Subject: **Preoperative skin preparation**

Purpose: To provide a guideline for achieving effective skin preparation of a surgical site.

Many surgical site infections result from colonisation of the surgical site with the patient's own flora.[1] The goal of a preoperative preparation of a patient's skin is to reduce the risk of postoperative surgical site infection by removing gross contamination and transient microorganisms resident on the skin; to reduce the microbial count in a short period of time and with the least amount of tissue irritation and to inhibit rapid, rebound growth of microorganisms.

Personnel: Practice Nursing Staff

Patient skin preparation takes place in three very distinct stages:

1. **Clipping**: carried out in a preparation area outside the operating theatre area. This may be a room that also has another function but it must be totally separate from the operating theatre itself.

2. **Initial skin preparation**: also carried out in a preparation area outside the operating theatre area. Again this may be a room that also has another function but it must be totally separate from the operating theatre itself.

3. **Final skin antisepsis preparation**: carried out once in the theatre area under completely sterile conditions.

PROCEDURE

1. Clipping

Hair should NOT be removed with a razor as this has been linked to an increase in post-operative wound infections. The increase in surgical site infection (SSI) risk associated with shaving has been attributed to microscopic cuts in the skin that later serve as a focus for bacterial multiplication.

Hair removal creams can also irritate the skin causing the chance of skin infection post operatively.

To eliminate the possibility of cross contamination, single use disposable clipper blades would be advisable. If re-using clipper blades, a regular programme of sharpening should be implemented, with blades being sharpened at least once a week. Re-used blades should be replaced with new blades at least once a month.

If a practice re-uses blades, then the following cleaning routine should be adopted to minimise the opportunity for cross contamination to occur.

Clipper preparation:

1. Use a small bristle brush to dislodge any hairs from the blade. (Use appropriate blade size for the species).

2. Soak the blades in a 4% chlorhexidine solution for 20 minutes and leave to air dry.

3. Attach the blade to the clippers and use a standard clipper spray to disinfect the blade once in place and allow to dry.

4. Finally, use a cloth impregnated again with a 4% chlorhexidine solution and use this to thoroughly wipe the handle of the clippers. The clippers are now ready for use.

   This cleaning process should also be used after patient skin preparation stages and surgical procedure itself has been completed, as part of the practices' usual post operative cleaning protocol.

Before the skin preparation of a patient is initiated, the skin should be free of gross contamination (eg. dirt, soil or any other debris).

The surgical site should be confirmed verbally with the surgeon before initiating the skin preparation.

The surgical site should have all hair removed ***immediately prior to surgery****. All forms of hair removal cause a degree of skin damage, leading to rapid bacterial colonisation of the damaged area. If the time between hair removal and the start of surgery is increased, the incidence of post-operative wound infection is also increased.*

It is important that the site is clipped after induction of anaesthesia and following any radiography or investigations performed.

5. Confirm the surgical site and the area to be clipped verbally with the surgeon.

6. Clip the fir away from the surgical site first in the direction of hair growth and then in the opposite direction, against the direction of hair growth. *This will ensure a close clip but decreases the incidence of skin irritation or 'clipper rash'.*

The clippers should not be angled against the skin nor be used in an inverted position.

Leave a generous margin around the incision site and clip carefully to prevent skin scratching or abrasion.

7. In the case of joint surgery, the joints above and below the joint to be operated on should be included in the clip.

8. Once clipping is complete, vacuum the patient to remove any loose hair from the clipped site and adjacent fur. Then vacuum the table around the patient.

2. Initial skin preparation

1. If the patient is to undergo limb surgery, the distal portion of the limb is bandaged. *Eg. unless the foot is to be operated on it should not be routinely clipped, it should be covered, preferably with cohesive bandage.*

2. Prepare a scrub solution of 4% chlorhexidine and water in equal parts in a sterile kidney dish. Do not use a spray bottle.

Prolonged use of a multi-user container, transferring solutions to a secondary container and refilling containers has resulted in contamination with Pseudomonas aeruginosa. These microorganisms can survive more than one year and contaminated solution has resulted in the subsequent infections.[2]

Material safety datasheets for all antiseptic agents must be available in the practice area.

