

Surgical skin disinfection guideline

1. Purpose

This Guideline provides an overview of surgical skin preparation and the rationale for the selection and use of skin disinfection within the operating suite.

2. Scope

This Guideline provides information for all employees, contractors and consultants within the Queensland Health.

3. Guideline for Surgical Skin Disinfection

KEY CRITICAL POINTS

- Thorough cleaning of the surgical incision site can reduce the incidence of Healthcare Associated Infection (HAI).
- Product selection including strength should be determined after consideration of numerous factors specific to the patient and the facility.

Introduction

This guideline provides an overview of surgical skin preparation and the rationale for the selection and use of skin disinfection within the operating suite.

Surgical Site Infections (SSI) are one of the most common and costly Healthcare Associated Infections (HAI) among hospitalised patients.⁽¹⁾ These infections have been found to result in increased length of stay, additional costs and have the potential for increased morbidity and mortality.⁽¹⁻⁸⁾

A surgical site infection occurs when bacteria enter a surgical wound.^(6, 9) This most commonly happens in the operating room, where bacteria can come from several sources, including the environment, the staff and the patient. Most SSIs originate from the patient's own bacteria, which enter the wound during the surgical procedure, however infections from exogenous sources also occur.^(5-7, 9, 10)

Reducing the number of bacteria on the skin around the incision site reduces the risk of a patient developing a SSI.^(4-7, 10) This can be achieved through surgical skin disinfection, which removes transient bacteria and reduces resident bacteria through a combination of mechanical removal, chemical killing and inhibition.^(4, 7, 9)

Several antiseptic agents are available for preoperative preparation of skin at the incision site. Chlorhexidine gluconate, the iodophors and alcohol containing products are the most commonly used agents.^(2, 5)

Chlorhexidine gluconate

Chlorhexidine gluconate kills a range of Gram positive and Gram negative bacteria^(4, 6), viruses and fungi, and binds to the top layer of the skin, which results in persistent activity.^(1, 2, 5, 9, 11) Chlorhexidine does not become inactivated in the presence of organic material.^(1, 5, 6)

Iodophors (e.g. povidone iodine)

Povidone iodine kills a range of Gram positive and Gram negative bacteria, viruses and fungi.^(4-6, 9) The povidone carrier releases its iodine slowly; the iodine kills bacteria quickly but does not have a residual effect.⁽⁹⁾ Iodine is inactivated by organic material so should only be applied to clean skin.^(5, 6, 9)

Alcohol

Alcohol kills a range of Gram positive and Gram negative bacteria and many viruses and fungi.^(4-6, 9) The immediate antimicrobial activity of alcohol is stronger and kills more quickly than chlorhexidine gluconate or povidone iodine, but has no residual effect.^(1, 5, 6, 9, 11, 12)

Antiseptic combinations

Significant immediate activity is required before surgical incision, in addition to some persistent activity for the duration of the procedure.⁽¹²⁾ Persistence of the antimicrobial effect suppresses the regrowth of residual skin flora not removed by preoperative prepping, as well as transient micro-organisms contacting the prepped site. Therefore, the strong immediate action of alcohol in combination with the persistent activity from chlorhexidine gluconate or the slow release of iodine from iodophors is ideal.^(1, 2, 11, 12)

Use alcohol-containing preoperative skin preparatory agents if no contraindication exists. Consideration must also be given to the site to be prepped as the use of chlorhexidine or alcoholic solutions may be contraindicated, for example traumatic wounds, eyes, ears and/or mucous membranes.^(1, 6, 11) The most effective disinfectant (chlorhexidine or povidone iodine) to combine with alcohol has not been established in the literature.

A comparison of various strengths of chlorhexidine gluconate in isopropyl alcohol would be needed to conclusively determine the recommended strength of the chlorhexidine. In the absence of such evidence, the strength of chlorhexidine gluconate used should be determined in collaboration with the local infection control committee and be based on local factors such as SSI rates and infection characteristics, such as commonly affected surgical sites and causative micro-organisms.

Decisions on viability of solutions once opened and stored need to be made locally after adequate risk assessment, in consultation with but not limited to representatives from local infection management services and pharmacy service, taking into consideration local factors and the environment in which the solution will be used.

Guidelines for use

Product selection

Before a product is selected for surgical site disinfection the clinician should consider the following points ^(4, 5, 7, 9):

- patient sensitivity or allergy
- operative site
- condition of the patients skin
- presence of organic matter, including blood
- the surgeon's preference
- local SSI rates
- contain broad spectrum properties
- significantly reduce micro-organisms on intact skin
- be non-irritating and non-toxic
- be rapid acting
- have a persistent effect
- be compatible with other products used in operative skin preparation, such as pre-operative bathing
- be included on the Australian Register of Therapeutic Goods (ARTG).

Use alcohol-containing preoperative skin preparatory agents if no contraindication exists. The most effective disinfectant (chlorhexidine or povidone iodine) to combine with alcohol has not been established in the literature.

