schülke

Prevention is better than infection!

Patient decolonisation and hygienic patient washing with octenidine

we protect lives
worldwide

schülke has what germs fear.

Across the EU as a whole, the cost of dealing with nosocomial infections amounts to € 7 billion annually, making them a huge financial burden on EU healthcare systems. Wound infections, urinary tract infections and pneumonia, as well as vascular access device-associated infections, primary sepsis and Clostridium difficile infections represent a major hygiene and infection prevention challenge. A challenge that schülke has been meeting for more than a century. Our mission is to protect lives worldwide.

Antibiotic resistance on the rise

Despite all of the many advances in surgery, postoperative infection remains a much feared complication which has serious health and economic consequences. Although causes are complex, it is estimated that, with the right preventive measures, half of these infections could be avoided. Antibiotic-resistant microorganisms represent a particular danger, as treatment options are severely limited. In terms of antibiotic resistance, recent years have seen a shift in emphasis from Gram-positive to Gram-negative bacteria. Resistance is increasingly being seen against antibiotics of last resort.

Patient decolonisation – prevention is better than infection

Approximately 90 percent of surgical site infections are endogenous. This means they are caused by the patient's own microbial flora, mostly from the patient's skin. Nasal *Staphylococcus aureus* colonisation has long been recognised as a risk factor for wound infections. Performing decolonising whole body washes and cleansing the nasal vestibules can significantly reduce the risk of nosocomial infection – both preoperatively and in intensive care.

With the octenidine product family from schülke, you are giving your patients the best possible perioperative and ITU care.

Dr. Christoph Klaus
Scientific Affairs

Contents

Nosocomial infections

Hospital-acquired infections

Infections acquired in hospital, also known as nosocomial infections, are one of the most frequent complications of medical treatment.[1] Another frequently-used term is healthcare-associated infections (HCAIs), which includes infections acquired in all healthcare settings (e. g. long-term care facilities, rehabilitation centres, ambulances and doctor's surgeries).[2]

Distressing for patients and billions in additional costs

Nosocomial infections are not just a serious problem for patients. They also pose a major challenge for the healthcare system as a whole.[3] The World Health Organisation (WHO) estimates the total annual cost of treating HCAIs in Europe – including some 16 million extra days spent in hospital – at roughly €7 billion. These infections promote the development of antibiotic resistance, have long-term health consequences, including disability and incapacity for work, and cause – often avoidable – deaths.[4]

Across the EU, four million patients will acquire a nosocomial infection during a hospital stay every year. It is estimated that improvements in hygiene practices could simply and easily prevent up to 30 % or even more than 50 % of all such infections.[5,124,125] In Europe, 37,000 deaths each year are directly attributable to nosocomial infections, and in the US nosocomial infections account for 100,000 deaths annually. The number of people dying from indirect consequences of nosocomial infections is not recorded. In Germany, there are an estimated 400,000 to 600,000 nosocomial infections and about 10,000 to 15,000 deaths annually.[8,133,137,138]

> Nosocomial infections are a major patient safety issue, exacerbated by the emergence of multidrug-resistant microorganisms.

According to a report by the US Centers for Disease Control and Prevention (CDC), the direct medical costs of nosocomial infections to US hospitals amount to between $ 28 billion and $ 34 billion per year. According to the report's authors, up to 70 % of these infections would have been preventable. It follows that prevention would have saved up to $ 24 billion per year.[7]

In Germany, five times as many people die as a result of nosocomial infection as in road traffic accidents. In the 1970s, nearly 20,000 people were killed on Germany's roads each year. Since then, safety has been improved by changes in the law (compulsory seat belts, speed limits) and – sometimes very expensive – advances in vehicle technology (ABS, ESC, lane departure warning systems, airbags, etc.).

- EU-wide, **four million people** contract a nosocomial infection and **37,000** people die of one annually.[5]
- In Germany, **around 400,000 to 600,000 patients** acquire a nosocomial infection annually, resulting in around 10,000 to 15,000 deaths.[137, 138]
- Nosocomial infections prolong hospital stays by an average of **seven days** and give rise to **additional costs of € 6,000** to **€ 12,000 per patient.**[6]
- **Half** of all nosocomial infections could be **prevented** by **improved hygiene practices.**[5,124,125]

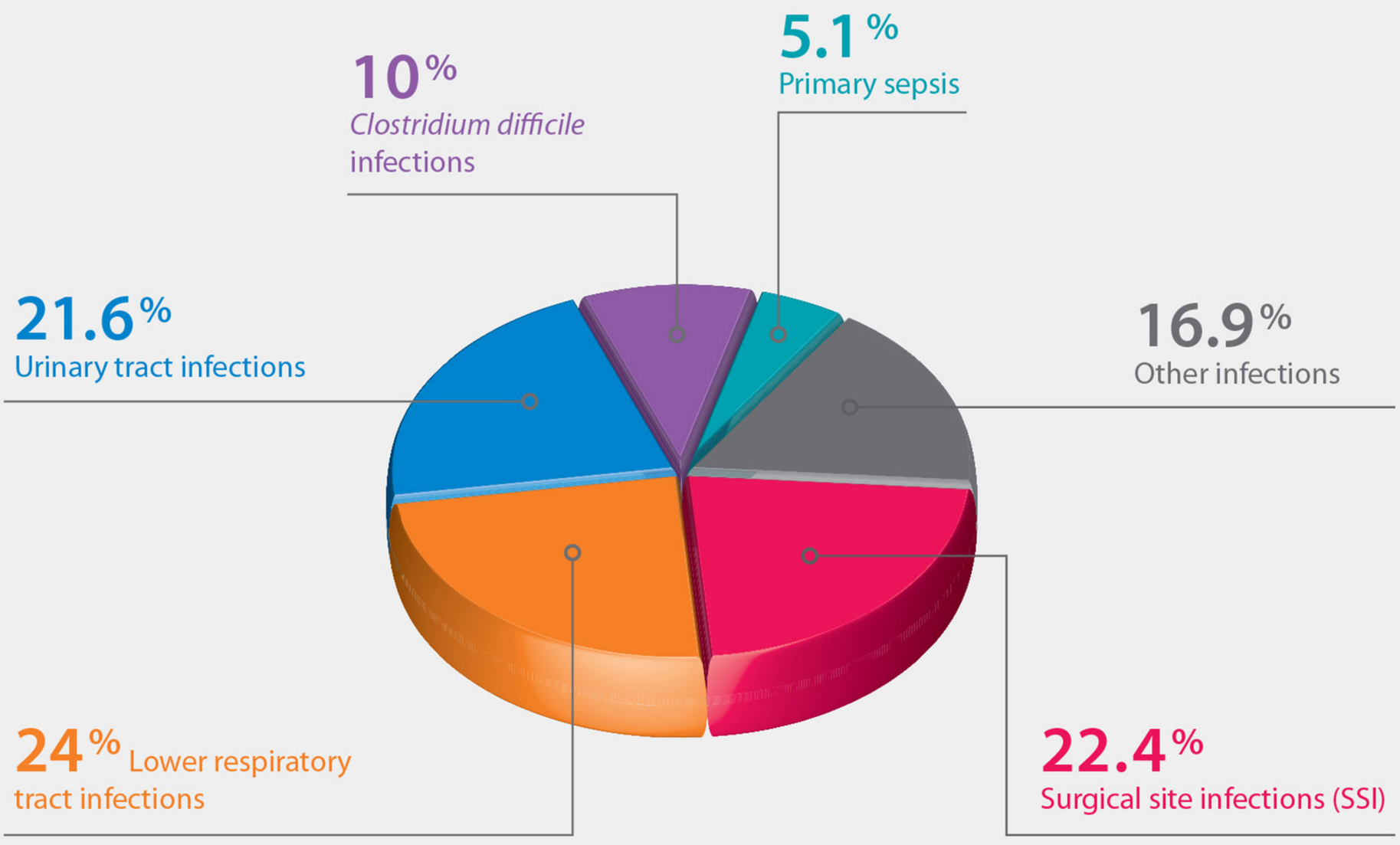
Poor health and poor hygiene aggravate the problem

The risk of nosocomial infection is increased in patients with severe underlying diseases, by treatment-related factors such as length of surgery and type of intervention, and by poor hygiene.[2]

Nosocomial infections in Germany

For many years, the top three nosocomial infections have been (in varying order) surgical site infections (SSIs), pneumonia (including other lower respiratory tract infections) and urinary tract infections. In 2016 the National Reference Centre for Surveillance of Nosocomial Infections (part of the Robert Koch Institute) carried out its third point prevalence survey. It found that SSIs were the second most common nosocomial infections.[3]

Nosocomial infections in Germany 2016[3]



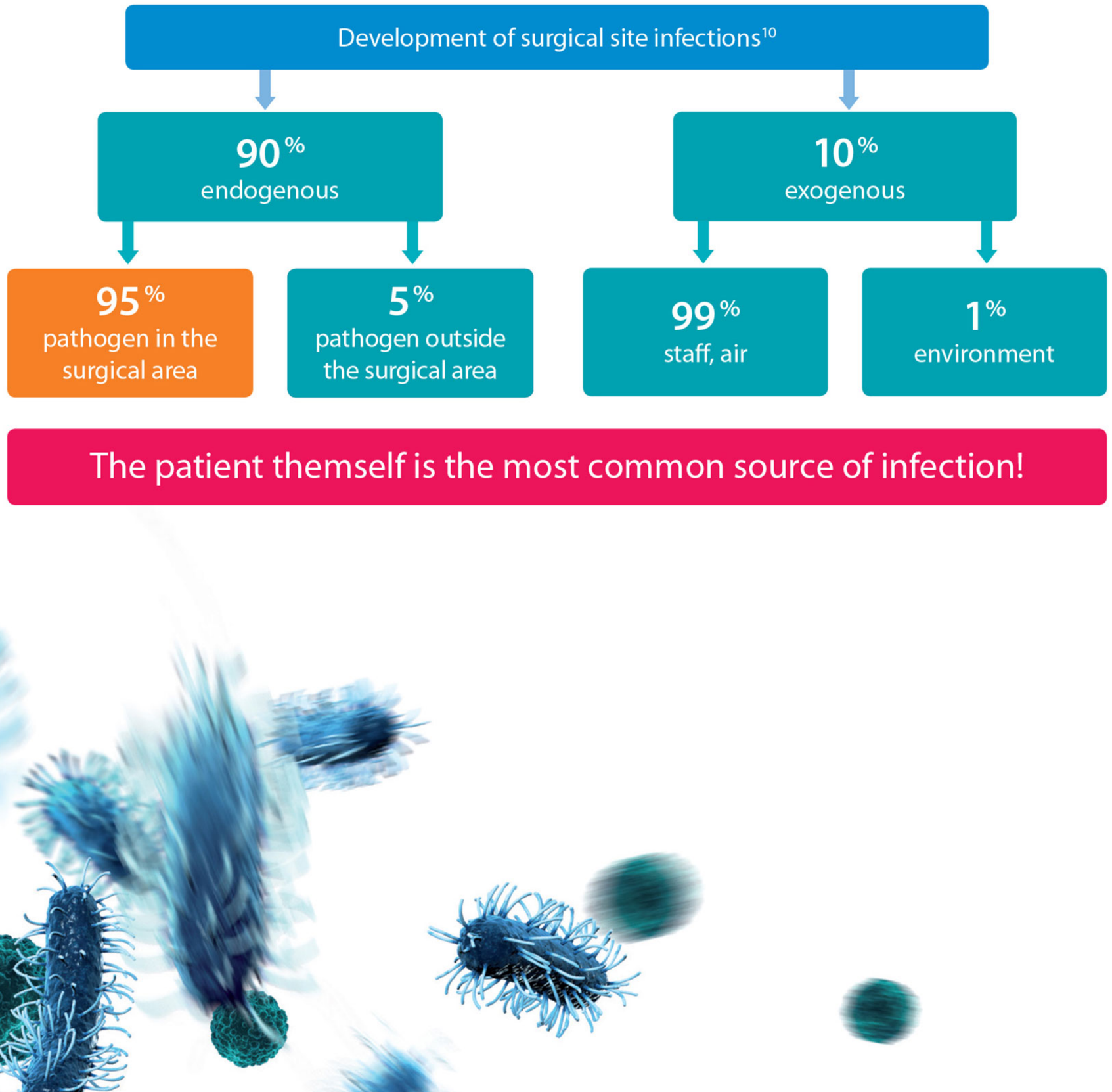
How are nosocomial infections acquired?

Nosocomial infections can be exogenous or endogenous. Infections are exogenous when pathogens are acquired from other patients or the environment. The main mode of transmission for exogenous infections is the hands of healthcare staff. Exogenous nosocomial infections are always preventable in principle – primarily through the use of regular hand disinfection.

Endogenous infections are infections acquired from the patient's own microbial flora, especially skin flora. If microorganisms from the body's own microbial flora are introduced – through surgery, via medical instruments (e.g. central venous catheters) or via mechanical ventilation – into parts of the body which are usually broadly free of microorganisms, this can lead to infection.

> Proper infection prevention begins before surgery, with the use of standardised preparation of the surgical field and careful hand hygiene.

Although it is not possible to eliminate the risk of endogenous infections completely, by using appropriate preventative measures (including patient decolonisation, a VAP prevention bundle and a catheter care bundle) it can be significantly reduced.[9]



Surgical site infections

Surgical site infections (SSI)

Despite all of the many advances in surgery, postoperative infection remains a much feared complication, which has serious health and economic consequences.[11] Public awareness of surgical site infections as a patient safety issue is therefore increasing.

What is a surgical site infection?

