



THE USE OF CHLORHEXIDINE® SOLUTION IN PERIOPERATIVE CARE DURING OBSTETRICS AND GYNECOLOGY OPERATIONS

Lindström P^{1,2}

Abstract

Background: Surgery site infection (SSI) is one of the most significant issues in patient safety, commonly according to healthcare-associated infection (HAI) between patients and medical staff in perioperative care in the healthcare system is surgery site infection (SSI). The lack of chlorhexidine (CHX) solution and poverty of optimization knowledge in quality improvement are one of the most important reasons for this research on the coronavirus pandemic in the woman`s clinic at the university hospital.

Aims: This study investigates the evidence for the effect of CHX on perioperative care to reduce SSI, especially before the bandage.

Materials and methods: This study is going to analyze and evaluate papers found from these four databases including PubMed, CINHAL, Cochrane, and Embase with a concentration on keywords from 2021-01-17 to 2022-02-02. The PICO method was used to clarify this object. This study analyzes and evaluates papers found in these four databases, including PubMed, CINHAL, Cochrane, and Embase. It focuses on keywords from 2021-01-17 to 2022-02-02. The PICO method clarifies this object. The state's preparation for medical and social evaluation (SBU) methods were used to review and grade all studies.

Result: It is important to note that no evidence or study suggests that the incision should be disinfected with CHX before the bandage is applied. But we gained brilliant insight into skin preparation with CHX in the preoperative phase before draping surgery with other items to remarkably decrease the rate of SSI. This includes quality improvement techniques and bundles involving the collection of evidence-based measures.

Conclusion: There are also additional research requirements for new experiments due to insufficient evidence. Evidence has shown that bundles enhance patient outcomes in perioperative care.

Keywords: Chlorhexidine, Tubiluchid, Novalsan, Sebidin A, Perioperative Care, Obstetrics, Gynecology

¹ Sahlgrenska University Hospital / Östra, Diagnosvägen 15, SE-416 85 Gothenburg, Sweden

² Sahlgrenska University Hospital / Östra, Diagnosv. 15, SE- 416 60 Gothenburg, Sweden

Background

Perioperative care is plagued by surgical site infections (SSIs). SSIs make up about 22% of all healthcare-associated infections (HAIs). Patients suffer more from these infections, which increases the risk of morbidity, mortality, and other negative consequences for society (1). Moreover, the cost of only additional days of care related to HAIs in Sweden is estimated at approximately 1.1 billion Swedish Krona annually. Approximately 30-50% of these costs can be avoided by applying accurate and appropriate preventative measures (2).

Sahlgrenska University Hospital's annual and quarterly reports for Q2 and Q3 of 2021 indicate that HAIs have increased in the gynecological and obstetrical departments compared to Q1 and Q4 of 2021. During the first quarter of 2022, HAI decreased (3).

According to evidence, SSIs are caused by errors and mistakes in the healthcare system or by individual mistakes, which can be prevented by improving routines (4, 5). Within 30 days of postoperative surgery without implants or a year of surgery with implants in the surgical area or wound, SSI occurs. There are three types of surgical infections: superficial, deep, and organ-related (8).

The evidence regarding risk factors, routines, and strategies concerning SSI in gynecological and obstetrical units is lacking (9, 10). In this case, Temming L. A. et al. (2017) show how evidence-based (EB) measures during maternal care can reduce postpartum complications, including SSI. To achieve this goal, evidence-based interventions will be used, including preoperative skin disinfection with chlorhexidine alcohol® (CHX), prophylaxis and antibiotic administration, endogenous and exogenous risk factors, and the use of subcutaneous and skin sutures (9, 11). Furthermore, the bundle has been proven to reduce the incidence of SSIs (9, 12). By the Institute for Healthcare Improvement (IHI), EB-routines are designed to improve care processes (12, 13).

It is important to note that antiseptic products come in various forms. 1 ml of uncolored chlorhexidine® CHX solution contains 5 mg of chlorhexidine gluconate, ethanol, and water, while colored CHX also contains phenol red or phenol sulfone phthalein (14, 15). No side effects or risks have been reported regarding skin irritation and allergic reactions. Newborns have also suffered chemical burns. Swedish

Medical Products Agency (14) reports no reported serious risks. Pharmaceutical Specialties in Sweden (FASS) states that CHX is an over-the-counter antiseptic used before surgical procedures (14, 15).

