



Position statement

Chlorhexidine for Skin Cleansing in Neonates

Executive Summary

- Use of chlorhexidine gluconate for skin cleansing prior to procedures in neonates is an important intervention to reduce the risk of infection in this vulnerable patient group.
- However, neonatal skin reactions and burns secondary to chlorhexidine solution use are widely reported in the literature. Factors which influence the risk of skin reactions include the concentration of the chlorhexidine solution used; whether the solution is in an aqueous or alcoholic base; and application technique. Pooling of excessive quantities of solution and prolonged contact time significantly increase the risk of burns occurring.
- There is limited evidence to inform the optimum approach to balancing the risk of infection against the risk of skin reactions in neonates. However, based on expert consensus opinion, the following is recommended:
 1. In babies born before 28 weeks' gestation **and** who are under 7 days old, use aqueous solutions of 0.5% chlorhexidine gluconate.
 2. In babies born from 28 weeks' gestation onwards, and for those babies born before 28 weeks' gestation who are now 7 days or older, use a solution of 2% chlorhexidine gluconate in 70% isopropyl alcohol.
 3. Where available, chlorhexidine should be applied using a pre-filled applicator containing an appropriate quantity of solution, as this is likely to reduce pooling of excessive quantities of solution on the skin.
 4. Where pre-filled applicators are not available and the solution requires decanting from a bottle to a tray/pot prior to a procedure, pour out the minimum amount required. Soak a sterile gauze in the chlorhexidine solution and ensure the gauze is thoroughly wrung out before applying to the skin
 5. Regardless of product used, employ a “dabbing” rather than a “rubbing technique during application.
- To help improve the evidence base, all cases of burns arising from use of chlorhexidine products in neonates should be reported on the local incident management system, as well as to the Operational Delivery Network (or equivalent network structure in the devolved nations). A standardised case report form is available [here](#). Burns should also be reported via the [MHRA Yellow Card](#) scheme.
- There is not currently a licensed aqueous 0.5% chlorhexidine solution available in the UK. Supplies of unlicensed products can be intermittent. Alternatives which may be used during periods of supply interruption are suggested later in this document.
- Chlorhexidine impregnated dressings should not be used in neonates as the resultant prolonged skin exposure to chlorhexidine increases the risk of burns.
- Further research to establish the optimum approach to neonatal skin cleansing is needed, including into whether alternative antiseptics such as octenidine may be beneficial.

Use of Chlorhexidine for Neonatal Skin Decontamination

Chlorhexidine gluconate (CHG) is widely used as a topical antiseptic agent prior to percutaneous procedures. CHG products vary considerably, both in terms of CHG concentration and the nature of the solvent, with some preparations being aqueous and others alcoholic. In the UK, use of 2% CHG in 70% isopropyl alcohol is recommended for skin antisepsis prior to venous cannulation and central venous catheter insertion in adults and children from 1 year of age^{1,2}. No recommendations exist for younger patients.

Neonatal skin, especially if born prematurely, differs significantly from that of infants, older children and adults; the stratum corneum is under developed until after 34 weeks' gestation. When born before 34 weeks, neonatal skin takes 2-3 weeks to mature, increasing the risk of infection and skin injury when external substances are applied³⁻⁵. Preterm neonates are also more infection prone due to a functionally immature immune system⁶.

Literature reports of neonatal skin reactions to CHG solutions are not uncommon, ranging in severity from erythema/severe redness to chemical burn, excoriation and skin breakdown. The risk of injury is increased:

- Within the first two weeks of life in infants born before 32 weeks and/or weighing less than 1.5kg.
- Where alcoholic solutions are used.
- Where the concentration of CHG exceeds 1%.
- When skin contact time is prolonged, particularly through pooling of CHG solution on skin or cot sheets.

Continued overleaf.

However, careful application can mitigate the risk of injury, and the risk of infection must also be considered. The recommendations provided below are an expert consensus opinion, aiming to balance these risks:

1. In babies born before 28 weeks' gestation **and** who are under 7 days old, use aqueous solutions of 0.5% chlorhexidine gluconate.
2. In babies born from 28 weeks' gestation onwards, and for those babies born before 28 weeks' gestation who are now 7 days or older, use a solution of 2% chlorhexidine in 70% isopropyl alcohol.
3. Where available, chlorhexidine should be applied using a pre-filled applicator as this is likely to reduce pooling of excessive quantities of solution on the skin.
4. Careful application of cleansing solutions is critical to minimising the risk of skin damage. Suggested techniques for the safe application of chlorhexidine solutions are provided below.

To help improve the evidence base, all cases of burns arising as a result of use of chlorhexidine products in neonates should be reported on the local incident management system, as well as to the Operational Delivery Network. A standardised case report form is available [here](#).