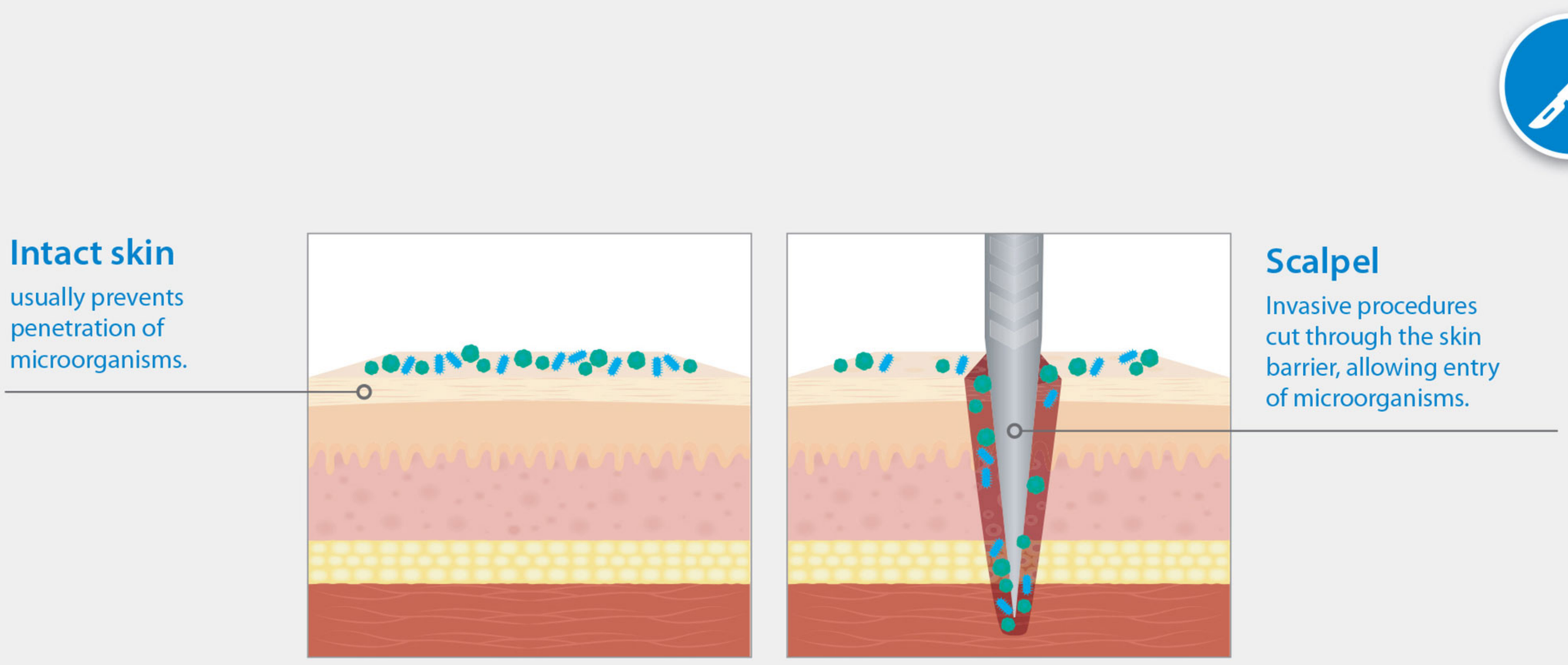
Surgical site infections are infections that are anatomically associated with and were not present prior to surgery.[12] They involve entry of microorganisms into and multiplication at the operation site. The infection may be localised to the wound or be systemic, affecting the entire body.[13]

An infection occurring within 30 days of surgery is referred to as a surgical site infection. For implanted foreign bodies and some specific operations (e.g. neurosurgery and cardiac surgery procedures), this period is extended to 90 days.[14] The trend towards shorter hospital stays means that surgical site infections are increasingly manifesting only after discharge and are in some cases going unrecorded.[15]

A report by German health insurer Barmer GEK even starts from the assumption that Germany's hospital-acquired infection surveillance system (KISS) systematically under-reports surgical site infections, because patients are not properly followed up after discharge.[131] In Switzerland, by contrast, patients are followed up using telephone surveys for twelve months after surgery. Rates of surgical site infection in Switzerland are two to three times higher than in Germany.[132]

See also:

Patient decolonisation on the ICU (p. 17) and before elective surgery (p. 23)

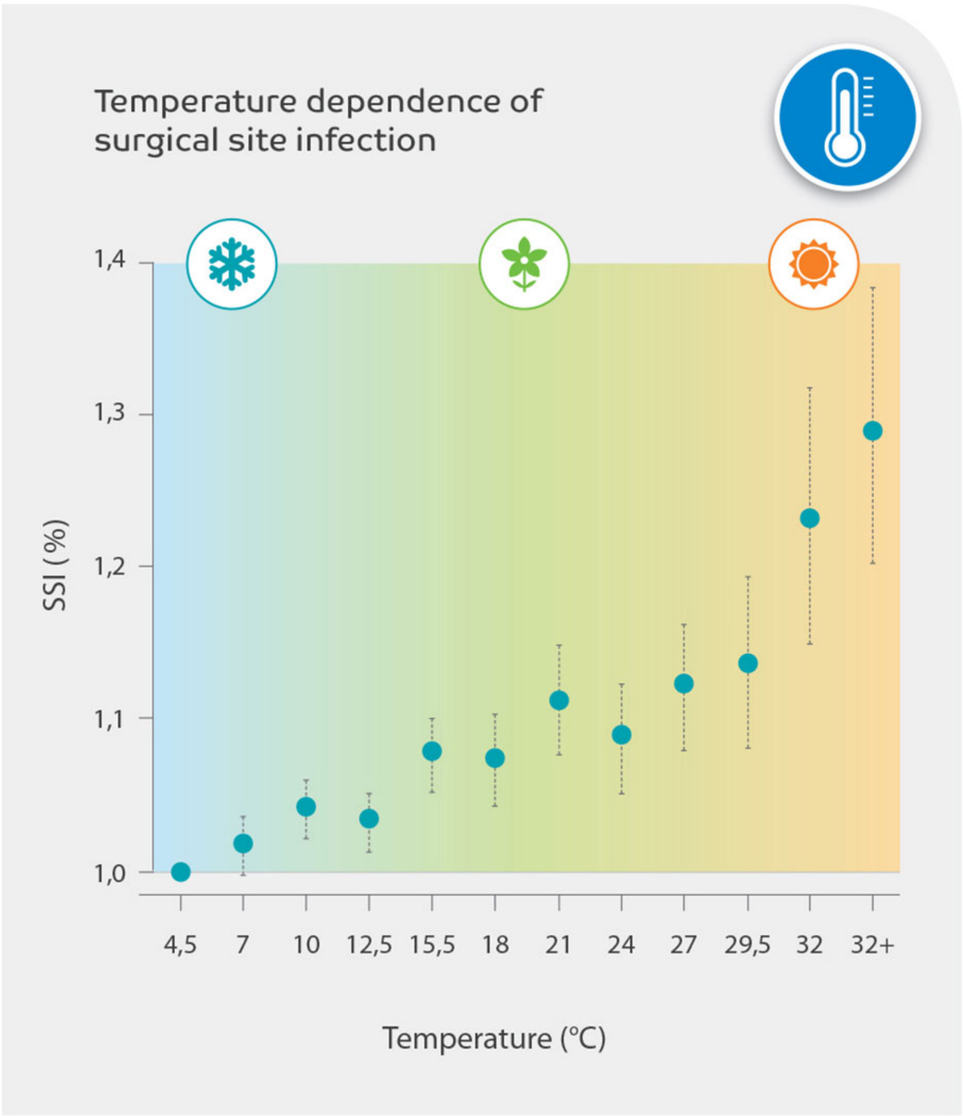


Dependence on type of intervention and season

In 2016, around 16.8 million operations were performed in Germany. With an SSI rate of 1.08 %, that means there were approximately 181,000 surgical site infections.[3,16]

The frequency of SSI is highly dependent on the type of intervention. Colonic surgery carries the largest surgical site infection rate (6 % to 15 %, depending on risk category). The literature gives the incidence of deep sternal SSIs, a complication of cardiac surgery, as 8 %.[137] Interventions with a relatively low SSI risk include caesarean sections (0.3 – 0.5 %), arthroscopic knee surgery (0.2 – 0.3 %) and laparoscopic inguinal hernia repair (0.1 %).[2,17]

There is also seasonal variability in surgical site infection rates, particularly for knee and hip replacements. SSIs are most common in summer, with SSI risk increasing during hotter months.[18,19]



Life-threatening, and a major cost to healthcare systems

Surgical site infection has significant consequences, ranging from increased treatment costs and significantly longer hospital stays, to an increase in readmissions. Patients with SSIs are more likely to be admitted to an intensive care unit (> 60 %) and have increased mortality. Particularly dangerous are infections involving antibiotic-resistant organisms such as MRSA.[10,20–22]

In addition to the suffering they cause, SSIs also impose significant costs on hospitals and healthcare systems.

About 90 % of these additional costs result from increases in the length of hospital stays.[23] Patients with severe surgical site infections spend an average of seven extra days in hospital. In Germany alone, this results in one million extra days spent in hospital per year.[24]

Elderly patients with an *S. aureus* SSI have a five-fold increase in mortality and spend an average of twelve extra days in hospital. The additional cost for such patients has been calculated at $ 40,000 per infection. Surgical site infections caused by MRSA result in as much as an eleven-fold increase in mortality.[22]

Preventing a single case of MRSA SSI can save a hospital up to $ 60,000. Interventions such as decolonisation and screening will therefore pay for themselves if they are able to prevent just a single MRSA SSI.[20]

Orthopaedic surgical site infections – a key scientific focus

Worldwide, the number of hip and knee replacements performed is increasing steadily. Implantation of artificial joints is now a routine surgical procedure.

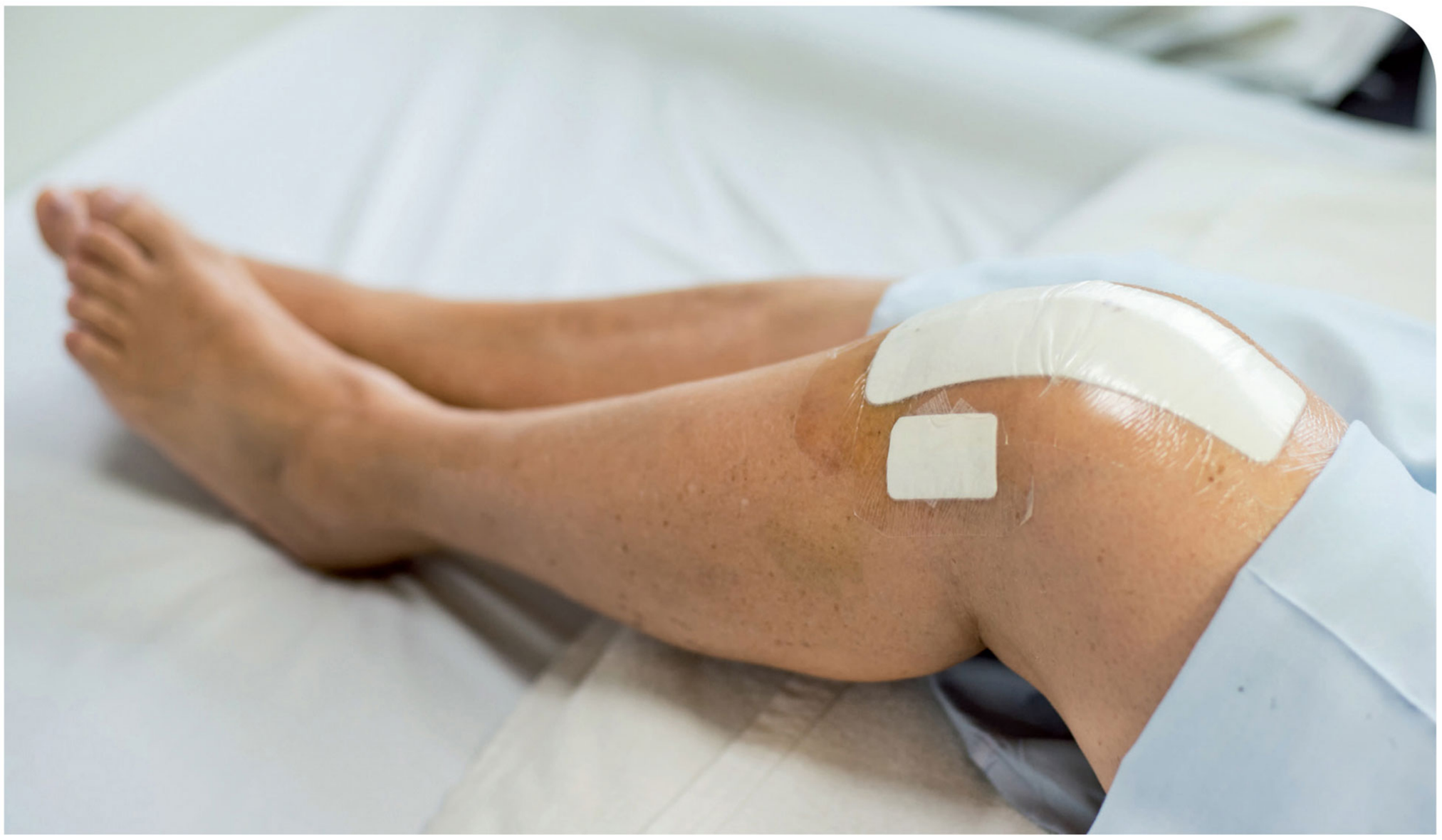
Although SSI rates after this type of procedure are relatively low, the increasing number being performed means that the economic and health effects of SSIs relating to these procedures is considerable. The surgical site infection rate for knee replacement procedures is 0.5 % and for hip replacements between 1 % and 3 %.[25,17] Surgical site infections are the number one cause of revision operations following knee replacement surgery and the third most common cause following hip replacement.[26]

For hip replacements, they result in a two to threefold increase in length of hospital stay (up to 28 days) and a significant increase in costs.

Patients who experience a surgical site infection following knee replacement surgery spend much longer in hospital than uninfected patients (up to 24 days). The average cost of treating each infected patient is $ 116,000, compared to $ 28,000 for patients who do not contract an infection.[27]

> To enable the establishment of appropriate preventive measures for reducing SSI rates, it is essential that all involved are aware of how surgical site infections arise.

Left untreated, a surgical site infection can penetrate deeper into the joint and may develop into a far more serious – and costly – periprosthetic joint infection. **In the US, the use of preoperative patient decolonisation prior to knee surgery could save between $ 0.8 billion and $ 2.3 billion annually.[29] Early use of preventive measures is therefore strongly recommended.[28]**



Stronger together against SSI – care bundles

When it comes to patient safety, piecemeal use of individual infection prevention measures is not an adequate strategy. Care bundles involve bundling together, learning to use and consistently applying multiple hygiene practices with proven preventive potential. Consideration is given to both exogenous and endogenous factors. In preventing surgical site infections, the focus for hospital hygiene is increasingly on the patient's endogenous flora.

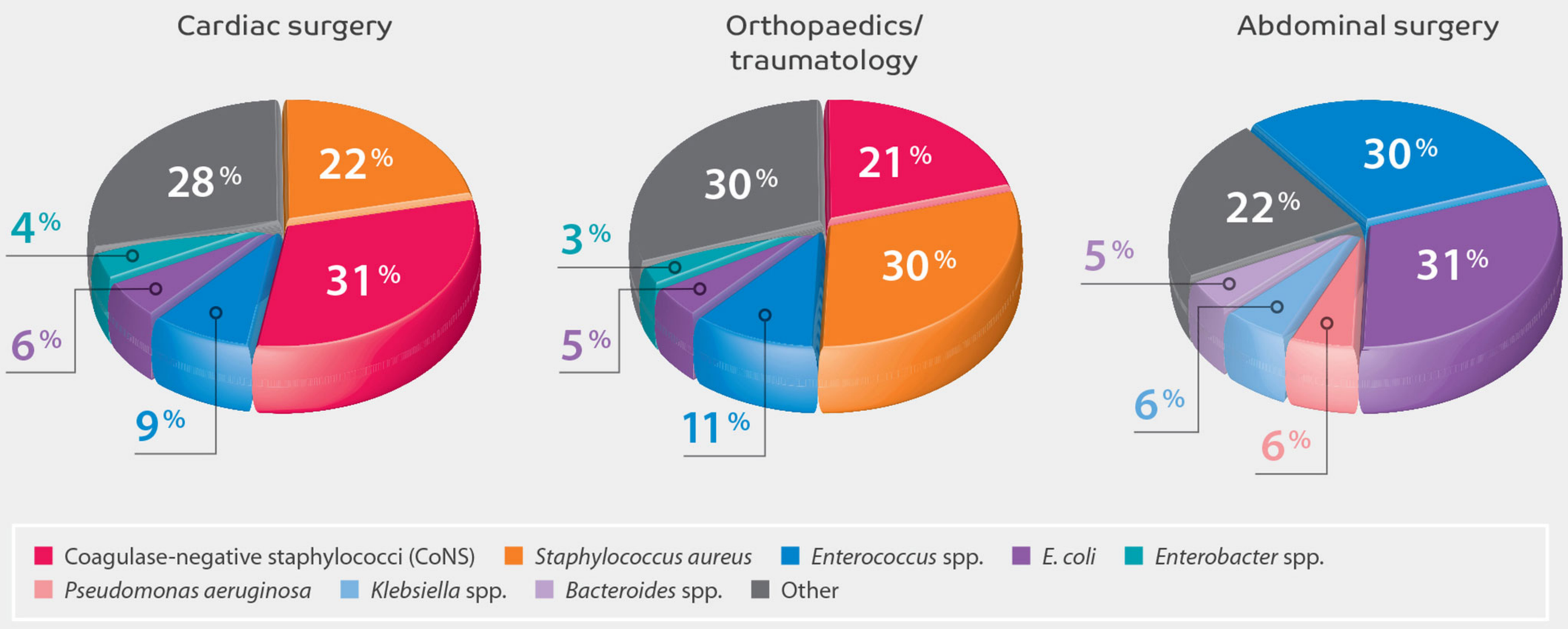
One study found that bundles of eleven or more components had the greatest effect on SSI rates. It is, however, important that the way practices are bundled ensures long-term efficacy and good compliance.[30, 31]

In putting together an SSI care bundle, the following elements should ideally be considered:

- risk-adapted preoperative *S. aureus* screening
- preoperative decolonisation of *S. aureus*-positive patients or universal decolonisation
- standardised preoperative skin antisepsis (alcohol in combination with active substances with a residual effect)
- maintenance of aseptic discipline by the surgical team (including surgical hand disinfection)
- postoperative wound antisepsis
- surgical site infection surveillance

Which microorganisms cause surgical site infections?

