal activity
against all enveloped viruses; plus: non-enveloped adeno-viruses, noroviruses and rotaviruses

Virucidal against enveloped viruses
against all enveloped viruses, e.g., SARS-CoV-2

bactericidal
against all bacteria, except mycobacteria

myco-bactericidal
against all mycobacteria

tuberculocidal
against *Mycobacterium tuberculosis*

sporicidal
against bacteria spores (not fungal spores!)

sporicidal against *Clostridioides difficile*

The extensively tested effectiveness of BODE/HARTMANN disinfectants also covers multi-resistant organisms (MRO). Resistance in such cases refers to antibiotics, not disinfectants.

Selection criteria for disinfectants:

Spectrum of activity:
- depending on target organism
- according to classification of the medical device (non-critical, semi-critical, critical)
- according to risk assessment

Other aspects:
- odour
- exposure time
- efficiency
- toxicity/protective measures
- ease of application
- skin compatibility
- material compatibility
- biodegradability

Approval:
- products must be approved or registered for the respective application (for hands, skin, surfaces or instruments)
- approval as a medicinal product, biocide, medical device, cosmetic product

Any questions?

Your tried and tested service, under a new name: The experts of the HARTMANN SCIENCE CENTER will advise you on all matters relating to hygiene and disinfection:

Tel.: +49 (40)-54 00 6 -111
Fax: +49 (40)-54 00 6 - 777
E-Mail: science-center@hartmann.info

You can reach us by phone:
Mon. - Thurs. 8:00 a.m. to 4:30 p.m.
Fri. 8:00 a.m. to 3:00 p.m.

Available as of January 2022*

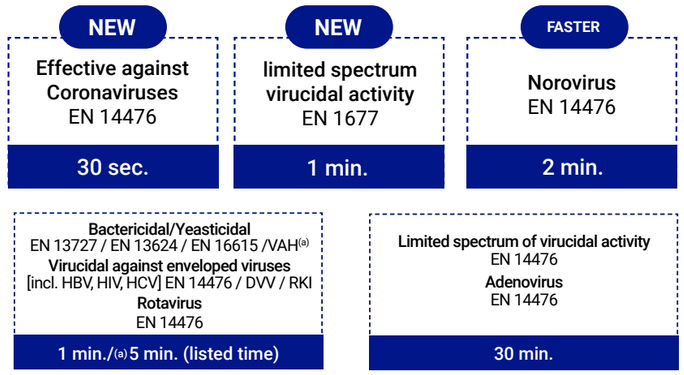
Bacillol® 30 Sensitive: Certified skin and respiratory compatibility

Surface disinfection with more coverage, less residues and improved cleaning performance

The Bacillol® brand has been a success on the market for almost a century with various products aimed at surface disinfection. Since we at HARTMANN are always striving to improve our products, we have listened carefully to our customers and taken their wishes into account. The focus was on the desire for an even more powerful, easy and safe to use product that is at the same time gentle to the skin and the material. The result is Bacillol® 30 Sensitive as a foam and tissues:

- Optimal effectiveness
- Very good coverage per tissue
- Ideal residue behaviour
- Best cleaning performance compared to its competitors.**/***
- First professional surface disinfectant certified for allergy and asthma sufferers and with very good skin compatibility

Fast, safe, convenient:
Bacillol® 30 Sensitive impresses in the practical tests with top effective times against viruses, bacteria and fungi.****



* The release date may vary in different countries and regions. Contact your local distribution partner for more information.
GER, AT, CH, CZ, LU, LT, LV, SI, SK, GB, SE, EE, PL, IE: January onwards (Status Nov. 21); ES, PT, HU, GR, UA: March onwards (Status Nov. 21)

** In the removal of a fat-dust soil, test report WL 2566A/21 of 29.04.2021, "Comparative investigation of the cleaning performance of 14 ready-to-use wet disinfectant wipes", wfk - Institut für Angewandte Forschung GmbH, Krefeld.

*** The tested ready-to-use wet disinfection wipes represent more than 90 % of the value share (as of Q1, 2021) in the German market in the segment of pre-soaked disinfection wipes.

**** Tested with Bacillol 30® Sensitive Tissues according to the latest EN standards for medical surfaces, including the 4-field test (EN 16615)

Optimal efficacy against practice-relevant viruses, bacteria and fungi

Of course, Bacillol® 30 Sensitive has been tested for on the basis of the latest EN standards with regard to the efficacy against various viruses and bacteria. Particular attention was paid to germs that are relevant in health care facilities, but also wherever large numbers of people gather together (e.g., nurseries, kindergartens, schools). In detail, this means that the products are effective against coronaviruses according to EN 14476, limited virucidal also according to the practical test 16777, even faster effective against norovirus according to EN 14476 as well as tuberculocidal and mycobactericidal on the basis of EN 14348.

Gentle on the skin and respiratory tract

Frequent contact with disinfectants, detergents and gloves can trigger skin diseases such as atopic dermatitis. A Dutch study showed that one third of all nurses develop hand eczema within 3 years of starting their training [2]. In Germany, too, work-related skin diseases are among the most common occupational diseases – led by hand eczema at 90 % – and contribute dramatically to absenteeism and incapacity to work [3]. It should not come as a surprise that during the COVID-19 pandemic, hand eczema became a major cause of illness among both health workers and the general population due to intensified hygiene measures [4, 5]. In order to

MIS and classification of Bacillol® 30 Sensitive Tissues and negative and positive control.
0 up to <0.1: non-irritant / very well tolerated, 0.1 up to <0.2: well tolerated, 0.2 up to <0.35: tolerated, 0.35 up to <0.5: less compatible, >0.5: irritant.

	Mean Irritancy Score (MIS)	Classification
Bacillol® 30 Sensitive Tissues	0,01	Non-irritant / very good compatible
Negative control (distilled water)	0,01	Non-irritant / very good compatible
Positive control (0,5 % SDS)	1,17	irritant

confirm its skin and allergy friendliness, Bacillol® 30 Sensitive was subjected to extensive testing. The renowned independent SGS INSTITUT FRESENIUS carried out a semi-occlusive controlled 24-hour skin patch test on 30 test persons (22 with sensitive, 6 with normal and 2 with atopic skin). The result: Bacillol® 30 Sensitive Tissues showed a very good skin tolerance (Mean Irritancy Score = 0.01), which corresponded to the irritation potential of the negative control with distilled water [6]. Therefore, all Bacillol® 30 Sensitive products were awarded the seal "dermatologically tested".