Technique for application of topical chlorhexidine preparations

If using aqueous chlorhexidine 0.5% solution:

- If the solution requires decanting from a bottle to a tray/pot, pour out the minimum amount required.
- Pick up sterile gauze with forceps or gloved hands.
- Soak gauze in chlorhexidine solution.
- Ensure gauze is thoroughly wrung out.
- Apply skin preparation solution to skin using soaked gauze with a “**dabbing**” technique. DO NOT wipe the gauze in a circular motion on the skin.
- Do not allow the solution to pool.
- Change the sterile drape immediately if any soakage is noted.
- Allow the solution to air dry for 30 seconds prior to commencing the procedure.
- Once the procedure is complete, any exposed skin previously cleaned with chlorhexidine should be cleaned with sterile water prior to applying any secure dressing.

If using a Chlorprep™ (chlorhexidine 2% in isopropyl alcohol) applicator:

- Select an appropriately-sized applicator for the skin area to be cleansed. As a guide, a 1mL applicator is adequate for a skin surface area of 8cm x 10cm, and a 1.5mL applicator for a skin area of 10 cm × 13 cm⁶.
- Squeeze the applicator gently to break the ampoule and release antiseptic solution onto the sponge.
- Gently press the sponge part of the applicator onto the baby's skin, applying the solution sparingly in a **dabbing** motion for 20-30 seconds. DO NOT wipe the gauze in a circular motion on the skin.
- Do not allow the solution to pool.
- Change the sterile drape immediately if any soakage is noted.
- Allow the solution to air dry for 30 seconds prior to commencing the procedure.
- Once the procedure is complete, any exposed skin previously cleaned with chlorhexidine should be cleaned with sterile water prior to applying any secure dressing.

Supply of Aqueous Chlorhexidine 0.5%

A licensed 0.5% aqueous chlorhexidine solution is not currently available in the UK; consequently unlicensed products are used. Information on available unlicensed products can be found on the [NPPG website](#).

Supply problems with unlicensed 0.5% aqueous chlorhexidine solutions have occurred not infrequently, requiring use of alternatives. There is currently insufficient evidence to suggest a single suitable alternative. Suggested options are given below; these should be assessed for suitability locally, considering the relative risks:

1. 0.5% alcoholic chlorhexidine solution, available via NHS Supply Chain. An example product is shown [here](#), but others are available, also via NHS Supply Chain.
2. 2% aqueous chlorhexidine solution, an example product is shown [here](#).
3. 2% aqueous chlorhexidine sponge, available via NHS Supply Chain. An example product is shown [here](#), but others are available, also via NHS Supply Chain.

Further Information

Safety

Good quality evidence on the safest product for skin cleansing in neonates is lacking⁷, and UK practice is known to be highly variable⁸. Although studies suggest that CHG is generally well tolerated^{6,9-12}, including in pre-term neonates, caution is still required because of the number of published case reports of chemical burns after application of CHG.

In 2015 the Medicines and Healthcare Products Regulatory Agency reviewed 44 cases of chemical burns after application of CHG solutions to neonates¹³. Severity of skin reaction ranged from erythema/severe redness to chemical burn, excoriation and skin breakdown. Most of these occurred in infants born at or before 26 weeks' gestation, or in infants of birth weight under 1kg. 29 cases occurred after use of CHG solutions of 0.5% or 2% CHG in 70% alcohol, whereas 11 cases followed exposure to 2% aqueous solutions. Death was reported in five cases, and severe chemical injury considered a possible contributory cause of death in one infant with extensive burns as a result of being left lying on an incontinence mat soaked with CHG solution.

A randomised study looking at efficacy of skin disinfection of catheter sites compared 70% alcohol disinfection followed by application of a CHG-impregnated dressing with povidone-iodine disinfection¹⁴. Contact dermatitis was more prevalent in neonates weighing under 1kg. 15 (15%) of the 98 neonates under 1kg and four (1.5%) of the 237 over 1kg exposed to CHG developed contact dermatitis under the dressing. Two additional neonates developed an area of pressure necrosis under the CHG dressing. The mean gestational age and mean birth weight of neonates with contact dermatitis were 24.5 weeks (range: 22.5–26.5 weeks) and 720g (range: 560–880g) respectively. No contact dermatitis was observed in the povidone-iodine group.

A multi-factorial intervention to combat nosocomial infection was evaluated in 185 babies weighing 1.5kg or less¹⁵. Four (11%) of 36 infants weighing under 1kg and below 48 hours of age developed severe skin irritation with 2% aqueous CHG. In one infant, this progressed to skin breakdown and exudation. Additionally, case reports describe extensive burns following use of 0.5% CHG in 70% alcohol or 2% aqueous CHG for skin preparation in infants below 26 weeks' gestation¹⁶⁻¹⁹.