With the exception of abdominal surgery, where the main organisms involved are enterobacteriaceae such as E. coli and enterococci, one of the most significant pathogens in surgical site infections is *Staphylococcus aureus*. In cardiac surgery, the dominant organisms are now coagulase-negative staphylococci.[17,32] Staphylococci *(S. aureus and S. epidermidis)* are also the dominant species found in infections arising from vascular access devices, artificial joints and other implants.[33, 11]

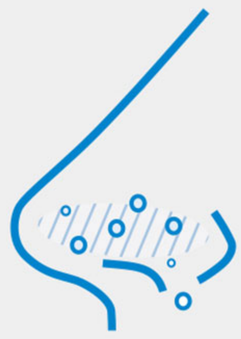


S. aureus – a common skin organism and a major risk factor

Nosocomial *S. aureus* infections are generally of endogenous origin, with a high proportion – up to 80 % – being caused by the patient's own microbial flora.[40] The nasal mucosa is a natural site for *S. aureus* colonisation. Up to 85 % of the population have permanent or intermittent colonies of *S. aureus* in their nasal cavity.[34] It has been repeatedly demonstrated that *S. aureus* strains found in wounds match those previously found in the same patient's nasal cavity.[35,37] A study at a German university hospital looked at factors involved in nasal colonisation with *S. aureus*. Men were significantly more likely to be colonised than women.[36]

Nasal *S. aureus* colonisation has been considered a risk factor for surgical site infection since the 1950s. Patients at particular risk include pre-operative patients, patients with vascular access devices, patients on intensive care units and dialysis patients.[37–40] The risk of contracting an SSI is six to seven times higher in patients colonised by *S. aureus*, and up to twelve times higher for patients on an intensive care unit.[41–43] MRSA carriers are eight to nine times more likely to contract an SSI.[44]

Studies have shown that nasal colonisation with *S. aureus* has a large effect on the risk of infection.



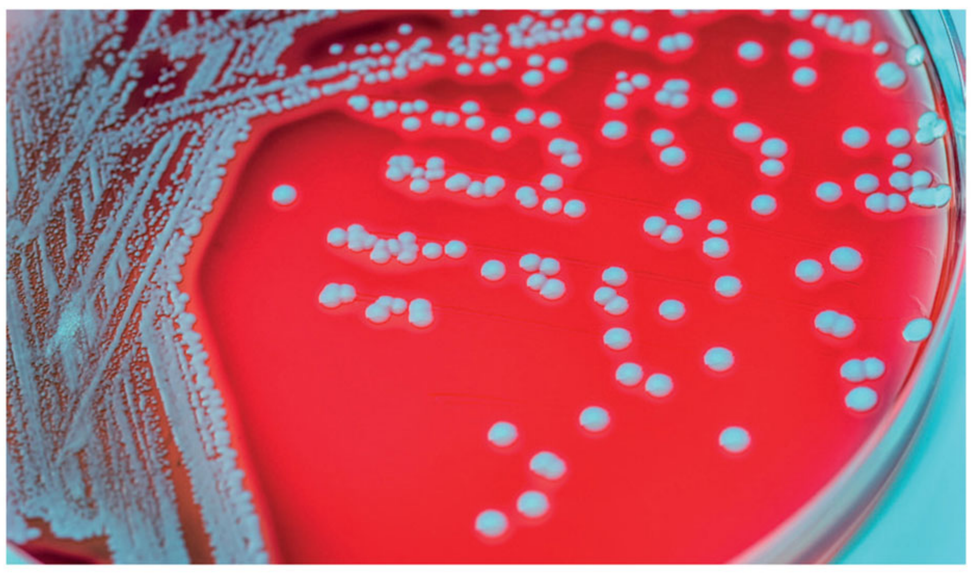
MRSA

Over the last few decades, methicillin-resistant *Staphylococcus aureus* (MRSA) has developed into one of the most significant drug-resistant microorganisms globally. It leads to significant morbidity and is associated with rising healthcare expenditure. MRSA colonisation has repeatedly been shown to be associated with an increased risk of contracting an MRSA infection within one year and of dying from such an infection.[31] A study on patients undergoing haemodialysis found that nasal MRSA carriers had a significantly higher mortality rate.[45]

20 – 60 % of patients with MRSA colonisation in acute care settings went on to develop an MRSA infection.[46] Where contact protection measures are inadequate, MRSA can be transmitted by both staff and patients. Proper basic hygiene, particularly hand disinfection, is therefore essential.[31]

Screening

Screening for *S. aureus* or MRSA usually includes nasal screening. In addition to the nasal vestibule (58 – 88 %), MRSA is frequently found in the navel (56 %), perianal area (53 %), pharynx (53 %), groin (50 %) and axillae (31 %). The probability of identifying MRSA carriers is increased by combining swabs from different sites. The recommendation given in the literature is that standard screening for *S. aureus* prior to cardiac and orthopaedic surgery should include swabs from at least three different sites.[36,47,48]



Vascular access device-associated infections

Catheter-related bloodstream infections (CRBSI)

Vascular access devices are an essential component of modern medicine. They can be used to administer drugs, electrolytes, blood and blood products, and are essential for parenteral nutrition. They are also used diagnostically (e. g. for haemodynamic monitoring) and therapeutically (in haemodialysis and plasmapheresis). Proper management is essential for minimising the risk of serious infection-related complications. In sepsis, microorganisms and/or microbial toxins enter the bloodstream and cause a complex systemic inflammatory reaction.

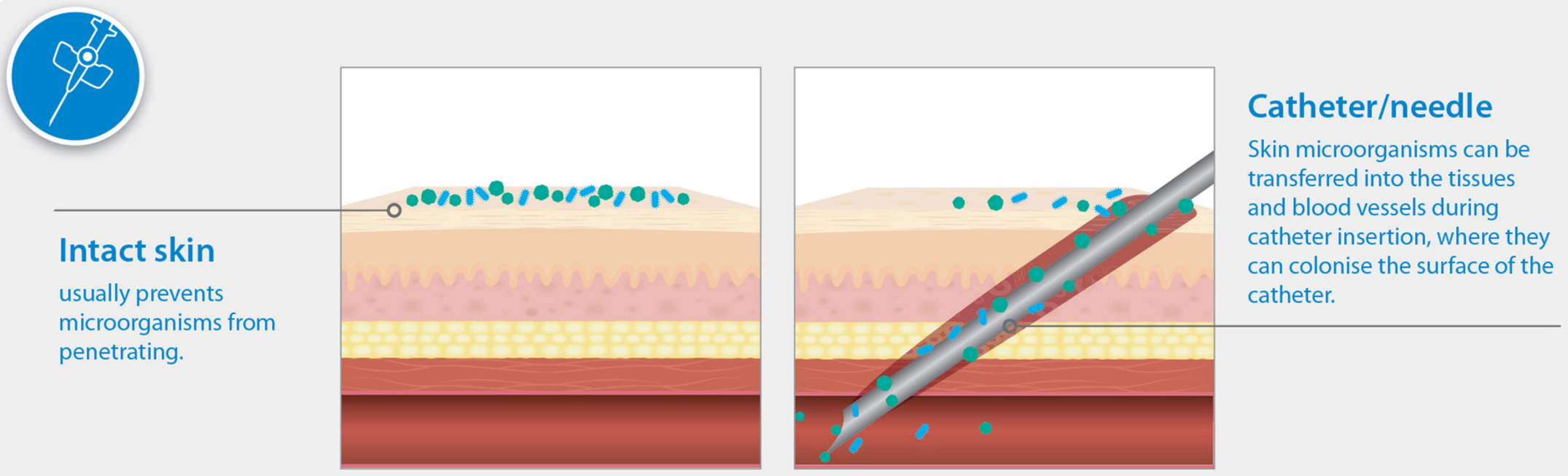
Essential, but high risk

In Europe and the US, more than half of hospitalised patients are treated using at least one vascular access device (peripheral or central venous catheter). But as well as the various benefits these devices bring, their use also carries some risk. Because they create a permanent break in the skin, microorganisms can invade the surrounding tissue or even enter the bloodstream. In very rare cases, infused fluids can cause sepsis. Much more common is the development of a vascular access device-associated infection as a result of previous colonisation of the device.

It has been demonstrated that colonisation of the catheter exit site leads to colonisation of the catheter or catheter-associated sepsis involving the same species of bacteria.[49] **Consistent application of preventive measures during insertion and care of the vascular access device could prevent up to 70 % of these infections.**[50] The Commission for Hospital Hygiene and Infection Prevention (KRINKO) therefore recommends skin disinfection with skin antiseptics which have a residual effect[51] (e. g. octeniderm® colourless) and ensuring that access devices are properly cared for.

Only octenidine demonstrates a **statistically significant decrease in bacterial load** around the catheter exit site **48 hours** after application.[52]
Octenidine is also preferred in the most recent KRINKO recommendations on prevention of vascular access device-associated infections in premature babies.[53]

There are projected to be 20,000 cases of nosocomial primary sepsis – including 8,400 cases of central venous catheter-associated sepsis on intensive care units – in Germany annually.[51] Central venous catheter-associated sepsis leads to an average increase in length of hospital admission of 2.8 days. The increased length of intensive care unit stay alone therefore results in additional costs of € 34 million per year.[54]



Drug resistance

WHO sounds the alarm!

In the early years of the 20th century, infectious diseases were the number one cause of death in Europe. The discovery of antibiotics around 90 years ago, however, led to a revolution in medicine. Suddenly, bacterial infections were no longer the dreaded diseases they had been in the past. Over many years, however, large scale use of antibiotics – both in medicine and in farming – has enabled microorganisms to develop a wide variety of resistance mechanisms. As a result, we are now faced with the problem that microorganisms involved in infections such as surgical site infections can in some cases no longer be controlled using standard therapies.[55]

Raising awareness of the need for more prudent antibiotic use

The WHO is warning of a post-antibiotic era, in which bacterial infections which have been completely treatable for decades once again become fatal diseases. The WHO considers antimicrobial resistance to be one of the top three threats to global health security. As well as making it harder to select the right antibiotic for treating an existing infection, resistance also makes it harder to select the right antibiotic for prophylaxis during surgery. Antibiotic resistance is increasingly affecting last-resort antibiotics such as carbapenems and colistin.[64,124]

The period from 2000 to 2015 saw a dramatic 65 % rise in global antibiotic use in human medicine.[56] To help raise public awareness of the dangers of antibiotic resistance, in 2008 the ECDC launched European Antibiotic Awareness Day. EU member states are invited to take steps to promote more prudent use of these life-saving medicines.

Total antibiotic use in human medicine in Germany is 700 – 800 tonnes per year. About 85 % of this is prescribed in the community and around 15 % in hospitals.[57]

The WHO recommends:

- better monitoring of resistance
- controlled use of antibiotics
- encouraging more circumspect use of antibiotics in all fields
- improving infection prevention in hospitals
- raising public awareness

Antibiotic use in Germany

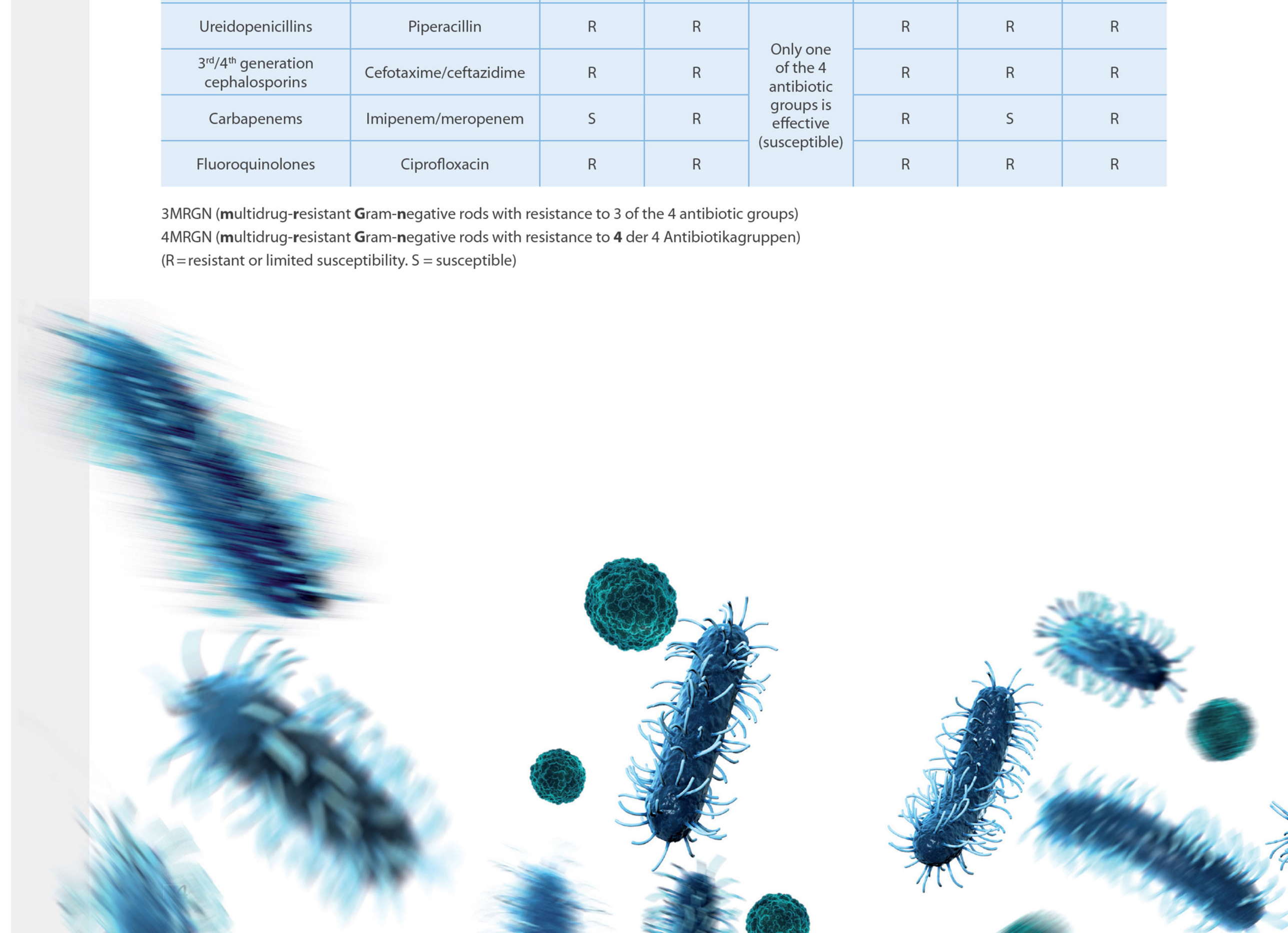
Multidrug-resistant Gram-negative bacteria (MDRGN)

Antibiotic-resistant bacteria are a particular problem on intensive care units. Until quite recently, the focus was generally on (methicillin-resistant) *S. aureus*. Gram-negative bacteria, however, are increasingly coming to be seen as an even greater danger. In German, they are designated 3MRGN or 4MRGN, depending on their resistance profile.