Bacillol® 30 Sensitive ECARF certified: The first professional allergy and asthma friendly surface disinfectant

In addition, Bacillol® 30 Sensitive has been awarded the ECARF Seal of Quality for Allergy and Asthma Friendliness, which is awarded by the independent European Centre for Allergy Research Foundation (ECARF) only after rigorous testing and enjoys international recognition. Skin friendliness was tested on people with atopic dermatitis over a 7-day period. As work-related asthma is the most common occupational lung disease in clinical practice [7], the respiratory tolerance of the aerosols was also tested on subjects with bronchial asthma before and after the use test. Both tissues and foam were described as very good by all test subjects with regard to skin and respiratory tolerance as well as itching and fulfilled all test criteria for awarding the seal. Thus, the risk of developing new allergies through the use of these products is low [8, 9]. As far as local occupational health and safety guidelines allow, Bacillol® 30 Sensitive can therefore be used without gloves without hesitation.

Also awarded the ECARF seal: Sterillium® pure and Bacillol® AF

The skin compatibility of the hand disinfectant Sterillium® pure was examined in an application test according with ECARF guidelines on 21 test persons with atopic dermatitis who disinfected their hands 20 times a day for 7 days. The evaluation was carried out objectively via the TIS score (Three Items Severity Score) and the subjective perception of the test subjects. Sterillium® pure was well tolerated by all test persons without any significant deterioration in the results. Even allergy sufferers can disinfect their hands with Sterillium® pure without hesitation. It is unlikely that they will develop a new allergy as a result of using the product.

Bacillol® AF, the surface disinfectant for comprehensive rapid disinfection in cases of increased risk, has also been awarded the ECARF Seal through extensive testing.

Use disinfectant carefully. Always read label and product information before use. Classification according to Regulation (EC) No. 1272/2008
Bacillol® 30 sensitive: Flammable Liquids Category 3 - H226: Flammable liquid and vapour. Eye Irritation, Category 2 - H319: Causes serious eye irritation.
Bacillol® AF: Flam. Liq.: Flammable Liquids Category 3 - H226: Flammable liquid and vapour. Serious eye damage, Category 1 - H318: Causes serious eye damage. Specific target organ toxicity - single exposure Category 3, central nervous system - H336: May cause drowsiness and dizziness.
Sterillium® pure: Flammable liquids, category 3 - H226: Flammable liquid and vapour. Eye Irritation, Category 2 - H319: Causes serious eye irritation.
Specific target organ toxicity - single exposure, category 3, central nervous system - H336: May cause drowsiness and dizziness. Long-term (Chronic) hazardous to the aquatic environment, Category 3 - H412: Harmful to aquatic life with long lasting effects.

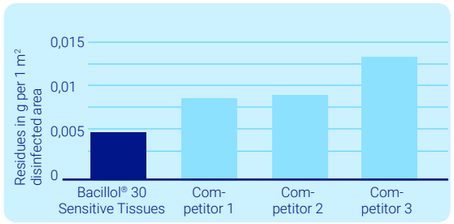
Gentle on surfaces, economical in use

Outstanding material compatibility

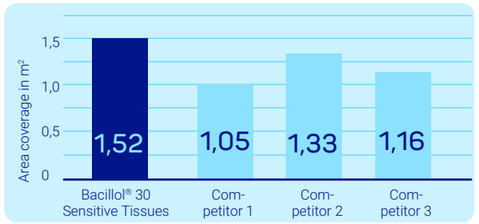
With its patented formula, Bacillol® 30 Sensitive is particularly gentle and effective at the same time. Its excellent material compatibility was confirmed by externally conducted insertion tests and stress crack tests [10].

Focusing on the future – particularly low residues

Bacillol® 30 Sensitive also scores points in terms of environmental impact. The tissues leave the least residues per square metre of disinfected area compared to competitor products – namely only 5 mg/m² [11]. This is made possible by its innovative active formula, which uses 60 % fewer surfactants for high performance.



Average value of a pack of disinfectant wipes



Measured average surface coverage of the tested disinfectant wipes.

Higher performance, fewer tissues used

In addition, the tissues were tested by the German Institutes for Textile and Fibre Research (DITF) with regard to their coverage and compared with commercially available, low alcohol pre-soaked competitor products. Testing at a constant 23 °C and 50 % relative humidity on a continuous surface clearly showed that Bacillol® 30 Sensitive Tissues achieved the highest surface coverage with 1.52 m² per wipe [11]. This means that the same area can be disinfected and cleaned with fewer wipes. In addition, Bacillol® 30 Sensitive showed the best cleaning performance in comparison with various competitor products [1]. **,***

Bacillol® 30 Sensitive thus contributes to the responsible, gentle use of active ingredients with an eye to the future. Its skin and allergy friendliness confirmed by the ECARF Foundation and the SGS INSTITUT FRESENIUS underline the safe use of Bacillol® 30 Sensitive products without gloves. This also saves resources and allows the ever-growing number of particularly sensitive people to use the products at a low risk.

Conclusion: Bacillol® 30 Sensitive Tissues and Foam are not only highly effective and material-compatible, but also particularly allergy-friendly and future-oriented thanks to its maximum coverage and low residues.

** In the removal of a fat-dust soil, test report WL 2566A/21 of 29.04.2021, "Comparative investigation of the cleaning performance of 14 ready-to-use wet disinfectant wipes", wfk - Institut für Angewandte Forschung GmbH, Krefeld.

*** The tested ready-to-use wet disinfection wipes represent more than 90 % of the value share (as of Q1, 2021) in the German market in the segment of pre-soaked disinfection wipes.

Please contact your local HARTMANN representative for more information.

"Bacillol® 30 Sensitive Tissues feel noticeably soft and pleasant to the touch. The skin does not dry out and it leaves no residues at all."

"We are thrilled about its sensitive formula and particularly welcome the dermatological expert opinion."

"The tissue is well soaked and shows a good cleaning and wetting performance. The disinfectant dries quickly and the odour dissipates swiftly."
Gudrun Klein, Kinderland PLUS gGmbH, Poing

Use surface disinfectants carefully. Always read the label and product information before use. Classification according to Regulation (EC) No. 1272/2008: Flammable liquids, Category 3, H226: Flammable liquid and vapour. Eye Irritation, Category 2, H319: Causes serious eye irritation. For further information please refer to the safety data sheets.