A 2013 survey found that 30 of 57 (53%) UK neonatal units used alcoholic CHG products. Seven units reported chemical burns, of which three had subsequently ceased using 2% CHG in 70% alcohol in very preterm infants²⁰. A similar exercise in the USA in 2010 revealed that 55 neonatal units used CHG of which 28 (51%) reported adverse skin reactions, including erythema (32%), erosions (7%), and burns (61%). 13 (76%) of the 17 reported burns had occurred in neonates of birth weight below 1.5kg. 28 (51%) of the units using CHG limited its use based on birth weight (median limit 1kg), gestational age (median 28 weeks) or chronological age (median 2 weeks)¹⁵. 57% of respondents used alcoholic CHG and the extent to which different concentrations of CHG were used was not described, though no difference in reported rates of adverse effects was observed between centres using different formulations²¹. A further 2019 survey in the USA yielded similar results, though again little detail was reported on the concentrations of CHG used by the various respondents²².

A feasibility study for a randomised controlled trial compared the efficacy and safety of 2% CHG in 70% isopropyl alcohol with 2% aqueous CHG for skin disinfection in preterm neonates. 116 infants were recruited; 88 (76%) were allocated to the alcoholic solution. Median (IQR) gestation at birth was 28 (26-30) weeks, and median (IQR) age at CHG application was 5 (2-7) days. 40% of use was before 3 days postnatally and 22% was in babies below 26 weeks' gestation. Although the study was not powered to detect statistical differences, no significant CHG-related skin injury was reported in either group⁹. A further study compared 1% aqueous and 2% aqueous solutions of CHG. 308 neonates with a median (IQR) gestation age of 34 (31–37) weeks and mean birth weight of 2.03kg were randomised on 685 occasions (1% CHG: n=341; 2% CHG: n=344). There were no severe skin-related adverse events in either group, though a mild dermatitis was reported equally between the two products¹⁰.

A study conducted in Ireland randomised 304 infants (mean gestational age 27 weeks) to either alcoholic 2% CHG or 10% povidone-iodine for skin preparation prior to CVL insertion. Skin reaction rates were low (<1% CVL insertion episodes) and did not differ between the two groups¹¹. Similarly, an Italian study published in 2025 concluded that use of alcoholic 2% chlorhexidine applied following a standardised protocol prior to CVL insertion in premature neonates, did not lead to severe skin lesions⁶. A survey of Italian neonatal units conducted at a similar time identified ongoing variation in use of alcoholic 2% CHG within the country, though the authors underscored the importance of application technique in avoiding skin damaged²³.

Studies report that topically applied CHG can be absorbed by term neonates, and whilst no obvious systemic adverse effects were observed, the significance of detectable blood levels of CHG needs further evaluation^{5,12,24-26}. It should be noted that systemic absorption of other antiseptics, such as povidone-iodine is also a concern in neonates^{11,22}.

Efficacy

Alcoholic 0.5% or 1% and aqueous 0.5% or 2% CHG solutions all provide a concentration of CHG that is higher than the Mean Inhibitory Concentration for most nosocomial bacteria and yeasts^{1,27}. Subset analysis for aqueous and alcoholic solutions showed similar effect sizes, but also that only alcoholic CHG solutions produced a significant reduction in Catheter-Related Blood Stream Infections, though this could be due to the powering of the studies. Increasing resistance to CHG is also thought to be a concern however, and so inappropriate use of lower concentrations may result in an increased risk of infection²⁸.

A small number of studies have compared the efficacy of different CHG concentrations. In vitro, alcoholic 2% CHG was more effective than alcoholic 0.5%, aqueous 0.5% and aqueous 2% CHG at reducing colony-forming units²⁹. An RCT concluded that aqueous 0.5% CHG is superior to aqueous 0.05% CHG in bacterial clearance as identified from skin swabs on neonates (mean age 29.6 weeks; mean weight 1.46kg)³⁰. No published RCTs have compared safety and efficacy of alcoholic CHG with aqueous CHG for neonatal antisepsis. However, a pilot study which recruited 116 babies (median (IQR) gestation at birth of 28 (26-30) weeks) demonstrated that 2% CHG in 70% isopropyl alcohol and 2% aqueous CHG had apparently similar efficacy, but was not powered to determine statistical significance⁹. 1% aqueous CHG was shown to not be non-inferior to 2% aqueous CHG in a blinded, randomised trial of 308 babies with a median (IQR) gestational age of 35 (31-37) weeks¹⁰.

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Written by: NPPG Executive Committee

Version: 2

Published: July 2026

Review date: July 2031

Key changes from Version 1 (published October 2021):

- Change of cut-off for use of aqueous 0.5% chlorhexidine from 34 to 28 weeks corrected gestational age.
- Addition of suggested alternatives to aqueous 0.5% chlorhexidine during supply shortages.
- Addition of request for cases of burns thought to be secondary to chlorhexidine use to be reported.

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