Classification of multidrug-resistant Gram-negative bacteria by resistance[58]

Antibiotic group	Lead substance	Enterobacteriaceae		*Pseudomonas aeruginosa*		*Acinetobacter baumannii*	
		3MRGN	4MRGN	3MRGN	4MRGN	3MRGN	4MRGN
Ureidopenicillins	Piperacillin	R	R	Only one of the 4 antibiotic groups is effective (susceptible)	R	R	R
3rd/4th generation cephalosporins	Cefotaxime/ceftazidime	R	R		R	R	R
Carbapenems	Imipenem/meropenem	S	R		R	S	R
Fluoroquinolones	Ciprofloxacin	R	R		R	R	R

3MRGN (**m**ultidrug-**r**esistant **G**ram-**n**egative rods with resistance to 3 of the 4 antibiotic groups)
4MRGN (**m**ultidrug-**r**esistant **G**ram-**n**egative rods with resistance to **4** der 4 Antibiotikagruppen)
(R = resistant or limited susceptibility. S = susceptible)



Mupirocin and chlorhexidine resistance in patient decolonisation

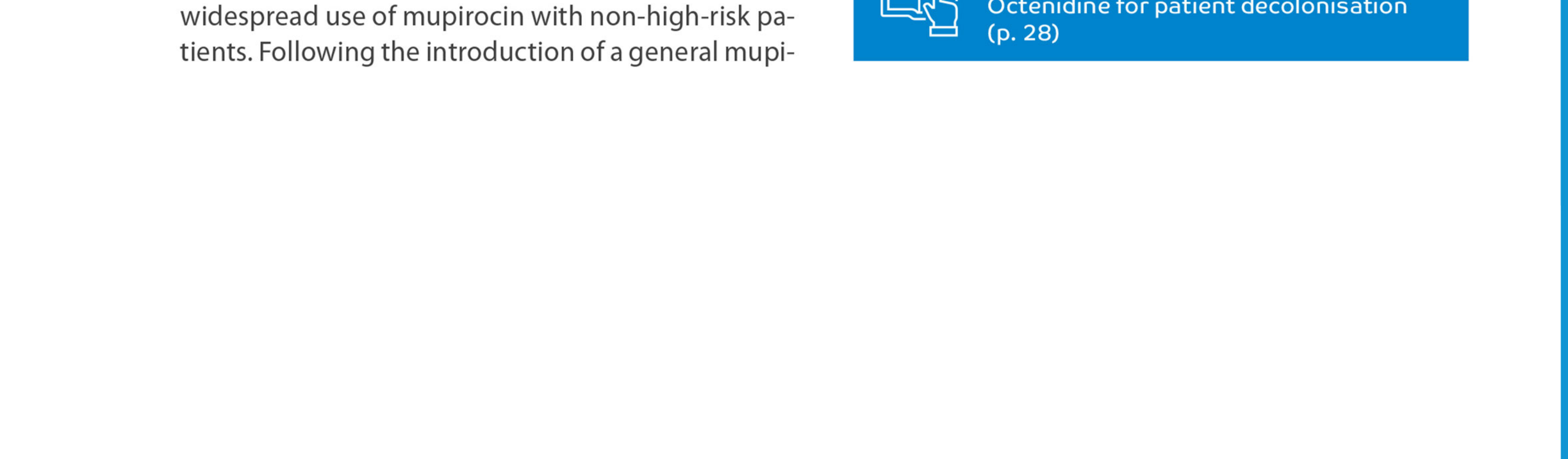
Despite excellent hygiene standards in healthcare facilities in the developed world, up to 10 % of patients suffer a nosocomial infection. One in four of these is caused by an antibiotic-resistant organism.[55] To help prevent endogenous infections such as surgical site infections, defined groups of patients are subjected to whole body decolonisation. Because the literature on this subject is predominantly British/American, this practice often makes use of a combination of the antibiotic mupirocin (nasally) and chlorhexidine (for washing the body). The undoubted efficacy of this practice has been repeatedly demonstrated.

The downside is, however, becoming increasingly apparent. Increased topical use of mupirocin has led to reports of mupirocin-resistant MRSA from a number of countries. A recent publication from Saxony reports a large increase in mupirocin-resistant strains. Whereas from 2000 to 2015 only 1 % of *S. aureus* at Dresden University Hospital was mupirocin-resistant, in 2015/2016 this figure soared to nearly 20 %.[59] Miller *et al.* also warn against the widespread use of mupirocin with non-high-risk patients. Following the introduction of a general mupirocin prophylaxis protocol, mupirocin resistance of MRSA strains rose from 3 % to 65 %.[60] Similarly, in view of the risk of resistance developing, Bode *et al.* recommended that mupirocin be used solely in patients who are known to be *S. aureus* carriers.[40]

A number of studies have also identified resistance/adaptation to chlorhexidine.[61–63] Although chlorhexidine in products intended for topical use is used at concentrations above the minimum inhibitory concentration (MIC) for resistant organisms, it can contribute to the induction of cross-resistance to antibiotics such as colistin. Vali *et al.* found that MRSA isolates exposed to chlorhexidine had raised MICs for chlorhexidine, vancomycin, gentamycin and oxacillin.[64]

For this reason, the hunt is on for alternative active substances for patient decolonisation.[66]

See also:
Octenidine for patient decolonisation (p. 28)



Patient decolonisation

An additional preventive hygiene practice

Surgical site infections, CRBSIs, pneumonia and other nosocomial infections are often caused by the patient's endogenous microbial flora. Practices which reduce this flora have been proven to reduce the risk of infection. Patient decolonisation – generally involving a combination of antiseptic whole body washing and nasal decolonisation – is performed prior to surgery (preoperative washing) and on intensive care units (preventive washing). A distinction is made between universal decolonisation of all patients (with no prior screening) and targeted decolonisation of carriers.

Objectives of patient decolonisation

- to reduce nosocomial infections
- to reduce antibiotic use
- to improve patient safety
- to reduce follow-up and care costs

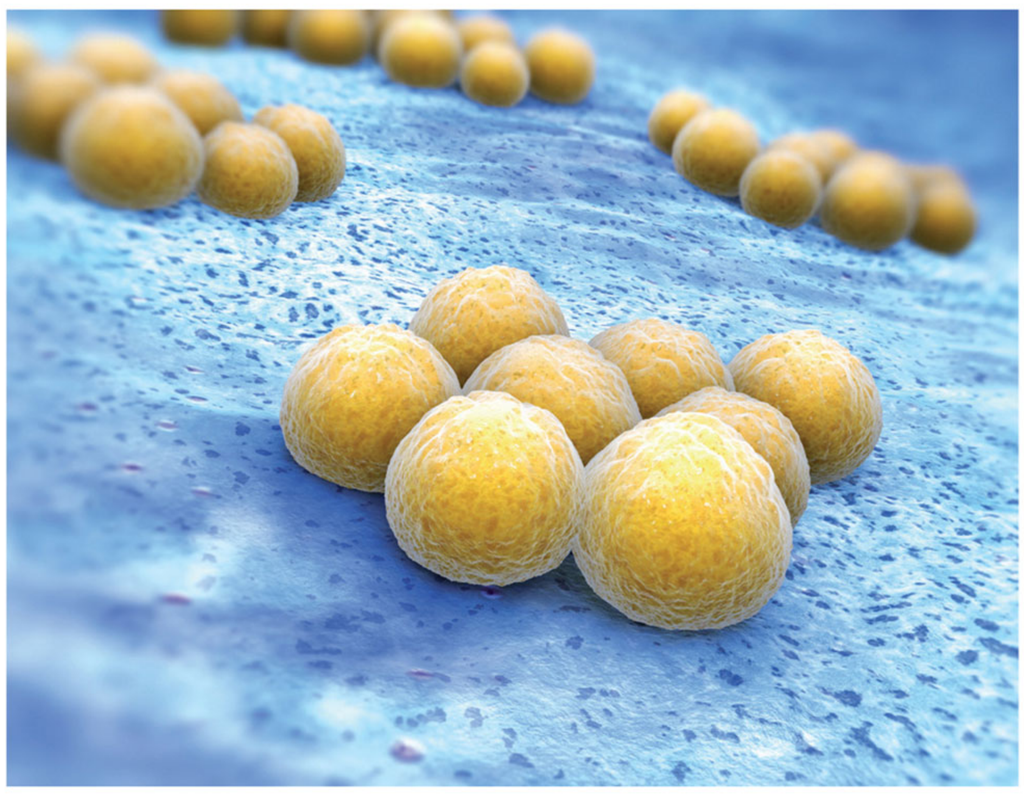
...on the intensive care unit

Decolonisation strategies – universal or targeted?

Hospitals worldwide are increasingly relying on preventive measures to stop the spread of multidrug-resistant microorganisms. Patients on intensive care units in particular are at increased risk of infection. Consequently, 'problem microorganisms' need to be effectively eliminated or the microbial load needs to be reduced to an extent which reduces the infection risk and prevents transfer to other patients. A key practice with a good evidence base is preventive patient decolonisation. Ideally this involves decontaminating the nasal vestibules, the whole of the skin and any wounds, generally simultaneously.

Multidrug-resistant organisms on the rise

Intensive care-acquired bloodstream infections are a key risk of intensive care treatment. In addition to methicillin-resistant staphylococci (MRSA), resistant organisms such as vancomycin-resistant enterococci (VRE) and multidrug-resistant Gram-negative bacteria (MDRGN) are also playing an increasingly important role in these infections. It is these pernicious microorganisms which are responsible for increasing morbidity and mortality in intensive care patients.[70,71]



Should we wait for the lab results?

In practice, patients are primarily decontaminated once a microorganism has been positively identified in lab tests *(targeted decolonisation)*. In addition to the cost of performing microbiological testing, this method has one major disadvantage – decolonisation is commenced at too late a stage. By the time microbiology results are available, the organism may already have spread – either to other sites on the same patient or to other patients and staff.[72]

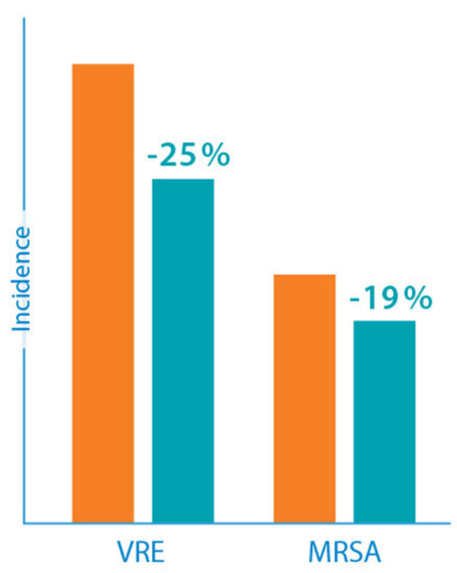
The alternative is *universal decontamination*. In this case, patients do not undergo comprehensive screening. Instead, all patients – irrespective of their bacterial status – commence decolonising washes on admission. In the last few years, a number of large clinical studies have shown that 'preventive washing' is both efficacious and cost-effective. The impressive success of universal decolonisation procedures is due to two factors. Firstly, they eliminate both the patient's own endogenous skin flora – responsible for the large majority of nosocomial infections – and organisms transmitted from elsewhere. Secondly, the intervention is commenced immediately and, unlike targeted decolonisation, is not subject to any delay.[72,73]

Scientifically proven! Universal decolonisation of intensive care patients, and targeted and universal decolonisation of patients prior to a range of operations can reduce the number of hospital-acquired infections and enhance cost-effectiveness.[37,74-77]

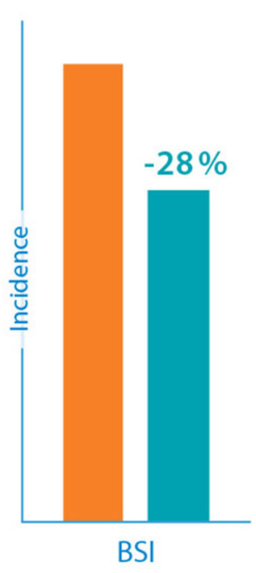
Evidence for universal decolonisation

Patient decolonisation is superior to conventional washing

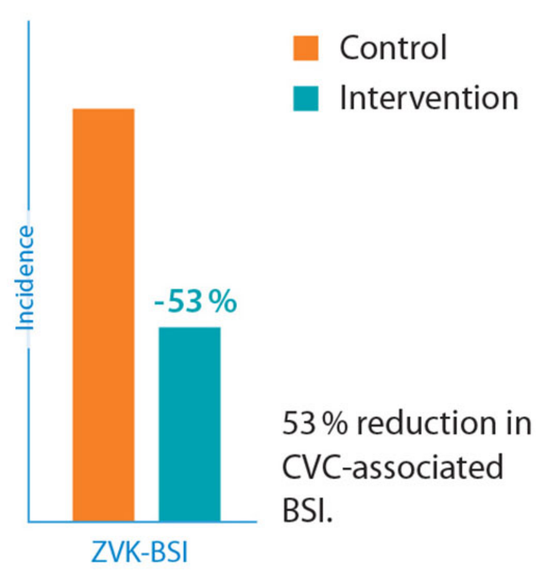
Climo M.W. et al., 2013: A comparative study of more than 7,000 intensive care patients found that, compared to conventional washing, daily whole body washes with antiseptic-impregnated wash cloths reduced the rate both of VRE and MRSA transmission and of bloodstream infections.[73]



23 % reduction in nosocomial transmission of multidrug-resistant organisms. 25 % and 19 % reduction in transmission of VRE and MRSA respectively.



28 % reduction in nosocomial BSI.



53 % reduction in CVC-associated BSI.