Sources:
1. Ophüls A (2021): WL2566A/21. Unpublished report - Data from BODE Chemie GmbH.
2. Visser MJ, Verberk MM, van Dijk FJ, et al. Wet work and hand eczema in apprentice nurses; part I of a prospective cohort study. Contact Dermatitis 2014;70: 44–55. https://doi.org/10.1111/cod.12131
3. Herloch V, Elsner P. The (new) occupational disease no. 5101: "Severe or repeated recurrent skin diseases". J Dtsch Dermatol Ges 2021;19: 720 742. https://doi.org/10.1111/ddg.14537_g
4. Reinholz M, Kendziora B, Frey S, et al. Increased prevalence of irritant hand eczema in health care workers in a dermatological clinic due to increased hygiene measures during the SARS-CoV-2 pandemic. Eur J Dermatol 2021;31: 392–395. https://doi.org/10.1684/ejd.2021.4046
5. Jindal R, Pandhi D. Hand Hygiene Practices and Risk and Prevention of Hand Eczema during the COVID-19 Pandemic. Indian Dermatol Online J 2020;11: 540–543. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7413445/
6. Segger D. (2021): SGS Study No. 204-01-0029. Unpublished study – Data from BODE Chemie GmbH
7. Lau A, Tarlo SM. Update on the Management of Occupational Asthma and Work-Exacerbated Asthma. Allergy Asthma Immunol Res 2019;11: 188–200. https://doi.org/10.4168/aair.2019.11.2.188
8. Zuberbier T (2021): ECARF Study 021-S-21. Unpublished study - Data from BODE Chemie GmbH.
9. Zuberbier T (2021): ECARF Study 033-R-21. Unpublished study - Data from BODE Chemie GmbH.
10. Internal investigations as well as external expert opinions on material compatibility - Data from BODE Chemie GmbH.
11. Internal tests as well as expert reports in preparation by German Institutes for Textile and Fibre Research. Denkendorf; Service Centre for Testing Technologies (2021), unpublished report - Data from BODE Chemie GmbH

Conclusion of the IPC Conferences 2021

Prepare for the next pandemic now!

SHEA, ECCMID, ICPIC: Hygienists and infectiologists had the opportunity to exchange ideas at conferences this year despite COVID-19. However, the pandemic also dominated the discussions. Here is our review of the most important meetings in the field of Infection Prevention and Control (IPC).

What needs to change in infection management after the COVID-19 pandemic? This was one of the questions discussed in mid-September in Geneva, Switzerland, during the 6th "International Conference of Prevention and Infection Control" (ICPIC). The conference took place in a hybrid format for the first time: on-site and online. One consequence of the pandemic: in order to simplify communication about hygiene measures, especially in social media, an emoji for hand washing should be introduced, analogous to the well-known emoji with a mask. The proposal was part of the discussion on the importance of human factors engineering (HFE) – the consideration of human requirements in the design of products and processes ("ergonomic aspects") – for infection management. One conclusion: Protocols should become more practical and accessible, for example by using visuals, i.e. graphics, symbols, icons or emojis.

ICPIC Lectures (Abstracts):
https://aricjournal.biomedcentral.com/articles/supplements/volume-10-supplement-1

The #ICPIC2021 Innovation Academy Award went to Jincy Jerry from Dublin, Ireland. She was awarded for her work on the "use of robotic process automation (RPA) for rapid analysis and interpretation of multi-drug resistant organisms and COVID-19 results". In Geneva, the focus on the pandemic did not distract from other challenges, such as antibiotic resistance, surgical infections, dealing with fake news and the use of electronic monitoring systems to record compliance.

Alarm in AMR prevention

The meeting of the Society for Healthcare Epidemiology of America, the "SHEA Spring" conference in mid-April, on the other hand, was still held exclusively as an online event. The focus was on the consequences of the pandemic on infection management (IPC), antibiotic resistance (AMR) and healthcare-associated infections (HAI). The SHEA published a research programme on this topic. It identifies knowledge gaps and challenges in the field of hospital epidemiology that have arisen in relation to the COVID-19 pandemic (e.g. monitoring, PPE, contamination and disinfection, supply shortages, antimicrobial stewardship, occupational health). Some common problems during the pandemic were, for example, skipping hand disinfection, frequent staff changes and increased contamination of blood cultures.

Another topic was virtual infection prevention: it was said to be the future. But only in a hybrid model that combines remote work with on-site presence. Prerequisite for success: optimal prevention strategies. On the subject of antibiotic resistance (AMR), the voices in April were less optimistic: although much has been achieved in recent years, there is a risk of missing the momentum in the fight against resistant pathogens. It is therefore important not to neglect AMR prevention in the face of new threats such as the current pandemic!

Strengthening non-pharmaceutical interventions

Antibiotic-resistant pathogens were also on the agenda at the "European Congress of Clinical Microbiology & Infectious Diseases" (ECCMID). The actions against such pathogens must become more concrete, was demanded at the congress, which was held exclusively online for the first time in July. Much can be learned from the measures against tuberculosis and HIV, for example the use of simple language, evidence-based strategies as well as representative recording. Interesting: At the end of last year, the WHO therefore founded the "One Health Global Leaders Group on Antimicrobial Resistance". Of course, SARS-CoV-2 was also discussed at ECCMID. Conclusion: Preparations for the next pandemic must be made now. And that includes developing strategies for non-pharmaceutical interventions!

More about the conferences:
ICPIC 2021: https://conference.icpic.com
SHEA: https://sheaspring.org
ECCMID: https://www.eccmid.org

Review – Recommendations for routine cleaning

Up-to-date, comprehensive and close to everyday life

Up to now, there have been few or no generally applicable specifications or guidelines for routine cleaning and disinfection in healthcare facilities. The publication [1] by the group of authors led by Professor Ojan Assadian (Medical Director of the *Landesklinikum Wiener Neustadt*, Vienna, Austria), which appeared in the Journal of Hospital Infection in March 2021, now provides a remedy by means of a comprehensive literature review and recommendations for practice derived from it.

Preventing nosocomial infections with multimodal approaches

The transmission of nosocomial pathogens through surfaces has long been considered negligible. This view has changed drastically in recent decades. Today, there are numerous studies showing that contaminated surfaces – especially "high-touch" surfaces, i.e. surfaces that are touched frequently – very much serve as reservoirs for pathogens and contribute to their transmission [2, 3]. Hand hygiene remains the key factor in combating nosocomial infections. However, experts agree that the overall goal can only be achieved with multimodal approaches and that greater importance should be attached to surface cleaning [1].