Note: The same antimicrobial agent shall be used for all phases of the patient's skin preparation, to ensure full residual benefit and consistent action.⁽⁷⁾

Pre-operative showering/bathing

The efficacy of antiseptic agents is dependent on the cleanliness of the skin. Removal of superficial soil, debris, and transient microbes before applying antiseptic agents reduces the risk of wound contamination by decreasing the organic debris on the skin.⁽⁵⁻⁷⁾

Unless contraindicated, advise patients to shower or have a bath (or help patients to shower, bath or bed bath) using soap, either the day before, or on the day of, surgery.^(3, 10, 13-15)

Hair removal

Hair at the surgical site should be left in place whenever possible as studies have found that preoperative shaving of the surgical site increases the risk of surgical site infection.^(1, 3, 5, 16)

If the presence of hair will interfere with the surgical procedure the following precautions should be taken:

- hair removal should be performed the day of surgery, in a location outside of the operating theatre or procedure room^(1, 7, 10)
- only hair interfering with the surgical procedure should be removed⁽⁵⁾

- hair should be clipped using a single-use electric or battery-operated clipper, or a clipper with a reusable head that can be disinfected between patients. Razors should not be used.^(1, 5, 7, 10, 16, 17)

Application technique

- Remove all jewellery from the operative site prior to commencing skin preparation.⁽⁷⁾
- A sterile applicator should be used.⁽⁴⁻⁶⁾
- Solutions used should be single-use.⁽⁹⁾
- The preparation solution should be applied using friction⁽⁹⁾, and should commence from the cleanest area, usually the operative and/ or incision site and proceed in a concentric fashion to the least clean area⁽⁴⁻⁷⁾
 - the applicator should be discarded once the periphery has been reached.⁽⁴⁾
- If a highly contaminated area is part of the procedure, the area with a lower bacterial count should be prepared first, followed by the area of higher contamination.⁽⁷⁾
- When both the abdominal and perineal areas require preparation, the preparation should be performed sequentially (not simultaneously). Evidence as to the sequence in which the areas are prepared is not conclusive, whether preparing the perineal area or abdominal first ensure a new applicator is used for each site, gloves are replaced and hand hygiene is performed between sites⁽¹⁸⁾
- The solution should be allowed to completely dry naturally.^(2, 4, 5, 7, 9)
- Avoid drying the incision site after the application with a swab or sponges as this reduces the efficacy of the antimicrobial solution.^(5, 7)
- The prepared area of skin should extend to an area large enough to accommodate potential shifting of the drape fenestration, extension of the incision, potential for additional incisions and all potential drain sites.^(4, 5, 7)
- Ensure that the antiseptic solution remains in contact with the skin for the required period of time as recommended by the manufacturer.⁽⁷⁾

Hazard precautions

Alcoholic preparations are safe if used correctly.

- The volume used should be sufficient to thoroughly wet the site for the recommended time, but avoid pooling of excess liquid beneath or around the patient.
- Allow adequate contact time, drying time⁽⁴⁾ and vapour dissipation of antimicrobial agents to prevent skin irritation as well as prevent fire or burn injuries.^(2, 7, 10, 14, 16)
- Areas with excess hair may take longer to dry.^(1, 2)
- All alcohol preparations are flammable; it is imperative that all preparations are allowed to evaporate completely before electrocautery/diathermy or laser instruments are switched on.⁽¹⁾
- Avoid dripping or pooling of alcohol based antiseptic solutions on sheets, padding, positioning equipment, adhesive tape and on or under the patient.^(1, 2, 10, 14, 16)

Surgical hand scrubbing

Two options on product type for surgical scrubbing are available for operating theatres to select from, this includes scrubbing with an approved skin antiseptic and water, or an alcohol based product. Staff should refer to both the Australian College of Operating Room Nurses (ACORN) standards for perioperative nursing⁽⁷⁾ and the manufacturer's recommendations for scrubbing procedures/techniques. Facilities should perform a risk assessment before implementing new products. Some points to consider include:

- Occupational Health and Safety issues
- storage implications
- product placement
- implementation strategies
 - consultation with Key Stakeholders
 - formal trialling of product
 - training and assessment of staff.

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5. Definitions of terms used in the policy and supporting documents

Term	Definition / Explanation / Details	Source
Surgical Site Infection	An infection at the site of a surgical operation that is caused by the operation. ⁽¹⁰⁾	⁽¹⁰⁾
Healthcare Associated Infection	Healthcare associated infections (HAI) are those infections that are not present or incubating at the time of admission to a healthcare program or facility, develop within a healthcare organisation or are produced by micro-organisms acquired during admission. ⁽¹⁰⁾	⁽¹⁰⁾

6. Approval and Implementation

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7. Version Control

Version	Date	Prepared by	Comments
1.0 [QH-GDL-321-6-6:2012]	Rescinded		
2.0	December 2012	Mareeka Gray	
3.0	October 2015	Paul Smith	