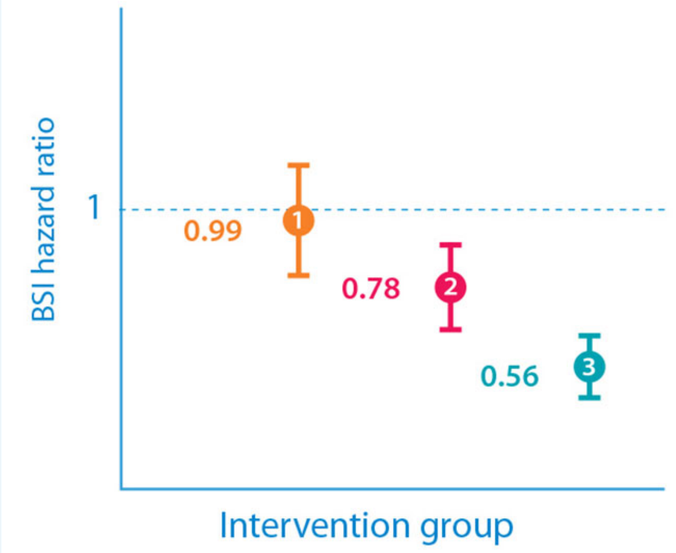
Huang S. et al., 2013: **Patients in this study were divided into three groups:**

MRSA screening plus isolation

MRSA screening plus isolation, targeted decolonisation by whole body antiseptic washing and nasal decolonisation

No MRSA screening, but universal decolonisation of all patients throughout their stay on the ICU irrespective of their microbial status

This study, involving more than 74,000 intensive care patients, impressively demonstrates that universal decolonisation irrespective of patient microbial status is more effective than alternative methods, such as screening and isolation, and screening plus targeted decolonisation. There was a 37 % decrease in clinical MRSA isolates and an – organism-independent – 44 % decrease in sepsis rates.[72]



Group 3 had the lowest risk of bloodstream infections.

Evidence for universal patient decolonisation with octenidine

Numerous studies have long shown that washing with preparations containing octenidine yields good results in MRSA-colonised patients. Octenidine is considered at least equivalent to chlorhexidine.[78-80]

Internationally, patient decolonisation is predominantly performed with chlorhexidine and mupirocin preparations. Questions have, however, been raised about their use for universal decolonisation due to concerns about resistance.[47]

> *« In the DACH countries, octenidine based products are available which surpass chlorhexidine in terms of effectiveness and tolerability.*[80]*»*
>
> Prof. Dr. Kramer, Greifswald University Hospital

Universal decolonisation at Charité

Gastmeier P. et al., 2016: Over a two-year period, approximately 30,000 intensive care patients at Charité Hospital in Berlin underwent regular decolonisation with octenidine-based products (octenisan® wash cloths throughout their stay in the hospital, octenisan® md nasal gel for five days). This reduced bloodstream infections on medical intensive care units by 22 % and positive tests for MRSA by 42 %. For patients and patient safety, this means a reduction in the risk of infection with and transmission of multidrug-resistant organisms. One positive side-effect for the hospital and staff was a reduction in the number of isolation days by just under 3,000 days.[81]

Care bundles for fighting MRSA on intensive care units

Spencer C. et al., 2013: A team of intensive care specialists studied the effect of daily patient washes with octenidine combined with application of a mupirocin-based nasal ointment for five days. These measures achieved a 76 % reduction in the number of patients colonised by MRSA. The authors therefore view octenidine as an acceptable alternative to chlorhexidine.[61]

Octenidine-based washes reduce nosocomial transmission rate

Lewalter K., 2015: This observational study demonstrated the effect of daily octenidine-based washes on MRSA transmission on a medical intensive care unit. Introducing routine washes more or less eliminated MRSA transmission, enabling the unit to suspend routine patient screening.[83]

MRSA decolonisation with octenidine in extended care

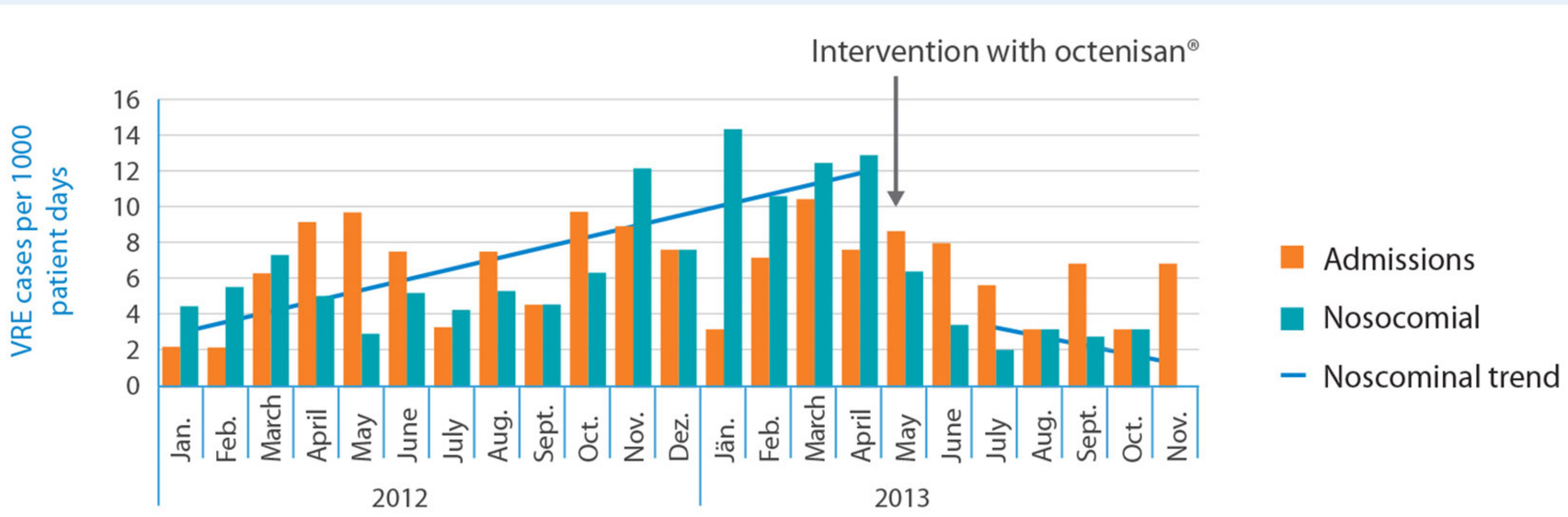
Chow A. et al., 2018: This interventional study examined the effect of two protocols on MRSA rates in extended care facilities in Singapore. In hospital A, in addition to the universal whole body washes with chlorhexidine which were already standard practice, MRSA carriers underwent targeted decolonisation with an octenidine-based nasal gel for five days. This reduced the MRSA rate from 31 % to 19 %, underscoring the importance of including nasal decolonisation in care bundles. At hospital B, there was no decolonisation protocol in place prior to the intervention. Implementation of the octenidine bundle (universal whole body washes with octenisan® wash lotion for all patients and targeted nasal decolonisation with an octenidine-based nasal gel for five days for MRSA carriers) produced a statistically significant reduction in the MRSA rate from 48 % to 34 %.[133]

Preventive octenidine washes

Niederalt G., 2017: All patients on intensive care units at University Hospital Regensburg underwent washes with octenisan® wash cloths and wash caps. After these washes were introduced, there was a clear drop in the number of multidrug-resistant organisms and a drop in the transmission rate for selected organisms. The waterless system also led to improvements in patient care and to the ward routine.[71]

Octenidine-based washes for fighting VRE

Messler S. et al., 2014: A reduction in both colonisation and the incidence of VRE-associated infections was observed following the introduction of octenidine-based washes and simultaneous improvements to hand disinfection compliance on an intensive care unit.[82]



Evidence for targeted decolonisation with octenidine

In long-term care settings

Pichler G. et al., 2017: After measuring MRSA prevalence, this interventional cohort study at Albert Schweitzer Hospital in Graz examined the practicability and efficacy of an octenidine-based, antibiotic-free decolonisation regime. Patients were screened by taking swabs from their nasal vestibules, axillae, groins and any wounds or vascular access sites present. The researchers were surprised to find that 20 % of the patients investigated were MRSA carriers. MRSA was identified on nasal swabs in just 52 % of MRSA carriers, so that screening involving just the nose would have failed to identify one in two MRSA-positive patients. To achieve decolonisation, octenidine-based products were used on the body, hair, nose, mouth, wounds and vascular access sites. After a total of three cycles, 93 % of carriers were MRSA-free.[48]

Of staff

Hübner N.-O. et al., 2009: MRSA-colonised staff can transmit MRSA to patients. After a total of three seven-day cycles using octenidine-based products, 98 % of staff treated had been successfully decolonised (68 % after the first cycle).[78]

On the neonatal unit

Wisgrill L. et al., 2017: Premature babies are another group of patients at high risk of nosocomial infection. MRSA screening is common, but even methicillin-susceptible *S. aureus* (MSSA) causes comparable morbidity and mortality in this group of patients. An interventional study of more than 1,000 premature babies with a birth weight below 1,500 g investigated the effect of octenidine on the incidence of MSSA infections. MSSA-colonised patients were decolonised by applying a mupirocin and 0.1 % octenidine solution for 5 days. This halved the incidence of MSSA infections (from 1.63 to 0.83 per 1,000 patient days).

The procedure used did not have any undesirable side effects, demonstrating that octenidine is very well tolerated, even in neonates.[84]

See also:
Octenidine for patient decolonisation (p. 28)

Preventing nosocomial infection on intensive care units

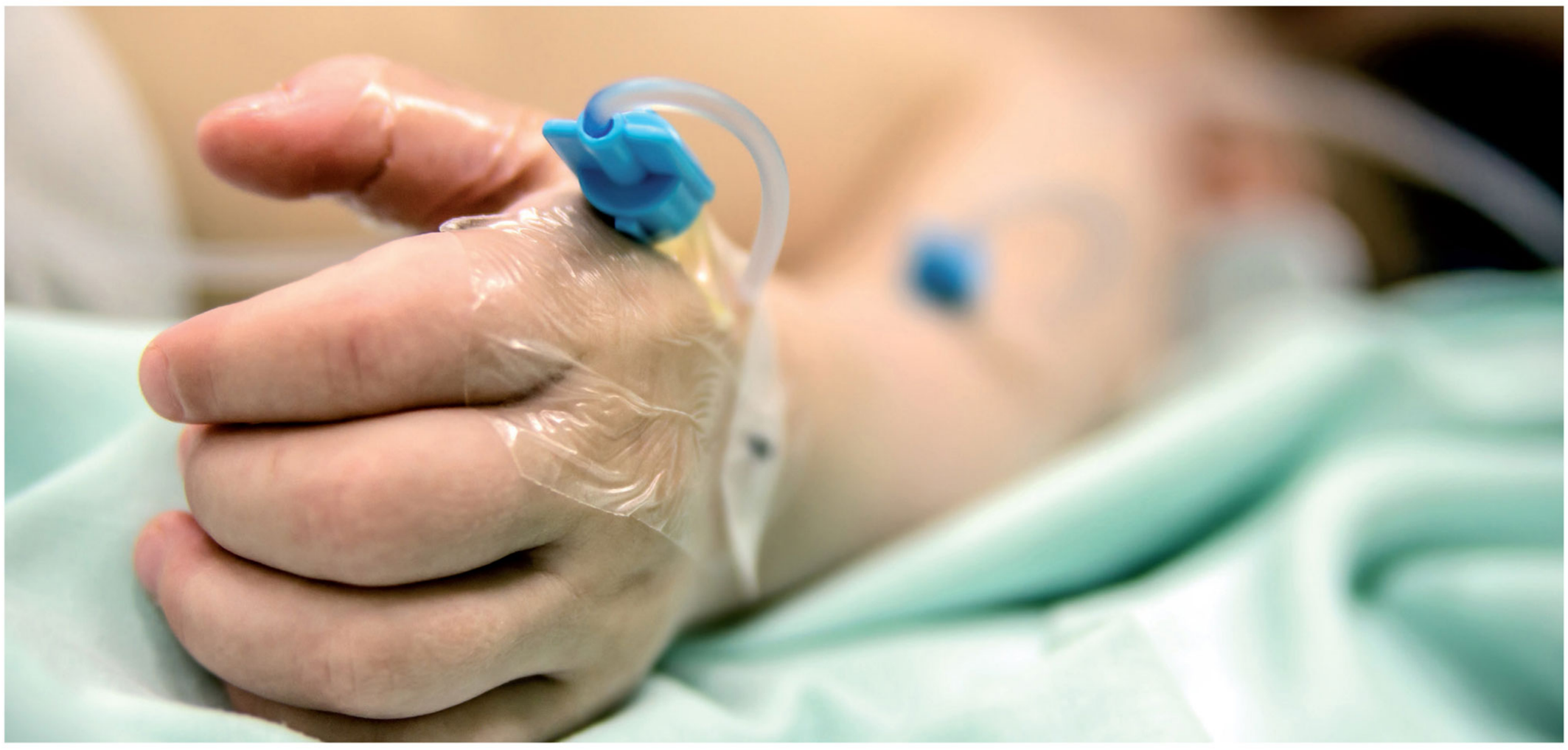
In view of the weight of scientific evidence, patient decolonisation is now one of the top 5 recommendations for nosocomial infection prevention on intensive care units. Daily antiseptic washes with chlorhexidine or octenidine can reduce the incidence of bloodstream infections. This appears to remove the need for general screening.[9]

Prevention of vascular access device-associated infections with octenidine

In severe cases, infections associated with vascular and other access devices can develop into sepsis or septic shock. Intensive care patients are particularly at risk.

To permanently reduce skin flora around the vascular access device exit site, it is recommended that an alcoholic skin antiseptic should be used in combination with a long-acting active substance such as octenidine (e. g. octeniderm® colourless) before insertion.[85,86] With a 48 hour residual effect, octeniderm® colourless is more clinically effective than both alcohol only, and alcohol and benzalkonium chloride preparations.[52, 87] octeniderm® colourless achieves a persistent reduction in bacterial load, reducing the risk of vascular access device-associated infections.

For care of the exit site following insertion of a vascular access device, the recommendation is for an aqueous antiseptic containing a long-acting active substance such as octenidine (e. g. octenisept®).[86] Numerous clinical studies have demonstrated that octenisept® is well tolerated and effective. In one study, the catheter exit site in 62 severely immunosuppressed patients with central venous catheters was disinfected with octenisept® each time the dressing was changed. There was a significant reduction in microbial colonisation of the surrounding skin, with no side effects observed.[88]



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Prevention is better than infection!

Octenidine – shielding you from infection

we protect lives worldwide

Decolonisation before elective surgery

The goal – prevention of surgical site infections

Surgical site infections are a major driver of healthcare costs. Patient decolonisation – either preoperative decolonisation or targeted decolonisation of MRSA carriers – is an effective method for reducing surgical site and other nosocomial infections. Preoperative washing combined with nasal treatment reduces infections and shortens hospital stays, reducing care and treatment costs.

It's proven – preoperative patient decolonisation works

Both the WHO and the CDC include surgical site infections in their list of potentially preventable infections in healthcare. Although the causes of postoperative wound infection are complex and multifaceted, it is estimated that half of all such infections could be prevented if appropriate practices were adopted.[89] In view of the economic significance of these infections, implementation of appropriate procedures is strongly recommended.[90] These include patient decolonisation before elective surgical procedures. Although preoperative skin antisepsis in the operating room immediately before making the skin incision eliminates the majority of bacteria in the immediate operating field, there remains a small risk that the patient's remaining endogenous flora could give rise to a subsequent surgical site infection.

