HEXI PREP®

EVIDENCE BROCHURE

2% chlorhexidine digluconate in
70% isopropyl alcohol impregnated pad

A review of the latest guidelines,
best practice and research studies in relation
to skin antisepsis techniques.

from the makers of clinell®

STERILE

Introduction

Breaching the skin barrier is essential for many investigative and therapeutic reasons such as the insertion of vascular access devices, blood sampling and blood culture collection. These invasive procedures have been linked to healthcare-associated infections and bloodstream infections.

The risk of infection is greatly reduced by complying with all critical parts of the process for safe insertion of the device. Effective skin disinfection, commonly referred to as skin antisepsis is a critical part of the process in protecting patients from infections during breaches of the skin barrier.

Contamination from inadequate skin antisepsis may adversely impact patient safety and care. It may lead to avoidable infection, inappropriate antibiotic use, pain, possible mortality, increased costs and other risks related to additional patient stay including repeat and extra tests.

National Guidelines Indicating Skin Antisepsis Best Practice

epic3: National Evidence Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England

A development team commissioned by the Department of Health and led by Professor Heather Loveday from the Richard Wells Research Centre at the University of West London.

England

Change to Loveday HP, Wilson JA, Pratt RJ, Golsorkhi M, Tingle A, Bak A, Browne J, Prieto J, Wilcox M, UK Department of Health. epic3: national evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. J Hosp Infect. 2014 Jan;86 Suppl 1:S1-70. doi: 10.1016/S0195-6701(13)60012-2.

IVAD14 Decontaminate the skin at the insertion site with a single-use application of 2% chlorhexidine gluconate in 70% isopropyl alcohol (or povidone iodine in alcohol for patients with sensitivity to chlorhexidine) and allow to dry prior to the insertion of a central venous access device.

IVAD15 Decontaminate the skin at the insertion site with a single-use application of 2% chlorhexidine gluconate in 70% isopropyl alcohol (or povidone iodine in alcohol for patients with sensitivity to chlorhexidine) and allow to dry before inserting a peripheral vascular access device.

Healthcare-associated infections: prevention and control in primary and community care NICE Clinical Guideline No139. (2012)

National Clinical Guideline Centre based at the Royal College of Physicians.

United Kingdom

National Clinical Guideline Centre. Infection: prevention and control of healthcare-associated infections in primary and community care: partial update of NICE Clinical Guideline 2. NICE Clinical Guidelines, No. 139. London: Royal College of Physicians; 2012 (Updated 2017).

1.4.3 Vascular access device site care
1.4.3.1 Decontaminate the skin at the insertion site with chlorhexidine gluconate in 70% alcohol before inserting a peripheral vascular access device or a peripherally inserted central catheter. [new 2012].

Infusion Therapy Standards of Practice - 8th Edition

Infusion Nurses Society (INS).

Australia

Gorski LA. A Look at 2021 Infusion Therapy Standards of Practice. Home Healthcare Now. 2021 Mar-Apr 01;39(2):62-71. doi: 10.1097/NHH.0000000000000972.

33. Vascular Access Site Preparation and Skin Antisepsis
33.1 Skin antisepsis is performed prior to VAD placement.
33.2 The intended VAD insertion site is visibly clean prior to application of an antiseptic solution; if visibly soiled, cleanse the intended site with soap and water prior to application of antiseptic solution(s).

Use a single-use sterile applicator containing sterile solution, not a multiple-use product (e.g., bottle of antiseptic solution).

Standards for Infusion Therapy (Under Review)

Royal College of Nursing

United Kingdom

Royal College of Nursing (2010). Standards for Infusion Therapy. London, Royal College of Nursing.

5.7 Insertion site preparation
Prior to peripheral, midline, arterial, central and peripherally inserted central catheter placement insertion, the intended site should be decontaminated with the appropriate antimicrobial solution using aseptic technique.

2% chlorhexidine gluconate in 70% alcohol should be used with awareness of potential chlorhexidine allergy and an alternative used (for example povidone iodine in alcohol) where this is the case.

Research studies - skin antisepsis

Chlorhexidine plus alcohol versus povidone iodine plus alcohol, combined or not with innovative devices, for prevention of short-term peripheral venous catheter infection and failure (CLEAN 3 study): an investigator-initiated, open-label, single centre, randomised-controlled, two-by-two factorial trial.