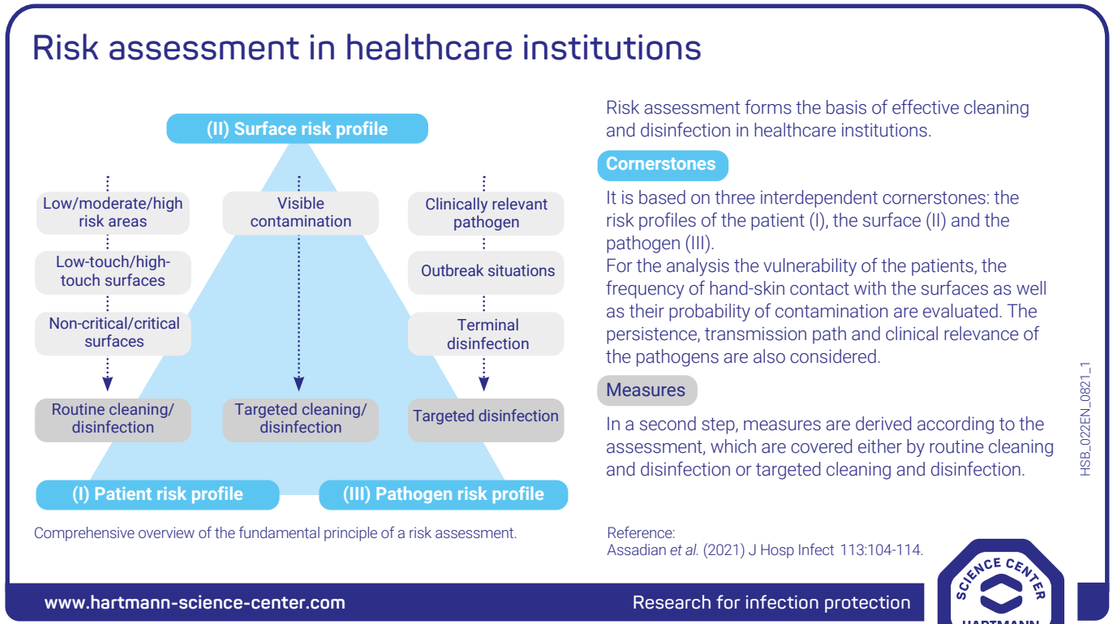
Essential aspects of routine cleaning summarised in an understandable and concise way

In order to provide concrete instructions for routine cleaning in health care facilities, the international team led by Professor Assadian came together without further ado. The result is an expert guide based on the current state of science, which addresses, among other things, "high-touch" and "low-touch" surfaces, disinfectants and equipment, the cleaning process as well as training, feedback and communication [1].

Relevant for different target groups thanks to its practical relevance and comprehensibility

The publication was already reviewed in April 2021 as part of the Infection Control Matters podcast series [4] and presented as an excellent summary. As it is practical and easy to understand, it is likely to appeal not only to hygiene professionals, but also to senior cleaning staff, decision-makers and budget managers. The recommendations refer to normal wards and finally also give practical instructions for clinically relevant pathogens and outbreaks.

Download the abstract here:
https://www.journalofhospitalinfection.com/action/showPdf?pii=S0195-6701%2821%2900105-5



Sources:
1. Assadian O, Harbarth S, Vos M, et al. Practical recommendations for routine cleaning and disinfection procedures in healthcare institutions: a narrative review. J Hosp Infect 2021;113: 104–114.
2. Mitchell BG, Dancer SJ, Anderson M, et al. Risk of organism acquisition from prior room occupants: a systematic review and meta-analysis. J Hosp Infect 2015;91: 211–217. https://doi.org/10.1016/j.jhin.2015.08.005
3. Otter JA, Yezli S, French GL. The role played by contaminated surfaces in the transmission of nosocomial pathogens. Infect Control Hosp Epidemiol 2011;32: 687–699. https://doi.org/10.1086/660363
4. https://infectioncontrolmatters.podbean.com/e/we-discuss/ (retrieved on 20.08.2021)

Multidrug resistant pathogens on computer keyboards in hospitals

Risk on the keys

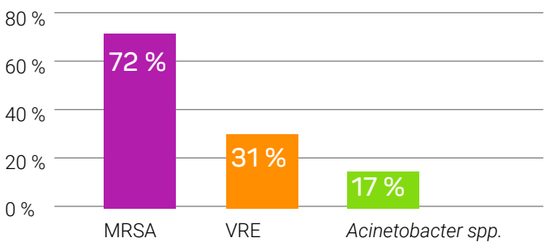
It is a well-known fact that a wide variety of germs can live on "high-touch" surfaces such as door handles and light switches. To prevent the spread of nosocomial infections in hospitals, these surfaces are cleaned regularly and frequently. Among the frequently touched objects in hospitals are undoubtedly computer keyboards, which belong to medical equipment, for example, and are used by various people. A study published in February 2021 [1] investigated whether these contribute to the further spread of pathogens despite routine cleaning, paying particular attention to persistent biofilms.

Bacteria detectable by wipe test on almost all keyboards

The study was conducted by renowned researchers such as microbiologist Stephanie Dancer and epidemiologist Jon Otter, who collected a total of 13 keyboards from three hospitals and a dental practice in the United Kingdom. They examined four frequently used letters per keyboard. While the team did not initially detect any bacteria in the simple swab test with gentle pressure, the serial transmission tests after wiping with sterile water or sodium hypochlorite showed positive rates of 69 and 54 %, respectively [1]. A considerable proportion of the bacteria was therefore actually viable.

MRSA in over 70 % of the samples

To find out which organisms they were, the keys were incubated overnight at 37 °C in growth medium and samples were taken from them on selective culture plates. It turned out that methicillin-resistant *Staphylococcus aureus* (MRSA) could be identified in 72 % of the samples, vancomycin-resistant *enterococci* (VRE) in 31 % and multidrug-resistant *Acinetobacter spp.* in 17 % [1]. Jon Otter's blog on infection prevention and control [2] also describes how this high proportion of antibiotic-resistant and transmissible bacteria surprised the researchers themselves, who therefore reviewed their methods to determine their suitability.



Contaminated keyboards as a health risk in hospital environments

The results show that contaminated keyboards pose a potential risk of infection and that routine cleaning does not seem to be sufficient to reliably prevent transmission to other surfaces or patients. The fact that no bacteria were released in the simple swab test, but were only detected after wiping, speaks for the formation of a dry biofilm. The keyboards examined in the study had all been in use for at least 6 months and had obviously not been cleaned thoroughly enough to prevent the formation of biofilms. Computer keyboards – especially in health care facilities – should therefore be thoroughly cleaned and disinfected on a regular basis to prevent biofilm formation from the outset.

How to clean computer keyboards properly

Low-alcohol ready to use disinfectant wipes such as Bacillol® 30 Tissues are ideally suited for uncomplicated and gentle disinfection, e.g., of computer keyboards. To prevent the formation of biofilms, keyboards should be cleaned and disinfected regularly and thoroughly from the moment they are put into operation.