> The objective is not zero infections, but zero tolerance for hygiene deficits.

There is now a wealth of scientific studies showing that appropriate preoperative practices can reduce the risk of surgical site infections and deliver huge cost savings.[91]

S. aureus carriers undergoing orthopaedic or cardiothoracic surgery are at increased risk of contracting a surgical site infection. A meta-analysis of 25 studies found that preoperative decontamination in these specialities reduces *S. aureus*-associated surgical site infections by an average of 50 %.[92] Screening followed by targeted decolonisation using whole body washing or antibiotic prophylaxis was also effective in reducing postoperative *S. aureus*-associated surgical site infections following cardiac and orthopaedic surgery.[93]

Universal decolonisation strategies are more practical. Because getting from microbiology results to actual eradication on admission has proven to be very difficult, all patients now undergo decolonisation procedures prior to joint replacement surgery, with no prior screening.[132]

There are also an increasing number of studies from other disciplines. A recently published review of surgical site infections in spinal surgery, for example, found the incidence of surgical site infections in this field to be between 1 % and 9 %. The most common disease organisms are endogenous Gram-positive bacteria.[44]

« In vascular surgery, particular attention should be paid to measures aimed at reducing the patient's endogenous skin and mucosal (nose/throat) flora. These include preoperative washing, decolonisation of nasal S. aureus carriers, and surgical skin antisepsis using an alcohol-based combination preparation.[94] »

Petra Gastmeier, Charité Universitätsmedizin Berlin

See also:
Surgical site infections (p. 7)

Evidence from orthopaedics – fewer surgical site infections …

Back in 1987, a UK study involving more than 2,000 patients found significantly lower rates of surgical site infection when the patient was given a preoperative chlorhexidine wash than when given a wash with normal soap or a placebo (9 % vs 12 – 13 %).[95] Advances in medicine and hygiene mean that infection rates today are much lower (0.5 % – 3 %).

There is good evidence for various orthopaedic procedures that patient washes with chlorhexidine-soaked wipes on the day before or the day of the operation can significantly reduce surgical site infections. For knee replacements, for example, a reduction in the incidence of surgical site infections from 2.2 % to 0.6 % has been reported.[96–98] A prospective study of total joint arthroplasty also found a significantly lower infection rate when patients underwent a five-day decolonisation procedure (nose and skin) prior to surgery (2.7 % vs. 1.2 %).[99]

A meta-analysis of 19 studies found that orthopaedic patients benefit from *S. aureus* decolonisation and that implementing a decolonisation procedure is cost effective.[103] A review of four studies on nasal decolonisation prior to knee or hip replacement surgery, involving a total of 10,000 patients with MRSA colonisation, confirmed the effectiveness of this practice (SSI incidence 1.1 % vs. 1.8 % – a nearly 40 % decrease in risk).[104]

A UK working group which investigated nearly 13,000 patients over a period of eight years found that using an *S. aureus* protocol prior to elective knee or hip replacement leads to a statistically significant reduction in postoperative infections (1.41 % vs. 1.92 %). All patients, irrespective of their carrier status, were asked to take daily showers with an octenidine body wash for five days before surgery. Patients with *S. aureus* colonisation were additionally treated with an antibiotic nasal ointment for five days prior to and a further five days after surgery.[105]

Endogenous reservoirs: Most surgical site infections are caused by the patient's own endogenous skin and nasal flora.[100-102]

… and cost savings

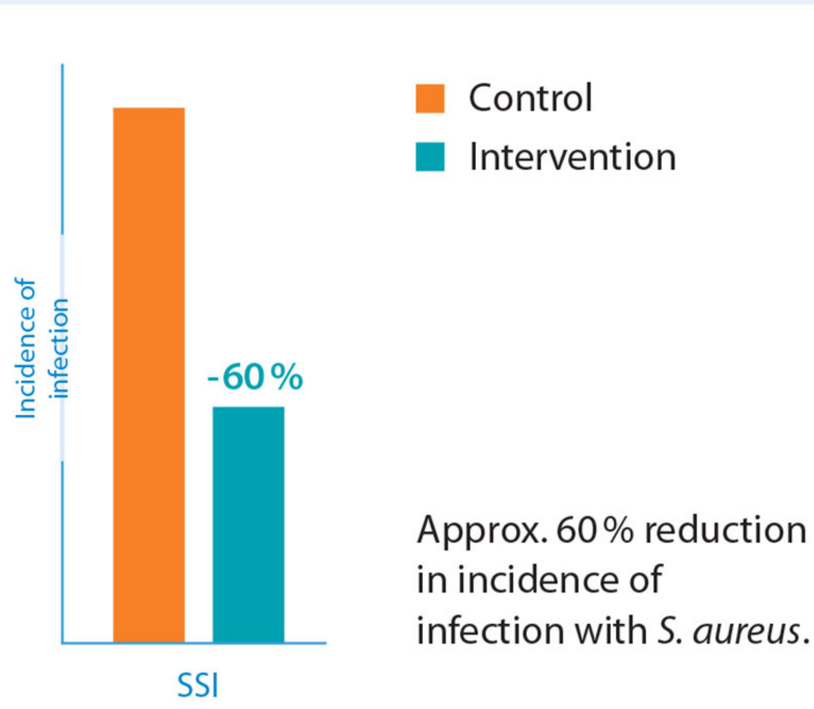
Stambough *et al.* compared targeted decolonisation after screening with universal decolonisation of all patients with no prior screening in a population made up of approximately 4,000 patients undergoing total joint arthroplasty. They found that this not only reduced the incidence of SSIs from 0.8 % to 0.2 %, it also delivered cost savings. By decolonising all patients for five days prior to surgery, the hospital realised annual savings of $ 717,000, even taking into account the additional cost of decolonisation products.[106]

Another analytical model evaluated the cost effectiveness of decolonisation of high-risk patients before arthroplasty. Universal decolonisation and screening (nose, axillae, groins and throat) was found to be the most effective strategy for patients. From the hospital perspective, universal decolonisation was also found to be the most economical strategy (more effective with lowest cost).[47] Kapadia *et al.* estimated that preoperative washing could save around $ 2.1 million per 1,000 knee replacement patients. Extrapolated to the US as a whole, implementation of this measure alone would save between $ 0.8 billion and $ 2.3 billion.[29]

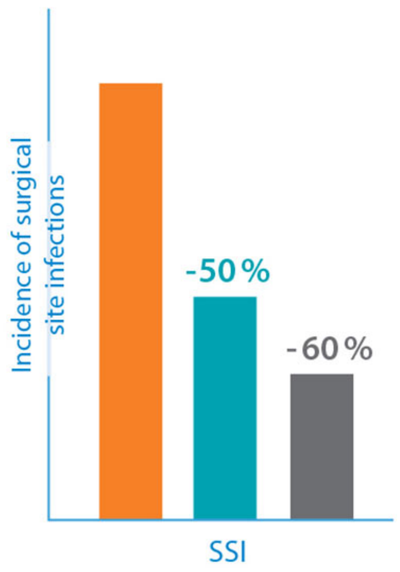
Evidence from other surgical disciplines

Fewer *S. aureus* and deep surgical-site infections and shorter hospital stays

Bode et al., 2010: One of the first major studies on preoperative patient decolonisation was carried out by Bode *et al.* (randomised and placebo controlled). Nasal *S. aureus* carriers from the departments of internal medicine, cardiothoracic surgery, vascular surgery, orthopaedics, gastrointestinal surgery and general surgery underwent treatment involving a combination of an antibiotic nasal ointment and decolonising body washes. They found that, compared to a control group, patient decolonisation resulted in significantly fewer S-aureus-associated SSIs (60 % reduction) and deep surgical-site infections and reduced the length of hospital stay.[40]



Approx. 60 % reduction in incidence of infection with *S. aureus*.



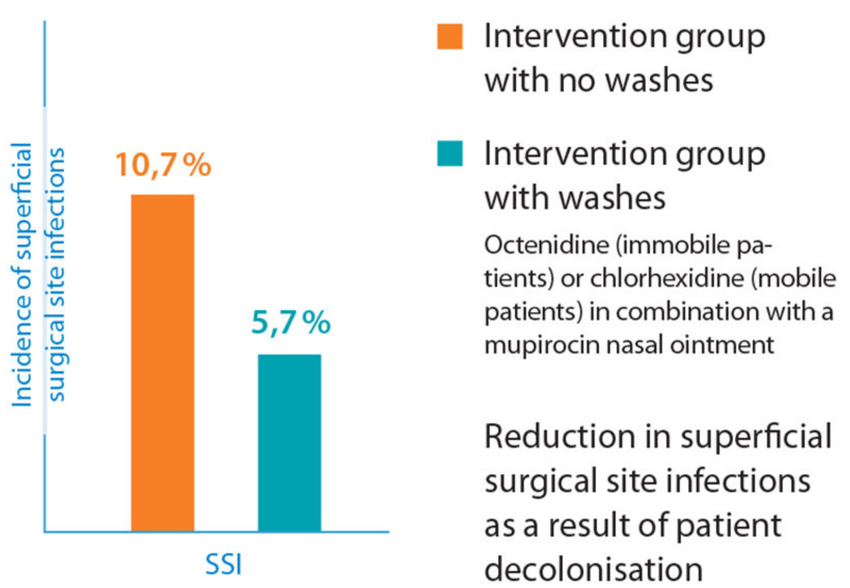
Approx. 50 % reduction in postoperative MRSA surgical site infections in the first and approx. 60 % in the second year.

Consistent fall in MRSA-associated surgical site infections

Thompson P. et al., 2013: A similar conclusion was reached in a case-control study with a total of 30,000 patients following orthopaedic, vascular, cardiac or neurological surgery over a period of three years. This study measured the effect of decolonisation of MRSA carriers on the rate of MRSA-associated surgical site infections. The study found a statistically significant decrease in infection rates in the first year, and an even larger decrease in MRSA surgical site infections in the second year. In this study, the largest effect was seen in cardiac and neurological surgery..[107]

Octenidine before cardiac surgery

Kohler P. et al., 2015: This study investigated the effect of preoperative octenidine (immobile patients) or chlorhexidine (mobile patients) washes in combination with a mupirocin nasal ointment in patients undergoing heart bypass or heart valve surgery compared to a no intervention control group. Patient decolonisation achieved a general reduction in superficial surgical site infections. There was a statistically significant reduction in coagulase-negative staphylococcus infections.[32]



Reduction in superficial surgical site infections as a result of patient decolonisation

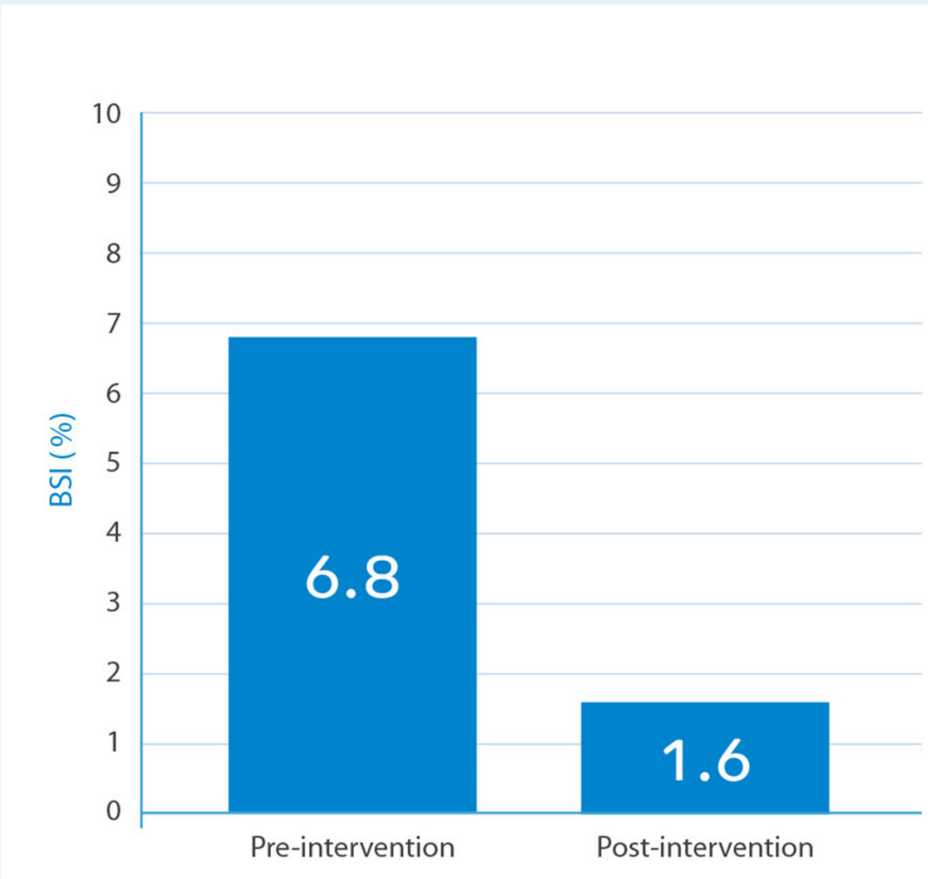
CURRENT STUDY DATA

Neurosurgery, ENT and vascular surgery

Lefebvre et al., 2017: *S. aureus* carriers who underwent decolonisation prior to deep brain stimulation surgery experienced fewer SSIs than the control group (1.6 % vs. 10.9 %).[109]