3. To prevent cross contamination, non-sterile gloves should be worn and then, using lint free gauze swabs, scrub the surgical site area using a methodical back and forth motion for 30 seconds, starting at the incision site and moving out to the periphery. Using a new swab each time, repeat this scrub 4 times.

The efficacy of the antiseptic agent to be applied is dependent on the cleanliness of the skin. Removal of superficial contaminants, debris and transient microbes before applying antiseptic agents reduces the risk of wound contamination by decreasing the organic debris on the skin.

4. Once the surgical site area has been prepped as above, the patient is then ready to be taken to the theatre. If necessary, the surgical site area is covered with a sterile disposable drape to protect the area during the transfer to theatre. Still wearing the gloves, the patient is then moved to the theatre.

3. Final skin antisepsis preparation

1. Before removing the non-sterile gloves, position the patient appropriately for the procedure to be undertaken. If limb surgery is to be performed, then the leg is suspended to prevent contamination of the surgical site.

2. If a sterile disposable drape has been used, this can be removed and disposed of, ready for the final sterile skin preparation procedure.

3. Remove and dispose of the non-sterile gloves, wash hands and replace with a pair of sterile gloves.

4. The final sterile skin preparation is carried out using a sterile, single use applicator containing a solution of 2% chlorhexidine gluconate and 70% isopropyl alcohol.

This specific combination of antiseptic and alcohol has demonstrated significantly better antimicrobial activity[3,4] and is effective against a broad range of micro-organisms including MRSA, VRE, Clostridium difficile, coagulase negative staphylococci and most viruses and fungi. It has good activity levels within 30 seconds and provides ***48 hours[5]*** *ongoing bactericidal activity after application.[8]*

The method of application is as important as the solution itself and using a sterile applicator with an ampoule of solution inside means the nurses hands never come into contact with either the solution or the patient's skin, preventing cross contamination.[8]

There are a range of different sizes of applicator and tinted versions are also available. See the Invicta Applicator List_00 for the different options and area coverage per applicator.

5. Remove the applicator from the sterile wrapper and hold the sponge facing downwards.

6. Squeeze the applicator gently to break the ampoule containing the antiseptic solution, which releases it onto the sponge in a controlled flow. (The broken ampoule remains safely contained within the applicator).

7. At the incision site, press the sponge gently against the patient's skin once and hold for a few seconds until the solution soaks the sponge.

8. Lift the applicator and then apply using repeated up and down, back and forth strokes for at least 30 seconds over the incision site and then work outwards to the periphery.

Applying antiseptic as a spray does no more than soak an area, no significant cleaning action occurs. A quick wipe with an antiseptic solution is insufficient to significantly reduce the bacterial burden prior to puncturing the skin and a concentric circular pattern in the same direction may not allow penetration into the cracks and fissures of the skin.[6]

There is evidence, however, to show that a back and forth scrub movement reduces microbial counts on the skin.[6,7] *The foam sponge controls flow to prevent splashing/pooling while gently helping to expose bacteria in the lower cell layers.*

There can be as many as 10 million aerobic bacteria on a single square centimetre of skin and 80% of resident skin bacteria may be found in the top 5 cell layers of the epidermis[1]!

9. Discard the applicator after a single use. Leave the area to air dry completely before applying sterile drapes. Do not blot or wipe away.

Important safety point: Do not drape or use ignition source until the solution has completely dried.

If drapes become wet, remove and replace. If moisture seeps through the drapes and becomes cold, this may put the patient at risk of hypothermia and wet drapes encourage movement of skin bacteria onto and through the drapes.

10. Once the area is completely dry and draped, the patient's final skin antisepsis preparation is complete.

11. Any adverse reactions to skin antiseptic agents should be reported in the practice's adverse event reporting system.

REFERENCES

[1] Hendley AAC91

[2] Weber AAC2007

[3] Hibbard Study 2005

[4] Adams 2005

[5] Garcia IDSA Abs 2002

[6] Fortin N. 2006

[7] McDonald Vox San 2006

[8] Sheila Inward BJN