Sources:
1. Ledwoch K, et al. (2021) How dirty is your QWERTY? The risk of healthcare pathogen transmission from computer keyboards. J Hosp Infect 112 :31–36. https://doi.org/10.1016/j.jhin.2021.02.021
2. https://reflectionsipc.com/2021/04/20/how-dirty-is-your-qwerty/ (retrieved on 23.08.2021)

Use disinfectant carefully. Always read the label and product information before use. Classification according to Regulation (EC) No. 1272/2008: Flammable liquids, Category 3, H226: Flammable liquid and vapour. Eye Irritation, Category 2, H319: Causes serious eye irritation. For further information please refer to the safety data sheets.

Dispenser density in Swiss acute hospitals

More disinfectant dispensers for a better hand hygiene compliance

Good hand hygiene with alcohol-based hand disinfectants is one of the most effective protective measures against infections. However, there are no international recommendations on the required dispenser density and the most suitable locations for dispensers in hospitals. A survey-based study [1] published in June 2021 led by Professor Andreas Widmer (Infectiology & Hospital Hygiene, University Hospital Basel; Swissnoso, National Centre for Infection Prevention Switzerland) examined the dispenser density in Swiss acute hospitals and compared the results with the data on disinfectant consumption in order to draw conclusions on hand hygiene compliance.

The average number of dispensers per bed significantly exceeds current German recommendations

Of the 178 Swiss acute hospitals invited to participate in the survey, 110 provided meaningful data representing 20,000 hospital beds. It turned out that the hospitals were equipped with an average of 2.4 permanently installed dispensers per patient bed – in most hospitals (84 %) directly at the entrance to the patient's room or at the washbasin (74 %) [1]. Thus, the number was about 2 to 4 times higher than recommended for German hospitals by the Commission for Hospital Hygiene and Infection Prevention (KRINKO) [2]. Furthermore, disinfectant consumption in large hospitals correlated with the number of disinfectant dispensers [1]. The results thus indicate that hand hygiene compliance increases with dispenser density.

Results could influence the new minimum standard

True to the motto "a lot helps a lot", equipping hospitals with more disinfectant dispensers per patient bed could actually help hospitals to increase hand hygiene compliance among staff and thus – along with other interventions – prevent hospital-acquired infections. It can be assumed that the study results will have an influence on the minimum standard in Swiss hospitals in the future. And the results should also be highly interesting for hospitals in Germany and serve as a point of reference for newly established hospitals when it comes to dispenser equipment. However, it remains to be seen whether the findings will have an influence on the KRINKO recommendations in the future.

Cleaning disinfectant dispensers

Regular reprocessing
according to the KRINKO recommendations [2], no fixed deadlines are set. Observe the manufacturer's instructions for proper reprocessing.

Manual reprocessing: Wipe the riser tube with disposable cloth, clean the dosing pump under running hot water, dry, clean the dispenser housing under running hot water, dry, wipe, disinfect the dispenser housing rear wall and dosing pump, reassemble the dispenser, repeatedly pump through some disinfectant.

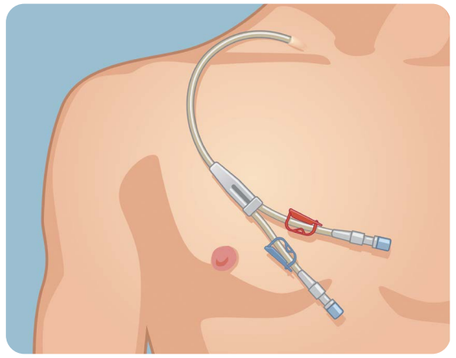
Machine reprocessing:
e.g., in a washer-disinfector, if possible [3].
Higher hygiene standards may be required in particularly hygiene-relevant areas: Certain manual metal dispensers such as the Eurospender 1 plus or the Eurospender 3 flex are autoclavable.

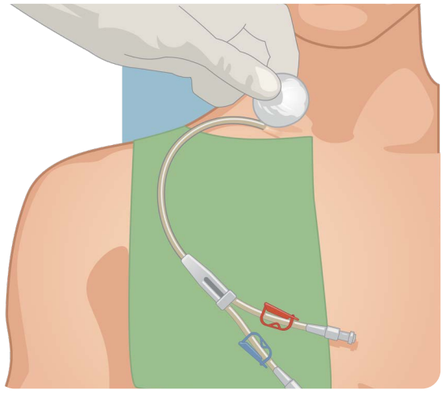
Detailed instructions with pictures for manual preparation can be found here: https://www.bode-science-center.com/file-admin/user_upload/download-en/reprocessing-of-dosing-dispensers_en.pdf

Sources:
1. Kuster S, Roth JA, Frei R, et al. Handrub dispensers per acute care hospital bed: a study to develop a new minimum standard. Antimicrob Resist Infect Control 2021;10: 93. https://doi.org/10.1186/s13756-021-00949-0
2. Commission for Hospital Hygiene and Infection Prevention (KRINKO) at the Robert Koch Institute (RKI). Hand hygiene in health care facilities. Bndesgesundheitsbl. 2016;59: 1189-1220. https://www.rki.de/DE/Content/Infekt/Krankenhaushygiene/Kommission/Downloads/Haendehyg_Rili.pdf?__blob=publicationFile (retrieved on 20.08.2021).
3. Trautmann M, Notburga P, Bobic R. Cleaning and disinfection performance of a reprocessing programme for routine cleaning of dispensers in hospitals. Hyg Med 2013;38: 468-472

Save time without compromising on therapy safety

MediSet® care sets for Demers catheters





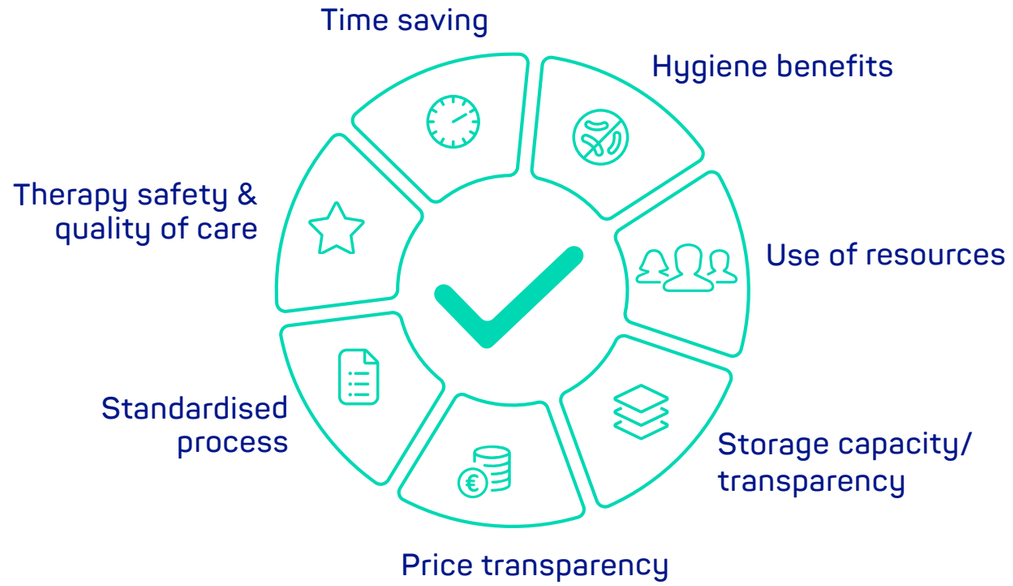
The German Society for Nephrology (DGfN) still recommends the arterio-venous fistula (shunt) as the vascular access of first choice for patients requiring dialysis. However, this requires surgery, which is unsuitable for an increasing number of patients, e.g., due to pre-existing conditions such as cardiac insufficiency. As an alternative, a Demers catheter (atrial catheter) can be used, which, as a tunnelled variant, can certainly be used for a longer period of time [1, 2]. However, particularly high demands are placed on catheter hygiene, which costs the staff a lot of time.