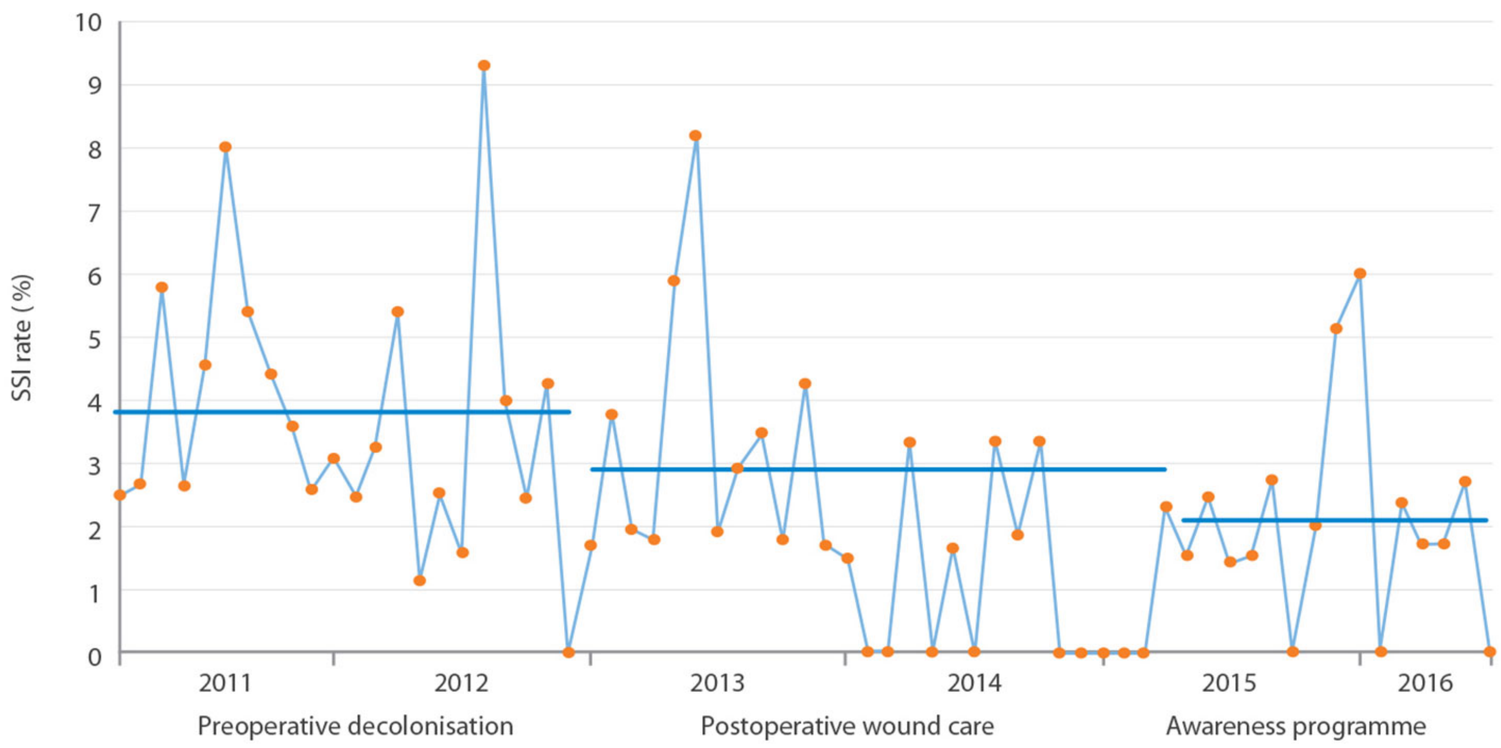
Richer und Wenig, 2008: Richer and Wenig reported some initial success with preoperative decolonisation prior to ENT surgery. Following the introduction of MRSA screening and targeted decolonisation, the postoperative MRSA infection rate fell from 0.8 % to 0 %.[110]

Parizh et al., 2018: By using a care bundle which included skin decolonisation, between 2012 and 2016 the SSI rate following revascularisation procedures of the lower extremities was reduced from 6.8 % to 1.6 %.[111]



Successful spinal surgery bundle strategy

Agarwal N. et al., 2018: A cohort study over a 10-year period found that step-by-step introduction of a variety of preventive measures each resulted in a reduction in the spinal surgery SSI rate. Following the introduction of patient decolonisation, this study additionally looked at the effect of postoperative wound care and of an active neurosurgeon awareness programme. Wound care and education together were able to almost half the incidence of infection (from 3.8 % to 2.1 %). The estimated annual cost savings for this hospital were $ 291,000.[108]



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Decolonisation

Ready for your op?

In Germany, around 15,000 people die from nosocomial infections such as surgical site infections annually.[8,133] These infections are particularly dangerous where they are caused by antibiotic-resistant organisms.

octenisan® – for decolonisation before elective procedures.

Gives you confidence and certainty.

we protect lives worldwide

Octenidine for patient decolonisation

A good evidence-based alternative

While chlorhexidine and mupirocin are the predominant products used for patient decolonisation internationally, octenidine-based products are gaining increasing traction. Numerous studies have demonstrated octenidine's success in decolonising MRSA carriers and in targeted and universal decolonisation of patients on intensive care units or prior to surgery. Because of its properties, octenidine is considered at least equivalent to chlorhexidine for decolonisation purposes – whilst being better tolerated. [48,61,69,78-81,84,88,105,112-114]

Why are people looking for alternatives?

The importance of alternatives is underlined by the increasing number of reports of resistance to mupirocin and of reduced efficacy of chlorhexidine.[59,61,66,81,115] In view of this, for universal decolonisation (where no pathogen has been detected) in particular, antibiotics should be used with considerable caution.[132]

The fact that Chlorhexidine is effective against Gram-positive bacteria but is only effective against Gram-negative bacteria in significantly higher concentrations, and that mupirocin is only effective against Gram-positive bacteria also needs to be considered.[81] In recent years there have been multiple reports of anaphylactic reactions following the use of chlorhexidine products. As a result, warnings have been issued by the relevant authorities in both Europe and the United States. [50,65,116,117]

Octenidine is listed in the latest Asia Pacific Society of Infection Control (APSIC) guidelines as an alternative substance for use in preoperative skin washing and targeted MRSA decolonisation.[134] There is little or no evidence for the use of other antiseptic agents, such as polihexanide (PHMB), povidone-iodine and didecyldimethylammonium chloride, in patient decolonisation.[67-69]

> *« We have fewer problems with Gram-positive MRSA here in Germany than in the US. The focus here has now moved to resistant Gram-negative pathogens. »* [117]
>
> Prof. Dr. Iris Charberny, Hannover Medical School

See also:
Drug resistance (p. 13)

Octenidine at a glance

Octenidine is also effective against mupirocin-resistant MRSA isolates[118] and has a residual effect lasting 48 hours.[52] These properties make it a useful alternative for decolonisation of patients with multidrug-resistant organisms.[81] It is also effective against a much broader range of pathogens than mupirocin and chlorhexidine. Octenidine is equally effective against Gram-positive bacteria such as *S. aureus*, MRSA and VRE, Gram-negative bacteria (MDRGN, ESBL-producing bacteria, etc.) and fungi.[79,119,120] Octenidine has also been found to be fully effective in the presence of the sort of protein residue levels encountered in actual practice.[118,119] Another advantage of octenidine is that it is not possible to induce stable resistance *in vitro* even in MRSA isolates.[121]

Particularly important is the fact that octenidine is very well tolerated. In the past, octenidine was used as the standard agent for wound and mucous membrane antisepsis. It is not absorbed and is not allergenic. It is therefore suitable for use in pregnancy and breastfeeding. Last but not least, it is recommended as the antiseptic of choice for use with very low birth weight (< 1500 g) premature babies.[53,84]

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Decolonisation

The octenidine strategy

The schülke bundle for combating healthcare-associated infections

octenisan®

For simple, reliable patient decolonisation.

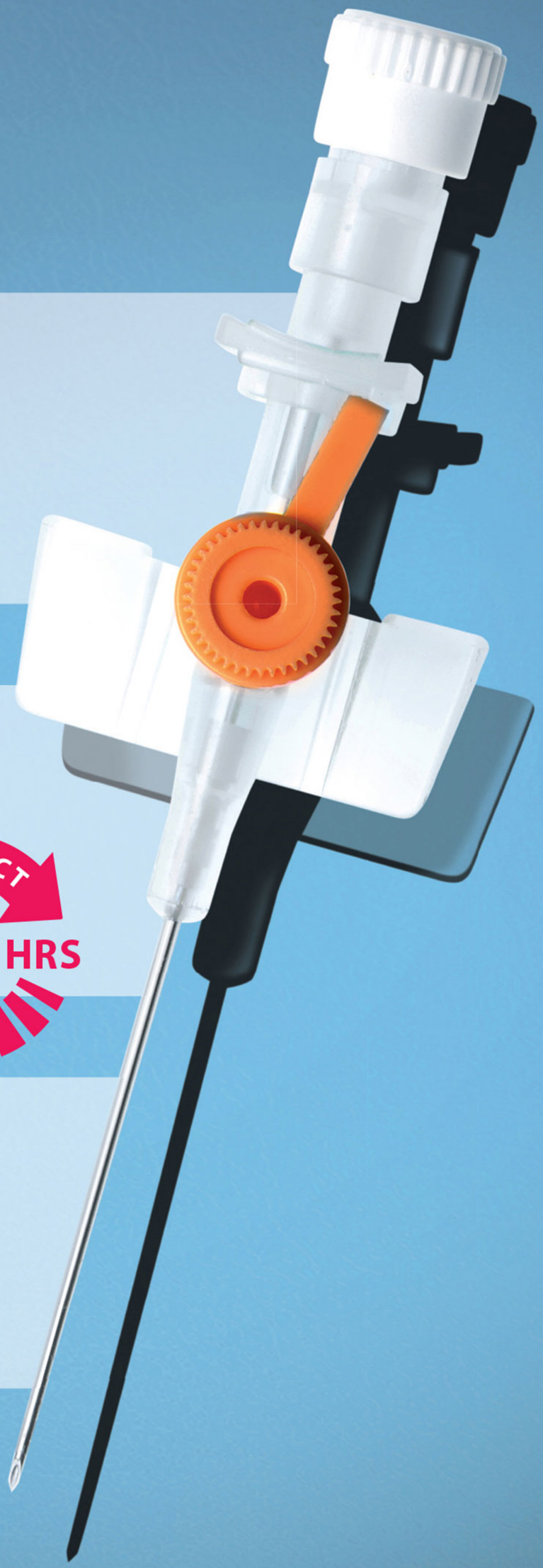
octeniderm® colourless

For long-acting 48-hour skin antisepsis prior to invasive procedures.

RESIDUAL EFFECT 48 HRS

octenisept®

For proven wound and mucous membrane antisepsis and for disinfecting catheter exit sites.



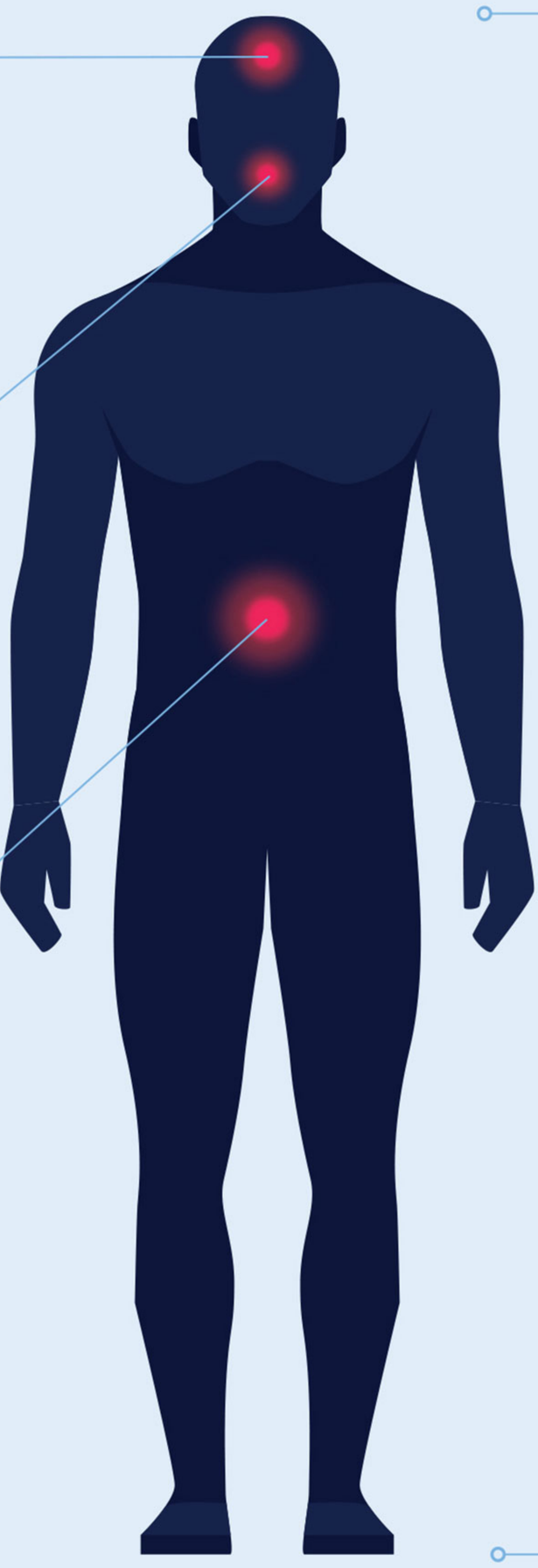
www.schuelke.com

we protect lives worldwide

The octenidine product family at a glance

schülke bundle strategy for patient decolonisation

Products containing octenidine are ideal for using in combination (bundle strategy), as there is no possibility of interactions between different active ingredients. Patient decolonisation with the octenisan® range can, for example, safely be combined with subsequent skin disinfection with octeniderm® colourless, postoperative wound care with octenilin® wound gel or wound disinfection with octenisept®, and ensures the maximum level of safety for patients.



Scalp and hair

octenisan® wash lotion

Specially designed for immobile patients:
octenisan® wash cap

Nose and throat

octenisan® md nasal gel
octenidol®

Access devices
(vascular access devices,
PEG tubes, drains)

octenisept®

Wounds

octenisept®

Body

octenisan® wash lotion

Specially designed for immobile patients:
octenisan® wash mitts

Skin antisepsis

octeniderm® colourless

Use on intensive care units

Waterless washing: leave-on products for immobile patients

Leave-on products (products that are not rinsed off after application) improve patient comfort, are much easier to use for nursing staff, and save time and money. For this purpose, schülke offers octenisan® wash mitts and octenisan® wash caps.

Benefits at a glance

- Approx. 2/3 **reduction in workload** compared to rinse-off products, meaning reduced staff costs
- **No contamination** or cleaning of wash bowls, wash cloths etc.
- **Less stress** and risk for patients recovering from severe trauma
- **No bacterial transmission** or cross-contamination via water
- **Cost savings** from procurement, storage and processing of wash bowls, wash cloths, dry wipes, etc.

Tips for targeted decolonisation with octenidine

Pichler G. *et al.* demonstrated the efficacy of antibiotic-free MRSA decolonisation using octenidine.[48,125]

Their study was carried out on patients under practice-like conditions. Both efficacy and practicability were satisfactory, and leave-on products in particular were found to reduce the workload for daily personal care. As a practical tip, the authors recommend using a pea-sized amount of octenisan® md nasal gel. This tip is particularly relevant to staff who are used to applying antibiotic nasal ointments. With gel products, a larger volume should be applied to the nasal vestibules than with more compact ointments.[126]

Long-acting skin disinfection – practical prevention of vascular access device-associated infections

With a 48 hour residual effect, octeniderm® colourless is clinically more effectively than alcohol only and alcohol and benzalkonium chloride-based preparations.[52,87] Skin microbial count is a reliable indicator of the risk of catheter-related bloodstream infection (CRBSI).[49] With its long-lasting antimicrobial action, octeniderm® colourless helps reduce the risk of CRBSI.