Guenezan J, Marjanovic N, Drugeon B, Neill RO, Liuu E, Roblot F, Palazzo P, Bironneau V, Prevost F, Paul J, Pichon M, Boisson M, Frasca D, Mimoz O; CLEAN-3 trial investigators. Chlorhexidine plus alcohol versus povidone iodine plus alcohol, combined or not with innovative devices, for prevention of short-term peripheral venous catheter infection and failure (CLEAN 3 study): an investigator-initiated, open-label, single centre, randomised-controlled, two-by-two factorial trial. Lancet Infect Dis. 2021 Jul;21(7):1038-1048. doi: 10.1016/S1473-3099(20)30738-6.

A randomized controlled two-by-two factorial trial comparing the effect of two skin preparation agents and two types of devices on complications related to peripheral venous catheters. The open-labelled study consisted of 1000 patients admitted to medical wards. Skin preparation was done with either a single application of 2% chlorhexidine plus 70% isopropyl or with 5% povidone iodine plus 69% ethanol for 30 secs. Devices were either open peripheral venous catheters with a three-way stopcock or closed integrated peripheral venous catheters with positive displacement needle-free connectors. Overall patients in the chlorhexidine plus alcohol group had fewer local infections – 0% of 496 and provides greater protection of peripheral venous catheter-related complication. The trial also concluded that the use of innovative devices extends the catheter complication-free dwell time.

Skin antisepsis: it's not only what you use, it's the way that you use it.

Casey AL, Badia JM, Higgins A, Korndorffer J, Mantyh C, Mimoz O, Moro M. Skin antisepsis: it's not only what you use, it's the way that you use it. J Hosp Infect. 2017 Jul;96(3):221-222. doi: 10.1016/j.jhin.2017.04.019.

This consensus paper viewed that a single-use skin antisepsis applicator, compared to using multiple-use bottles and gauzes had the potential to control the antiseptic volume, reduce drug errors, save time, reduce waste and may also potentially encourage a standardised and more thorough approach to skin preparation, offering reduction of the risk of cross-contamination during antiseptic application.

A randomized trial of 2% chlorhexidine tincture compared with 10% aqueous povidone-iodine for venepuncture site disinfection: Effects on blood culture contamination rates.

Suwanpimolkul G, Pongkumpai M, Suankratay C. A randomized trial of 2% chlorhexidine tincture compared with 10% aqueous povidone-iodine for venepuncture site disinfection: Effects on blood culture contamination rates. J Infect. 2008 May;56(5):354-9. doi: 10.1016/j.jinf.2008.03.001.

This study examined the efficacy of venepuncture site disinfection with 2% CHG in 70% alcohol and 10% aqueous povidone-iodine in preventing blood culture contamination through a prospectively randomized investigator-blinded trial. Of 2146 blood cultures, 108 (5.03%) were contaminated with skin flora. The blood culture contamination rate with 2% alcoholic CHG was 3.2%, compared with a rate of 6.9% ($P<0.001$) with 10% aqueous povidone-iodine. In ER, the contamination rates were 4.3% with 2% alcoholic CHG and 12.5% with 10% aqueous povidone-iodine ($P<0.001$). The authors concluded that 2% alcoholic CHG is superior to 10% aqueous povidone-iodine for venepuncture site disinfection before obtaining blood cultures.

Skin antiseptics in healthcare facilities: is a targeted approach necessary?

Wiemken TL. Skin antiseptics in healthcare facilities: is a targeted approach necessary? BMC Public Health. 2019 Aug 22;19(1):1158. doi: 10.1186/s12889-019-7507-5.

This discussion paper examines skin antiseptics in healthcare and the importance of understanding the preparation and manufacturing of the skin antiseptic products. Most skin antiseptic products are produced and sold as non-sterile, can potentially have microbial contamination and may actually contaminate the skin with microorganisms capable of causing infection. Novel ways to sterilise products such as chlorhexidine, which had previously been considered difficult to achieve are discussed. The author concludes that we should use products labelled as sterile for patients at risk of infection, conduct closer evaluations of current processes and outcome measures by regulators and suggests it is critical we undertake cost-effectiveness and cost benefit calculations for our skin antisepsis choices.