The risk of infection with catheters is significantly higher than with fistulas

Dialysis catheters can be inserted without surgery and, unlike shunts, are ready for immediate use, e.g., for short-term therapies in acute renal failure. They also enable patients with poor vascular conditions to receive low-risk long-term dialysis treatment. However, the use of dialysis catheters is associated with a significantly higher rate of bloodstream infections compared to shunts [2, 3]. In order to avoid such infections, the catheter must be maintained with special care. Certain bundles of measures are suitable for this purpose, consisting for example of basic hygiene such as hand disinfection, skin antisepsis and disinfection of the connector. In addition, the catheter can be sealed with antibacterial fluids between dialysis treatments [1-3]. In order to carry out the complex care, numerous components are needed, which must always be kept in stock by the dialysis facilities.

MediSet® Dialysis Catheter Set

1 x Protect drape, 38 x 45 cm
2 x syringe 3 ml, centric
3 x syringe 5 ml, centric
1 x syringe 10 ml, centric
1 x syringe 30 ml, centric
4 x gauze swabs size 3, plum size
1 x beaker 150 ml
2 x blue sealing caps
2 x gauze compress, 10 x 10 cm



Maintenance of dialysis catheters is time-consuming

Removing the dressing, cleaning the puncture site, unblocking the catheter and flushing the lumen, blocking the catheter after the dialysis treatment and closing the access – all these steps are time-consuming in themselves. In addition, the necessary materials such as syringes in various sizes, caps, perforated cloths, trays and compresses often have to be collected before the actual catheter care can begin. Another time-consuming factor in the challenging daily routine of a clinic or practice, but one that is avoidable.

Optimising processes with MediSet® care sets for Demers catheters

MediSet® care sets for Demers catheters from HARTMANN ensure a high level of therapy safety, streamline processes and thus create more time for patients. The pre-sorted care sets were developed together with dialysis facilities and are therefore optimally adapted to the actual needs on site. Since they contain all the necessary components for equipment, dialysis therapy and collection, the tedious gathering of the various materials is no longer necessary. This also makes the ordering process much easier. Separate blister trays also allow sterile separation of the components for the different steps and can also be used for skin disinfectants. With good preparation thanks to care sets, infection prevention in catheter care suddenly becomes very easy.

Sources:
1. German Society for Nephrology. Dialysis standard. Version: 1-2016, Update: 2-2020. https://www.dgfn.eu/dialyse-standard.html?file=files/content/downloads/20201120_Dialysestandard_Version_25-02-2020.pdf&cid=2212
2. German Society of Nephrology. Guideline on infection prevention and hygiene 2019 as a supplement to the dialysis standard. Updated: 27.01.2020. https://www.dgfn.eu/dialyse-standard.html?file=files/content/leitlinien/hygieneleitlinie/20200127_LL-Hygiene-Einzelseiten.pdf&cid=1950 (retrieved on 26.08.2021)
3. Fisher M, et al. (2020) Prevention of Bloodstream Infections in Patients Undergoing Hemodialysis. Clin J Am Soc Nephrol;15: 132–151.

For standard precautions

Skin antiseptic
Hand disinfectant
Disposable gloves

Cutasept G: Active ingredients: propan-2-ol. **Indications: S**kin disinfection before punctures, injections and surgical procedures. **Warnings:** No sufficient experience is available for the treatment of infants and small children. In these cases, the product may only be used after particularly strict indication and under medical supervision. Benzalkonium chloride may cause skin irritation. No skin wetting under blood-emptying cuffs. In the case of incision films, wait for complete drying. Do not use electrical equipment until dry. Avoid accumulation on patient bed surface. Do not bring into contact with open flames. Keep away from sources of ignition. Fire and explosion hazards are not to be expected if the preparation is used as intended. After spilling the disinfectant, take the following measures: Immediately absorb the liquid, dilute with plenty of water, ventilate the room and eliminate sources of ignition. Flash point according to DIN 51755: 21.5°C. Flammable. Any decanting may only be carried out under aseptic conditions (sterile cabinet). For risks and side effects, read the package leaflet and ask your doctor or pharmacist!

Sterillium classic pure: Active ingredients: propan-2-ol, propan-1-ol, mecetronium ethyl sulphate. **Indications:** For hygienic and surgical hand disinfection. For skin disinfection before injections and punctures. **Warnings:** Hand disinfection is used to specifically prevent the transmission of infections, e.g. in nursing. Sterillium classic pure should not be used on newborns and premature babies. Use on infants and small children should only be carried out after consulting a doctor. Contact of the solution with the eyes must be avoided. If the eyes have come into contact with the solution, they should be rinsed with running water for several minutes with the eyelids open. Transfer from one container to another should be avoided to prevent contamination of the solution. If decanting is unavoidable, it should only be done under aseptic conditions (e.g. use of sterile containers under laminar air flow). Do not use electrical equipment until dry. Do not bring into contact with open flames. Also do not use near sources of ignition. Flash point 23 °C, flammable. Fire and explosion hazards are not to be expected if the preparation is used as intended. After spilling the disinfectant, take the following measures: immediately absorb the liquid, dilute with plenty of water, ventilate the room and eliminate sources of ignition. Do not smoke. In case of fire, extinguish with water, extinguishing powder, foam or CO2. For risks and side effects, read the package leaflet and ask your doctor or pharmacist!