Use on intensive care units

Universal decolonisation by physical cleaning in patients with unknown bacteriological status

For the first 5 days

octenisan® md nasal gel

Twice daily

Throughout the admission

octenisan® wash mitts

Once daily (leave on to dry for 30 seconds)

octenisan® wash cap

2-3 times a week (leave on for 5 minutes)

Intermittent washes with water and wash lotion (e. g. weekly)

Alternatively:

octenisan® wash lotion

- Once daily body wash
- Apply undiluted and leave on for 1 minute
- Wash hair 2–3 times a week (1 minute)

As required antiseptic treatment

For the mouth and throat:

octenidol®

(Rinse for 20 seconds)

For wounds and access devices (vascular access devices, PEG tubes, etc.)

octenisept®

Once daily (leave on for 1 minute)

Vascular access device

Skin antisepsis prior to vascular access device insertion:

octeniderm® colourless

(Skin with a low density of sebaceous glands: leave on for 1 minute; skin with a high density of sebaceous glands: leave for 2 minutes)

Vascular access device exit site care:

octenisept®

Once daily (leave on for 1 minute)

Targeted decolonisation of carriers

5-day cycles
until negative bacterial status confirmed*

Screening & decolonisation

octenisan® wash mitts

Once daily (leave on to dry for 30 seconds)

octenisan® wash cap

2-3 times a week (5 minutes)

Alternatively:

octenisan® wash lotion

- Once daily body wash (1 minute)
- Apply undiluted and leave on for 1 minute
- Wash hair 2–3 times a week (1 minute)

octenisan® md nasal gel

Twice daily

As required

For the mouth and throat:

octenidol®

(Rinse for 20 seconds)

For wounds and access devices (vascular access devices, PEG tubes, etc.)

octenisept®

Once daily (leave on for 1 minute)

Other

- disposable combs
- disposable toothbrushes
- quick disinfection (e. g. mikrozid® universal wipes), e. g. for glasses, hearing aids and the patient environment
- hand disinfection
- fresh linen, towels, clothes daily

* Depending on local decolonisation procedure[48,78]

Preoperative use

Involving the patient in prevention

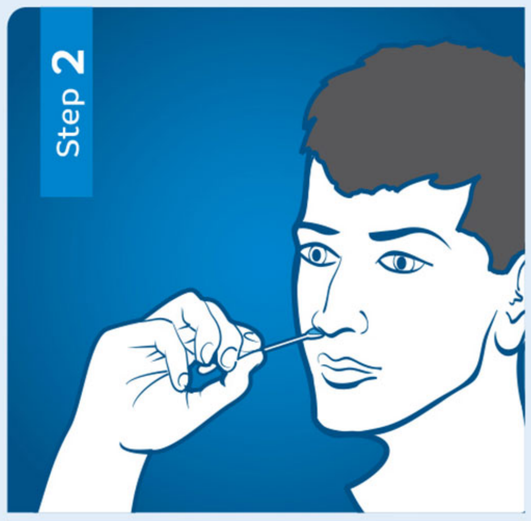
Efforts to improve patient safety and increasing public awareness mean that there is a lot of interest in patient involvement in the prevention of surgical site infections. Patients can, for example, be educated about the causes and risks of surgical site infections and, complementing the already high standard of hygiene in hospitals, be encouraged to implement additional measures themselves. Patients should be actively involved in both hand hygiene and preoperative washing.[127]

Decolonisation with octenisan® for patients with unknown bacterial status

octenisan® md nasal gel*

Twice daily

Apply a suitable quantity of nasal gel to a cotton bud.



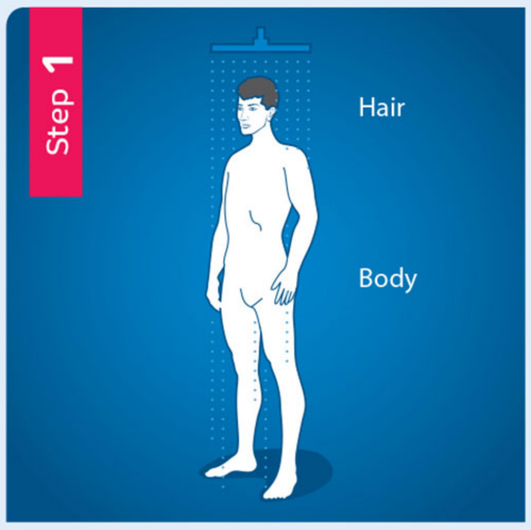
Apply the gel to the surfaces of the nasal vestibules.

Spread the gel by squeezing the sides of the nose. Remove any excess gel.

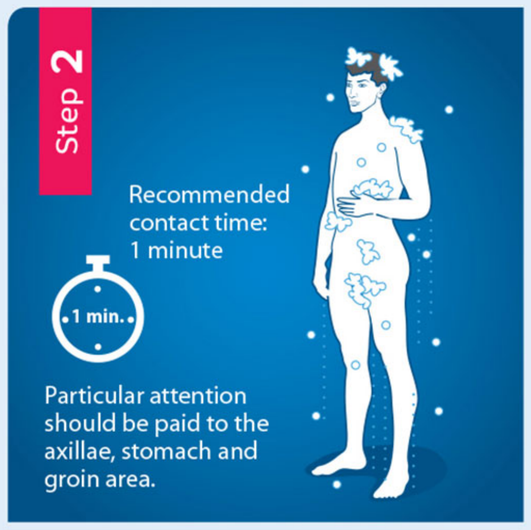
octenisan® wash lotion**

Once daily (1 minute) for skin and hair#

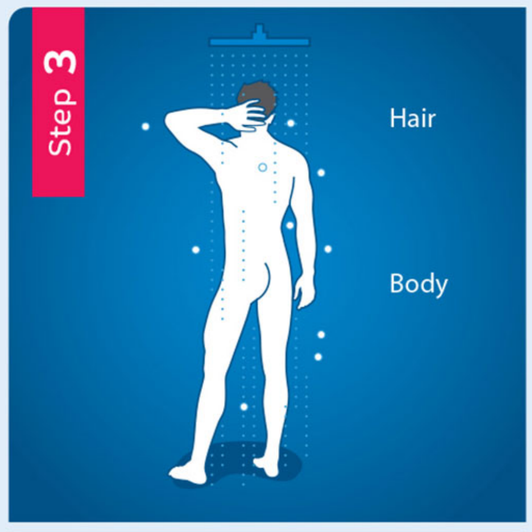
Apply undiluted and leave for 1 minute



Moisten hair and body completely.



Apply octenisan® evenly to the whole body. Pay particular attention to the axillae, stomach and groin area.



Wash off thoroughly.

Up to 5 days:

Nasal gel 2–3 x daily
Wash lotion once daily

Dry with a clean towel.

Put on clean clothes after each application.

* Warning: do not apply the gel too deep into the nose. Not suitable for children under 1.

** Do not use in children under 3.

\# After application, skin and hair care products can be applied and a hair dryer can be used. To avoid recolonisation from potentially contaminated care products, we recommend using previously unopened care products only.

A practical kit for preoperative prophylaxis

Recent studies show that decolonising whole body washes before surgery can significantly reduce the risk of surgical site infections. With octenisan® wash lotion, patients can start the decolonisation process at home. Because colonisation of the nasal vestibules plays a major role in infections, patients should also use octenisan® md nasal gel.

> Educating patients on preoperative behavioural measures for reducing infection risk using either a brochure or in person is always beneficial.[127]

A study carried out at Saarland University Hospital in 2016 assessed decolonisation measures for elective surgery from the patient perspective. The take-home message from the study was that participants really did use the recommended octenisan® Set kit, that 95.8 % found the procedure simple and that 98.9 % would do it again. Actively involving patients in preoperative hygiene can make them feel safer and help them feel in control.[128]

A study[128] of more than 400 people found that:

98.9 % of users would use octenisan® Set again!

octenisan® set is not available in every country.
Please check with your local distributor for availability.

Preoperative use

Decolonisation for patients with unknown bacterial status

Up to 5 days before the procedure + on the day of the procedure

Preoperative washing

octenisan® wash lotion

Once daily (1 minute) for skin and hair

Apply undiluted and leave on for 1 minute

Specially designed for immobile patients:

octenisan® wash mitts

Once daily (leave on to dry for 30 seconds)

octenisan® wash cap

Once daily (leave on for 5 minutes)

octenisan® md nasal gel

Twice daily

As required

For the mouth and throat:

octenidol®

(Rinse for 20 seconds)

For wounds and access devices (vascular access devices, PEG tubes, etc.)

octenisept®

Once daily (leave on for 1 minute)

Vascular access device

Skin antisepsis prior to vascular access device insertion:

octeniderm® colourless

(Skin with a low density of sebaceous glands: leave on for 1 minute; skin with a high density of sebaceous glands: leave on for 2 minutes)

Vascular access device exit site care:

octenisept®

Once daily (leave on for 1 minute)

Targeted decolonisation of carriers

5 → 7

5–7 day cycles
until negative bacterial status confirmed*

Screening & decolonisation

octenisan® wash lotion

- Once daily body wash (1 minute)
- Apply undiluted and leave on for 1 minute
- Wash hair 2–3 times a week (1 minute)

Specially designed for immobile patients:

octenisan® wash mitts

Once daily (leave on to dry for 30 seconds)

octenisan® wash cap

2-3 times a week
(leave on for 5 minutes)

octenisan® md nasal gel

Twice daily

As required

For the mouth and throat:

octenidol®

(Rinse for 20 seconds)

For wounds and access devices (vascular access devices, PEG tubes, etc.)

octenisept®

Once daily (leave on for 1 minute)

Other

- disposable combs
- disposable toothbrushes
- quick disinfection (e. g. mikrozid® universal wipes), e. g. for glasses, hearing aids and the patient environment
- hand disinfection
- fresh linen, towels, clothes daily

* Depending on local decolonisation procedure[48,78]

Product overview & ordering information

octenisan® wash lotion

Wash lotion for skin and hair based on selected skin care ingredients, skin-friendly surfactants and octenidine.

Features

- for whole body washing, including hair and showering (e. g. for multidrug-resistant organisms, MRSA, ESBL-producing bacteria)
- for mild, gentle washing of patients before surgery
- particularly suitable for use on intensive care units and isolation wards
- suitable for all skin types, including soap hypersensitivity/sensitive skin
- pH neutral
- colour and fragrance-free

Pack size	Item no.
Box of 30 x 150 ml bottles	on request
Box of 20 x 500 ml bottles	on request
Box of 48 x 100 ml bottles	on request

octenisan® md nasal gel

for moistening and decontamination by physical cleansing of the nasal vestibules as well as for supportive treatment of irritated skin underneath the nasal opening

Features

- decontamination of the nasal vestibules through physical cleaning
- for supporting treatment of irritated skin underneath the nose
- moisturising
- very well tolerated

Pack size	Item no.
Box of 20 x 6 ml tubes	on request

octenisan® wash mitts

For fast, effective whole body washing, without need for water.

Features

- soft, gentle and enriched with allantoin to soothe and protect skin
- for decontamination of multidrug-resistant organisms
- ready to use and efficient
- no need to rinse, colour and fragrance-free
- can be warmed if required (microwave, warming cabinet) or cooled for a more refreshing wash
- in the event of longer-term daily use, intermittent (e. g. weekly) washes with wash lotion and water should be performed
- can be used up to four weeks after opening.

Pack size	Item no.
Box of 24 packs of 10 wash mitts	on request

octenisan® wash cap

For fast, reliable, effective and gentle decontamination of hair and scalp.

Features

- for decontamination of the hair and scalp through physical cleaning
- ready to use, colour and fragrance-free
- can be warmed to body temperature
- hair can be washed with other shampoos and hair care products after being thoroughly rinsed with water.
- hair can be dried with a hair dryer after use.

Pack size	Item no.
Box of 24 packs each containing 1 wash cap	on request

octenisept®

For pain-free wound and mucous membrane antisepsis.

Features

- for pain-free wound and mucous membrane antisepsis.
- fast acting, after just one minute
- well tolerated on skin and mucous membranes
- suitable for babies/neonates
- suitable for use during pregnancy (from the 4th month)[139]
- pain-free and colourless

Pack size	Item no.
Box of 20 x 50 ml bottles	on request
Box of 20 x 500 ml bottles	on request

octeniderm® colourless

Colourless skin antiseptic with long-lasting 48-hour effect.

Features

- long-lasting effect (at least 48 hours)
- broad spectrum antisepsis (bactericidal inc. mycobacteria and MRSA, fungicidal, limited virucidal activity, inc. HIV, HBV, HCV, HSV)[139]
- conforms to KRINKO recommendation "Prevention of infections originating in vascular access devices"
- good incise drape adhesion after drying

Pack size	Item no.
Box of 10 x 250 ml bottles	on request
Box of 10 x 1 l bottles	on request

octenidol®

Reduction of odour producing germs in the oral cavity.

Features

- inhibits germs that cause bad breath
- ensures the mouth feels clean and fresh
- no discolouration of teeth[1]

Pack size	Item no.
Box of 10 x 250ml bottles	on request

[1] concerning discolouration of teeth: A cosmetic study with 53 subjects has shown that 94% of the subjects did not show any discolouration after a period of application of 4 weeks. Measurement method: vital scale

IMPORTANT USER INFORMATION

octenisept®

• **Composition:** 100 g solution contain: octenidine dihydrochloride 0.1 g, phenoxyethanol (Ph.Eur.) 2.0 g; Other ingredients: cocamidopropylbetaine, sodium D gluconate, glycerol 85 %, sodium chloride, sodium hydroxide, purified water. • **Indications:** For repeated, short-term antiseptic treatment of mucous membranes, adjacent skin and as adjuvant antiseptic wound treatment. octenisept® is intended for superficial application and must not be applied e.g. by syringe into the depths of the tissue. • **Contraindications:** octenisept® may not be used in cases of hypersensitivity to any of the components of the preparation. octenisept® should not be used for rinsing the abdominal cavity (e.g. intra-operatively) or the bladder, nor the tympanic membrane. • **Undesirable effects:** rare: burning, redness, itching and warmth at the application site, very rare: allergic contact reaction, e.g. temporary redness at the application site; frequency unknown: after lavage of deep wounds with a syringe, persistent edema, erythema and also tissue necrosis have been reported, in some cases requiring surgical revision . Rinsing of the oral cavity may cause a transitory bitter sensation. • **Special warnings and special precautions for use:** Do not swallow octenisept® and do not allow octenisept® to pass into the circulation, e.g. as a result of accidental injection. Usage of octenisept® in the eye should be avoided. In case of contact with eyes, rinse immediately with plenty of water. If any of the side effects gets serious, or if you notice any side effects not listed in this user information, please tell your doctor or pharmacist.

To prevent possible tissue injury, the product must not be injected into the deep tissue using a syringe.
The product is intended for superficial use only (application by swab or spray pump).

octeniderm®

• **Composition:** 100 g solution contain: octenidine dihydrochloride 0.1 g, 1-propanol (Ph.Eur.) 30.0 g, 2-propanol (Ph.Eur.) 45.0 g. Other ingredients: purified water. • **Indications:** Skin disinfection prior to surgical procedures, once-only suture care. If no special hand disinfectant is available, octeniderm® can also be used for hygienic and surgical hand disinfection. • **Contraindications:** octeniderm® should not be used in case of hypersensitivity to any of the components of the preparation. • **Undesirable effects:** Particularly in cases of frequent use, skin irritation such as redness, burning and itching may occasionally occur. In rare cases allergic reactions (e.g. contact eczema) are possible. • **Special warnings and special precautions for use:** Flammable! Do not spray into open flames. Remove the excess product to avoid pooling. Do not put thermocautery on skin before the disinfected areas have dried. In cases of accidental eye contact with octeniderm® the eye must be rinsed immediately with open eyelid for several minutes with plenty of water. Avoid inhalation of vapour. Due to the high alcohol content octeniderm® must not be applied on premature infants and neonates with immature skin (e.g. restricted barrier function of the skin). If any of the side effects gets serious, or if you notice any side effects not listed in this user information, please tell your doctor or pharmacist.

Manufacturer: Schülke & Mayr GmbH, 22840 Norderstedt, Germany, Tel. +49 40 52100-666, info@schuelke.com

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