Reducing blood-culture contamination rates by the use of a 2% chlorhexidine solution applicator in acute admission units

Madeo M, Barlow G. Reducing blood-culture contamination rates by the use of a 2% chlorhexidine solution applicator in acute admission units. J Hosp Infect. 2008 Jul;69(3):307-9. doi: 10.1016/j.jhin.2008.03.009.

The authors studied the effect of introducing 2% CHG in 70% isopropyl alcohol, for skin decontamination prior to blood culture ascertainment, on the contamination rates of a UK Accident & Emergency department. In the pre-intervention period the contamination rate was 7.5% of blood cultures (n=4072). Introduction of 2% CHG in alcohol reduced the contamination rate to 2.1% (OR=0.25; p=0.0001). Contamination of a blood culture is likely to lead to, at the very least, a repeat specimen being taken, resulting in a potentially unnecessary further test, discomfort for the patient and the human resource costs associated with this. The authors concluded that hospitals could find implementing 2% CHG in 70% isopropyl alcohol, beneficial in achieving their healthcare-associated infection performance management targets.

Pseudo outbreaks and no-infection outbreaks (part 2)

Curran ET. Pseudo outbreaks and no-infection outbreaks (part 2). J Infect Prev. (2013) 14(3):108-113. doi: 10.1177/1757177413484546.

This review paper is part of an outbreak column examining the phenomena of pseudo-outbreaks. The author states that the most common specimen collection errors leading to pseudo-outbreak reports in the literature are from contaminated blood cultures and provides useful guidance for investigation of unusual occurrences. The unsafe acts in these outbreaks were the failures to decontaminate the skin and/or the blood culture bottle tops.

Research studies - skin antisepsis technique

The manner of application of skin disinfectant is evidenced as being significant. The technique referred to as 'cross-hatching', a back-and-forth disinfecting technique was considered to be 10 times more effective at reducing bacterial load than the traditional so-called concentric circle technique for skin antisepsis.

The right skin preparation technique: a literature review

Silva P. The right skin preparation technique: a literature review. J Perioper Pract. 2014 Dec;24(12):283-5. doi: 10.1177/175045891402401204.

This literature review acknowledged that the evidence base was limited. However, they concluded that the back-and-forth technique reduces the microbe count in the patient's skin more effectively than the widely used concentric circles motion. The back-and-forth motion was found to enable maximum contact between the skin and antiseptic, and helps the solution to reach and disinfect deeper cell layers of the skin.

Short Peripheral Intravenous Catheters and Infections

Hadaway L. Short peripheral intravenous catheters and infections. J Infus Nurs. 2012 Jul-Aug;35(4):230-40. doi: 10.1097/NAN.0b013e31825af099.

This literature review included 45 papers, from a skin antisepsis perspective it concluded that the prevailing evidence pointed to the skin as a primary source of organisms colonizing all types of IV catheters, with the majority of these organisms residing in the layers of the epidermis and that attention was needed regarding the method of application of the skin disinfection agent. They found no scientific evidence to support using concentric circles, beginning with the point of insertion and working outward, and that the technique only painting the skin disinfectant on the skin rather than using friction to allow the agent to penetrate the layers of the epidermis.

Going Around in Circles

Stonecypher K. Going around in circles: is this the best practice for preparing the skin? Crit Care Nurs Q. 2009 Apr-Jun;32(2):94-8. doi: 10.1097/CNQ.0b013e3181a27b86.

This study compared 2 skin disinfection products and 2 disinfection techniques in an emergency department. For the first 6 months iodine was used and was applied using the recommended concentric circle technique and allowed to dry on the skin for the recommended 2 minutes. For the following 6 months, chlorhexidine gluconate was the solution of choice applying the back-and-forth technique as recommended by the manufacturer and allowed to dry for the recommended 15 to 30 seconds. A statistically significant ($\chi 2 = 22.02$, $P < .0001$) decrease in blood culture contamination rates was shown using 2% chlorhexidine and 70% alcohol preparation solution in comparison with the use of tincture of iodine. The limitations of the study were recognised and concluded more studies needed to be undertaken.