World Antimicrobial Awareness Week and European Antibiotic Awareness Day in November

COVID-19 pandemic and antibiotic resistance: an uncertain outcome

Antibiotic resistance is just as threatening as novel viruses because it deprives us of the sharpest weapon for treating bacterial infections. Whether the COVID-19 pandemic will influence the development of resistance in bacteria in the long term has been discussed in expert circles for some time, but only an assessment can be made for now [1, 2]. In view of the upcoming antibiotic campaigns in November, the pandemic could be used to raise awareness of the danger of resistance.

Fewer cases of antibiotic-resistant pathogens in Germany in 2020

For the year 2020, the Robert Koch Institute (RKI) reported about one third to one quarter fewer cases of antibiotic-resistant bacteria than expected on the basis of the previous year's data, depending on the pathogen. However, the reasons for this are unclear. It is possible that fewer elective procedures and increased hygiene measures actually resulted in fewer nosocomial infections. In addition, the overload of staff in clinics, laboratories and medical practices may have led to failures in the transmission [3].

A responsible use of antibiotics remains a priority

From a long-term and global perspective, however, it is also conceivable that the pandemic-related interruption of treatments, e.g., against tuberculosis, could have paved the way for resistance [4]. In addition, there is the danger that antibiotics will be used during the pandemic on a self-regulatory or preventive basis [1, 2, 4]. The World Health Organisation (WHO) therefore explicitly calls for the responsible use of antibiotics in COVID-19 patients in order to avoid the development of resistance. This includes, among other things, training health workers to recognise and distinguish signs and symptoms of severe COVID-19 and bacterial superinfections [4].

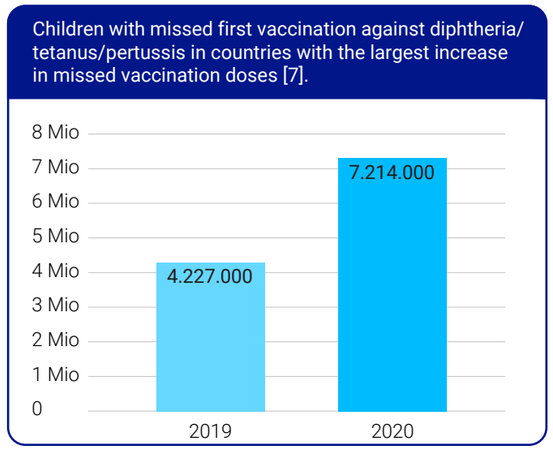
World Antimicrobial Awareness Week (WAAW):
18 to 24 November 2021

More information at:
https://www.who.int/campaigns/world-antimicrobial-awareness-week

European Antibiotic Awareness Day (EAAD):
18 November 2021

More information at:
https://antibiotic.ecdc.europa.eu/en

Children with missed first vaccination against diphtheria/ tetanus/pertussis in countries with the largest increase in missed vaccination doses [7].



Fighting antimicrobial resistance with vaccinations

Vaccinations also make a significant contribution to combating antibiotic resistance. If the population is not immunised against a bacterial pathogen, it can easily be transmitted to many people who then need antibiotics. The widespread use of antibiotics promotes the growth of resistant bacteria, which spread rapidly around the world.

Vaccinations, on the other hand, prevent a large proportion of infections, thus reducing antibiotic use and curbing resistance [5]. This even applies to vaccinations against viral diseases (especially respiratory ones such as influenza), which reduce antibiotic use by avoiding bacterial superinfections [6].

Unfortunately, according to recent WHO data, the COVID-19 pandemic has reduced the global vaccination rate among children. About 23 million children missed vaccinations – even for basic protection – in 2020 because of the pandemic; that's 3.7 million more than in 2019. Only international cooperation can ensure global access to vaccines and revive vaccination programmes for children [7].

Global actions to reduce antibiotic resistance therefore remain extremely important and must not be sidelined because of the COVID-19 pandemic. The antibiotic campaigns in November should serve as a reminder to pull together to ensure that antibiotics continue to be effective in the future.

How to prevent antimicrobial resistance:

Careful use of antimicrobial agents

- right spectrum of activity
- correct dosage
- recommended treatment duration

Infection prevention

- clean water
- hand hygiene
- vaccinations

Sources:
1. Monnet DL and Harbarth S (2020). Will coronavirus disease (COVID-19) have an impact on antimicrobial resistance? Euro Surveill; 25: 2001886. https://doi.org/10.2807/1560-7917.ES.2020.25.45.2001886
2. Rawson TM et al. (2020) COVID-19 and the potential long-term impact on antimicrobial resistance. J Antimicrob Chemother; 75: 1681–1684. https://doi.org/10.1093/jac/dkaa194
3. Robert Koch Institute, Epidemiological Bulletin 07/2021; https://www.rki.de/DE/Content/Infekt/EpidBull/Archiv/2021/Ausgaben/07_21.pdf (retrieved on 24.08.2021)
4. Getahun H et al. (2020). Tackling antimicrobial resistance in the COVID-19 pandemic. Bull World Health Organ; 98: 442–442A. https://doi.org/10.2471/BLT.20.268573
5. Jansen KU et al. (2018). The role of vaccines in preventing bacterial antimicrobial resistance. Nat Med; 24: 10–19. https://doi.org/10.1038/nm.4465
6. WHO (2020). Leveraging Vaccines to Reduce Antibiotic Use and Prevent Antimicrobial Resistance: An Action Framework. https://www.who.int/publications/m/item/leveraging-vaccines-to-reduce-antibiotic-use-and-prevent-antimicrobial-resistance (retrieved on 24.08.2021)
7. WHO (2021), COVID-19 pandemic leads to major backsliding on childhood vaccinations, new WHO, UNICEF data shows. https://www.who.int/news/item/15-07-2021-covid-19-pandemic-leads-to-major-backsliding-on-childhood-vaccinations-new-who-unicef-data-shows (retrieved on 24.08.2021)

Actions for hand washing and hospital hygiene

#ASpiritOfOptimism

Over and over again – and always important: as long as infectious diseases exist, of action that show how infections can be prevented also make sense. In October, Global Handwashing Day and the first of two "Digital Days" of the Clean Hospitals Initiative were on the calendar. The hope for lasting behavioural change was greater this time than before.

"Our Future is at Hand – Let's Move Forward Together" was the motto of this year's edition of **Global Handwashing Day** on 15 October. It sounded like a new beginning: the Global Handwashing Partnership initiative picked up on the increased importance of hand hygiene in private and public settings as a result of the Coronavirus pandemic and pointed to the unique opportunity to "establish hand hygiene as a fundamental component of health and safety". The first objective of the international initiative, which is supported by companies and institutions such as the World Bank and the UNICEF Children's Fund, is to raise awareness of the importance of washing hands with soap. The means to achieve this in these times: virtual events and campaigns in social networks such as Twitter and Facebook. The Handwashing Action Day thus complemented another global initiative that UNICEF had already launched last year together with its UN sister organisation WHO in response to the Coronavirus epidemic. The global "Hand Hygiene for All" initiative sees hand hygiene as a task for the whole of society. Its goal is to provide even the poorest and most vulnerable communities with the necessary means to protect their health. Everyone should have easy access to water and soap in their home environment and make handwashing a regular routine!

