Evaluation of Two Pre-Surgical Antisepsis Methods from the Perspective of Waste Generation and Process Optimization

S. Sánchez, Y. Reñones, A. Solé, S. Morell, T. Ruiz, M. Sánchez

This study is a collaboration between the Mutua Terrassa University Hospital (Catalonia, Spain) and BD

Introduction

Pre-surgical skin antisepsis is an essential intervention within the bundle of measures implemented to reduce the risk of surgical infections. This procedure aims to decrease the microbial load on the patient's skin, creating a safer environment and reducing postoperative complications.[1]

Objective

The main objective of our study was to compare the traditional skin antisepsis method using bottles of antiseptics, with the ChloraPrep™ applicator in terms of:

- amount of waste generated
- Total time needed for skin preparation process

Material & Methods

Variables collected in the operating room:

- Age, gender, height, weight, area to be prepared
- List of components used in the preparation
- Total time spent on preparation (s')
- Weight of the material before use.
- Weight of the waste.

Traditional method:

A 250 ml bottle of chlorhexidine, a basin/galipot, forceps, gauze swabs, and paper towels for drying any excess.

A standardized measurement of the weight of disposable material was performed before and after the 25 surgeries.
Each material was weighed three times, and the average of the three weights was taken.

ChloraPrep™ method:

A ChloraPrep™ 26mL, ChloraPrep™ packaging, swabs after use, used ChloraPrep™ applicator

Time measurements

Includes preparation time and antiseptic application time.

Preparation time: exclusively timed for the preparation of materials to be used in antisepsis. In the case of ChloraPrep™, preparation time is zero.

Application time: measured from the moment the healthcare professional picks up the swab or applicator until the antisepsis is considered complete and dry.

Study

The study was conducted at the Mutua Terrassa University Hospital, a tertiary care center with 17 operating rooms.

Since June 2020, the hospital has adhered to the Green Commitment, focusing on resource efficiency to reduce the environmental impact of its activities.

The study period was from February to April 2024.
The study population included 50 adult patients over 18 years old undergoing elective abdominal surgery.

The study group was divided into two cohorts: 25 patients with the current antisepsis method and 25 patients with ChloraPrep™.

In both groups, disinfection was performed with 2% alcoholic chlorhexidine applied using the Back & Forth technique.

Results

Average values on surgeries		
	Waste (g)	Time (s)
Chlorexidine (bottle)	75,04	98,67
ChloraPrep™	64,17	73,60
Saving w/ ChloraPrep™	10,88	25,07
	14,49%	25,41%

- The traditional method (chlorhexidine in bottle) generates 14,49% more waste than ChloraPrep™.
- Skin preparation time decreases by 25,41% using ChloraPrep™ vs traditional method.

Conclusion

Using ChloraPrep™ : Significant reduction in chlorhexidine waste, estimating an annual savings of 539 kg, as well as a decrease in surgical time by 105 hours.

The time saved could have a significant impact on operational efficiency and reduce the wear and tear on surgical equipment.

It is important to note that, given the limited size of our sample, it would be advisable to expand the study with a larger number of participants.

[1] WHO global guidelines for the prevention of surgical site infection 2018, section 4.7. Accessed at https://www.who.int/publications/i/item/9789241550475 May 2025.

ChloraPrep™and ChloraPrep™with Tint 2% w/v chlorhexidine gluconate/ 70% v/v isopropyl alcohol cutaneous solution. Refer to the Summary of Product Characteristics before prescribing. Presentation: ChloraPrep – each applicator contains 1ml, 1.5ml, 3ml, 10.5ml or 26ml of 20 mg/ml chlorhexidine gluconate and 0.70 ml/ml isopropyl alcohol; ChloraPrep with Tint – each applicator contains 3ml, 10.5ml or 26ml of 20 mg/ml chlorhexidine gluconate and 0.70 ml/ml isopropyl alcohol. Indication: Disinfection of the skin prior to invasive medical procedures. Dosage and administration: The choice of applicator will depend on the invasive procedure being undertaken. May be used for all age groups and patient populations. Should be used with care in newborn babies, especially those born prematurely. The applicator is squeezed gently to break the ampoule containing the antiseptic solution, which is released onto the sponge in a controlled flow. The sponge is gently pressed against the patient's skin in order to apply the antiseptic solution. Once the solution is visible on the skin, use gentle back and forth strokes to prep the site for 30 seconds. The area covered should be allowed to air dry completely. Contra-indications: Known hypersensitivity to ChloraPrep or ChloraPrep with Tint or any of its components, especially those with a history of possible chlorhexidine-related allergic reactions. Warnings and precautions: The solution is flammable. Do not use electrocautery procedures or other ignition sources until the skin is completely dry. Remove any soaked materials, drapes or gowns before proceeding with the intervention. Do not use excessive quantities and do not allow to pool in skin folds or under the patient or drip on sheets or other material in direct contact with the patient. Where occlusive dressings are to be applied to areas previously exposed to ChloraPrep, 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. Do not use on broken or damaged skin. In addition, direct contact with neural tissue or the middle ear must be avoided. When the solution has been applied in an over-vigorous manner to very fragile or sensitive skin or after repeated use, local skin reaction may occur. Prolonged skin contact with alcohol containing solutions should be avoided. The solution is an irritant to eyes and mucous membranes. Chlorhexidine known to induce hypersensitivity, including generalised allergic reactions and anaphylactic shock. Chlorhexidine-containing products are known causes of anaphylactic reactions during anesthesia. The symptoms of anaphylactic reactions might be masked in an anesthetized patient. If symptoms of an anaphylactic reaction are detected during anesthesia, chlorhexidine related allergic reaction should be considered. When chlorhexidine-related allergic reaction during anesthesia is suspected, other products containing chlorhexidine used during anesthesia (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 procedures has been associated with chemical burns in neonates. 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 and lactation: Although no studies have been conducted, no effects are anticipated as systemic exposure is negligible. Undesirable effects: Very rarely

BD, the BD Logo and ChloraPrep are trademarks of Becton, Dickinson and Company or its affiliates. © 2025 BD. All rights reserved. BD-149786