Following the intraoperative phase, one of the most important postoperative duties is to check the surgical incision before bandaging it (16). Furthermore, it is important to consider what type of dressing is required or what materials should be used to prevent SSI (17, 18).

The patient's status and well-being, as well as the complete body skin care, bandage, drainage, and marking of drainage, should be checked after the intraoperative phase before the patient leaves the operating room (OR) (5, 17). These measures are necessary for perioperative care at Sahlgrenska University Östra Hospital. In the OR of the gynecology and obstetrics clinic at the mentioned hospital, the operating nurse must disinfect the skin incision with CHX before bandaging, which is routine in this clinic (19).

On the Sahlgrenska University Hospital's site, there are a series of general guidelines and routines to avoid SSI, which are about aseptic techniques, healthcare hygiene, preoperative hygiene, shaving, patients' normothermia before surgery, etc. (20). However, there are no specific comprehensive and available routines about SSI for the relevant staff in this operating ward (19).

Currently, after shaving the surgical area, skin preparation with Descutan®4% sponge and CHX 5% is necessary for the patient before draping, it should be noticed that this does not apply to immediate emergency cesarean section CS (21). After suturing and checklist timeout the surgical incision is always disinfected with saline and CHX before bandaging, this is a local and clinical routine for all types of surgery in the Östra hospital's OR which is a part of Sahlgrenska university. However, there have been discussions for the purpose of quality improvement and a lack of information in this field emerged to studies in this major, whether the mentioned routine is evidence-based practice (EBP) or not.

The patient's status and well-being, as well as complete body skin care, bandages, drainage, and marking of drainage, should be checked after the intraoperative phase and before the patient leaves the operating room (OR) (5, 17). These measures are necessary for perioperative care at Sahlgrenska University Östra Hospital. In the OR of the gynecology and obstetrics clinic at the mentioned hospital, the operating nurse must disinfect the skin incision with CHX before

bandaging, which is routine in this clinic (19).

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After shaving the surgical area, skin preparation with Descutan®4% sponge and CHX 5% is necessary for the patient before draping. It should be noted that this does not apply to immediate emergency cesarean section CS. After suturing and checklist timeout, the surgical incision is disinfected with saline and CHX before bandaging. This is a local and clinical routine for all types of surgery in the

Östra Hospital's OR which is a part of Sahlgrenska University. However, there have been discussions about quality improvement, and a lack of information in this field emerged to study in this major, whether the mentioned routine is EBP or not.

Aim

This study aims to review a structured literature review and compile scientific articles that discuss the effect of CHX on perioperative care after suturing before bandaging to reduce the risk of surgical site infections SSIs. A description of the purpose is provided in Table 1. In this study, CHX was analyzed in all phases of the perioperative process.

The purpose is clarified according to the PICO framework (Table 1).

P	Women undergoing obstetric or gynecological surgery
I	Skin preparation with CHX® in perioperative care
C	Skin preparation without CHX® in perioperative care
O	Morbidity Surgery Site Infection (SSI) Sepsis CFU (Colony Forming Units, CFU/m ³) Skin & vaginal reaction Mortality

P = Patient/ Population/ Problem, I = Intervention, C = Comparison or Control and O = Outcome (22)

Design

Evidence was collected by analyzing and reorganizing previous papers in this field.

Method

As indicated in the PICO measurement, the method involved sampling and sampling outcome data to different types of databases in addition to searching and reviewing with consideration to study criteria, including:

Inclusion criteria

The inclusion criteria for the articles included the following:

- Original research studies that meet the requirements for Randomized Controlled Studies (RCT), observational studies,

cohort studies, etc.