Prescribing information: HEXI PREP 2% w/v / 70% v/v for cutaneous use. Refer to Summary of Product Characteristics before prescribing. **Presentation:** Each impregnated pad contains 1.5 ml or 3.0 ml of 20 mg chlorhexidine digluconate and 0.7 ml of isopropyl alcohol. **Indication:** Disinfection of the skin prior to invasive medical procedures that do not require a clean air environment. **Dosage & administration:** There are two pad sizes available. HEXI PREP may be used on all age groups and patient populations. Use with care in newborn babies, especially those born prematurely. The choice of pad size will depend on the size of the area to be disinfected, the invasive procedure and the clinician's preference. For both non-sterile and sterile procedures, the user should wear gloves during application. Keep the pad folded and press firmly against the skin on the intended area and wipe back and forth for a total of 30 seconds. Allow to air dry completely. It is recommended that HEXI PREP solution remains on the skin post-procedure to provide continued antimicrobial activity. If removal is necessary, remove with soap and water or alcohol. **Contraindications:** The medicinal product is contraindicated where patients have shown previous hypersensitivity to chlorhexidine or isopropyl alcohol. **Warnings & precautions:** The solution is flammable. Do not use with electrocautery procedures or other ignition sources until dry. Remove any soaked materials, drapes or gowns before proceeding with the intervention. Do not allow the solution to pool in skin folds or under the patient or drip onto sheets or other material in direct contact with the patient. Where occlusive dressings are to be applied to areas previously exposed to HEXI PREP, care must be taken to ensure no excess product is present prior to application of the dressing. For external use only on intact skin. Do not use on open skin wounds. Avoid prolonged contact with the skin. Do not use on broken or damaged skin. Avoid contact with neural tissue, the middle ear, the eyes and mucous membranes. Chlorhexidine-containing products are known causes of anaphylactic reactions during anaesthesia. The symptoms of anaphylactic reactions might be masked in an anaesthetised patient. If symptoms of an anaphylactic reaction are detected during anaesthesia, chlorhexidine-related allergic reactions should be considered. When chlorhexidine-related reaction during anaesthesia is suspected, other products containing chlorhexidine used during anaesthesia (e.g. IV lines) should be removed. Special precaution should be taken to avoid patient exposure to any other product containing chlorhexidine during the course of the treatment. The use of chlorhexidine solutions, both alcohol based and aqueous, for skin antisepsis prior to invasive medical procedures has been associated with chemical burns in neonates. Based on available case reports and the published literature, this risk appears to be higher in preterm infants, especially those born before 32 weeks of gestation and within the first 2 weeks of life. **Pregnancy & lactation:** There are no studies with this product in pregnant or lactating women. No effects during pregnancy are anticipated since systemic exposure to chlorhexidine digluconate is negligible. HEXI PREP can be used during pregnancy. No effects on the breastfed newborn infant are anticipated since the systemic exposure of breast-feeding women to chlorhexidine digluconate is negligible. HEXI PREP can be used during lactation. **Undesirable effects:** Skin disorders: very rare allergic or irritation skin reactions have been reported with chlorhexidine and isopropylalcohol: erythema, rash (e.g. erythematous, papular, or maculopapular), pruritus and blisters or application site vesicles. Other local symptoms have included skin burning sensation, pain and inflammation. Frequency not known: dermatitis, eczema, urticaria, chemical burns in neonates. Immune disorders: Frequency unknown: Hypersensitivity including anaphylactic shock. Cases of anaphylactic reactions have been reported during anaethesia. Common reported reactions: associated with site reactions often within the area of application and very rarely spread. This product may cause a severe allergic reaction. Symptoms may include wheezing / difficulty breathing, shock, facial swelling, hives or rash. Use of HEXI PREP is contraindicated where patients have shown previous hypersensitivity to chlorhexidine or isopropyl alcohol. If hypersensitivity or an allergic reaction occurs, stop use and seek medical help right away. **Reporting adverse events:** Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard. Adverse events should also be reported to GAMA Healthcare Ltd. **Per pad costs** (NHS Supply Chain; ex VAT): HEXI PREP(CHEX15) 1.5 ml UK £0.28, HEXI PREP (CHEX30) 3.0 ml UK £0.66. **Legal category:** UK GSL. **Marketing Authorisation Numbers:** HEXI PREP (PL 40867/0002). **Marketing Authorisation Holder:** GAMA Healthcare Ltd., Maylands Building, Maylands Avenue, Hemel Hempstead Industrial Estate, Hemel Hempstead, Hertfordshire, HP2 7TG. **Date of issue:** May 2023.

Revised Date: 16-Jun-2023 JBN211144

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