GLOBAL HANDWASHING DAY

15.10.21

Viewing clinics as a health care environment

The Clean Hospitals Initiative also took up a highly topical and important issue in October: On **Clean Hospitals Day** on 20 October, the international initiative focused on the clinical environment as a whole. Its message: nosocomial infections can only be effectively combated through a multimodal overall concept. Hospitals should therefore be understood as health care environments that can promote or hinder the recovery process of patients. In addition to the very important hand hygiene, all other factors that have an influence on hygiene in health care facilities are also taken into account. For example, surface hygiene, air purification, waste disposal or the reprocessing of medical devices. But uniform hygiene standards and evidence-based recommendations for action, including training for all staff, also play a role in such a concept.

The action day was therefore accompanied for the first time by a "Digital Day". The training event for healthcare professionals offered lectures and a virtual exhibition as well as space for questions and networking. A second "Digital Day" is planned for 7 December. The presentations of both days will be available on the CLEAN HOSPITALS website by the end of the year.

cleanhospitals Day 20.10.21

HARTMANN and the Clean Hospitals Initiative

Global days of action and initiatives are essential for infection prevention. HARTMANN therefore supports the Clean Hospitals Initiative as a participating partner. Clean Hospitals was founded in 2018. Partners from science, industry, NGOs and government agencies work together at Clean Hospitals to increase hygiene in hospital environments and to improve patient safety. Clean Hospitals is an independent source of information for both hygiene specialists and the public. Specific measures include research projects in the field of surface cleaning, training and certification programmes, and evidence-based recommendations.

More about the Clean Hospitals Initiative:
https://cleanhospitals.com

Be there, listen, read:

Infection prophylaxis, easy to understand

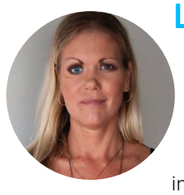
Knowledge protects against infections! Take advantage of the continuing education offers within the framework of our MISSION: INFECTION PREVENTION. How and where you want: conveniently from home or on the go.

Launch of new symposium series

On 11.11.2021 the time had come: our new symposium series "Safety first - Infection prevention" was launched. This year only as an offer for our German-speaking customers in Europe with the topic of "Basic hygiene on the move - approaches to infection prevention", only as an offer for our German-speaking customers in Europe.
The next session is planned for 2022 and will be held internationally. We will keep you up to date on this.

- **Prof. Dr. Andreas Widmer** (National Centre for Infection Prevention/ Switzerland & WHO)
  Topic: New national minimum standard for infection prevention in Swiss hospitals.
- **Dr. Tobias Kramer** (Clean Hands Campaign Germany)
  Topic: Importance of hand hygiene for basic hygiene, especially before aseptic procedures.
- **Prof. Dr. Johannes Knobloch** (University Medical Centre Hamburg-Eppendorf, UKE)
  Topic: Transmission through inanimate surfaces – importance of cleaning and disinfection measures.

Listen: New podcast series



"People need to hear stories like mine so they understand the urgency of the situation," says Vanessa Carter from South Africa in the first episode of our new podcast series on infection prevention. Vanessa Carter is involved in patient protection and hand hygiene worldwide – after an antibiotic-resistant pathogen destroyed parts of her face. Her case dramatically illustrates the danger of nosocomial infections. During the first podcast episode, renowned hygiene experts from Germany explain how we can permanently deal with the problem of hospital germs and learn to avoid infections: Professor Johannes Knobloch from the University Medical Centre Hamburg-Eppendorf (UKE) and Dr. Tobias Kramer from the Clean Hands Campaign Germany (*Aktion Saubere Hände, ASH*).

Listen now:
MISSION: INFECTION PREVENTION Podcast
ON THE TOPIC "Nosocomial infections"
https://www.hartmann.info/en-corp/mission-infection-prevention/world-patient-safety-day-podcast

Read: "From shame and guilt to objectivity"

Hospital germs could have a harder time in the future: "We have moved away from a culture of shame and blame towards a culture of objectivity, where we talk freely about the challenges and develop solutions", says **Professor Dr. Ojan Assadian.** In an interview with HARTMANN, the specialist in hygiene, microbiology and infectious and tropical medicine, who is the Medical Director of the *Landesklinikum Wiener Neustadt* in Vienna, Austria, explained which future challenges and developments could influence the fight against nosocomial infections.
For example, technical innovations – intelligently designed medical devices or minimally invasive surgery – offer the chance to further reduce the number of infections. Artificial intelligence (AI) could help with diagnosis and the selection of suitable antibiotics. In hospitals, however, the number of visitors must also be discussed, he said: Experience during the COVID-19 pandemic showed that a controlled and reduced flow of visitors contributed significantly to the reduction of nosocomial infections.

Complete interview with Prof. Assadian

Part 1: https://www.hartmann.info/en-corp/mission-infection-prevention/interview-assadian-part-one

Part 2 https://www.hartmann.info/en-corp/mission-infection-prevention/interview-assadian-part-two

Disinfacts EN 02/21

DISINFACTS is published on behalf of BODE Chemie GmbH –
A company of the HARTMANN GROUP, Hamburg
www.hartmann-science-center.com
www.hartmann.info
Editorial team: HARTMANN SCIENCE CENTER
Text: Dr. Julia Dittmann, Arnd Petry
Design: Beling Agentur für visuelle Kommunikation, Hamburg
Print: Kabel Druck, Hamburg

Picture credits:
Title: iStockphoto; p. 2/3: Allianz Arena, Marco Grundt Fotografie; p. 4: Bernd Ducke, Fotograf; p. 5/6/7: BHuK, Marco Grundt Fotografie; p. 8: Laura Stirnberg; p. 11: iStockphoto; p. 13: Marco Grundt Fotografie; p. 14: Dr. Heide Niesalla; p.16: iStockphoto, Beling Grafikdesign; p. 17: Beling Grafikdesign; p. 18/19: Rainer Michaels, Beling Grafikdesign; p. 20/21: iStockphoto; p. 22: Gettyimages; p. 23: Vanessa Carter, Prof. Dr. Assadian, p. 24: iStockphoto

HARTMANN

SCIENCE CENTER HARTMANN

Research for
infection protection