- English language
- Obstetrics or gynaecological surgery
- Adult patients > 18 years' old
- Published between 2012-2022
- CHX for Skin preparation method/solution subjected to a quality analysis conducted by the Swedish Agency for Health Technology Assessment and Assessment of Social Services (SBU) to determine credibility and reliability

Exclusion criteria

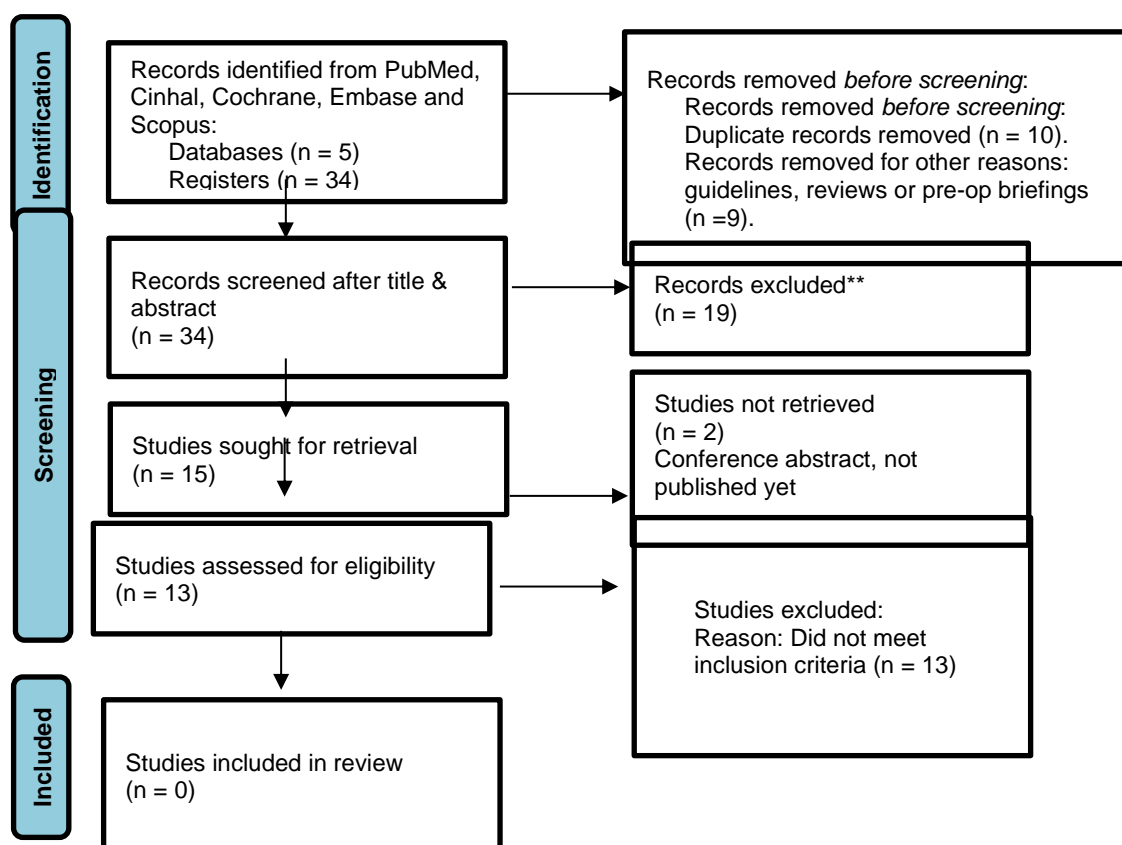
- Reviews or literature studies
- Guidelines
- Not published

Data Collection

The searches were conducted between 2021-01-

17 and 2022-02-02. These databases were searched for combinations of the emphasized subject with various terms: PubMed, Cinahl, Cochrane, and Embase. A search was conducted using the following search terms, with both subject words (MeSH terms, entree terms, and Cinhal headings) and free text terms: (Chlorhexidine [MeSH Terms] and [Title/Abstract], Tubiluchid [Title/Abstract], Novalsan [Title/Abstract], Sebodin A [Title/Abstract], Perioperative Care [MeSH Terms] and [Title/Abstract], Obstetrics [MeSH Terms] and [Title/Abstract] with Gynecology [MeSH Terms] and [Title/Abstract]) (see attachments).

Flowchart (Figure 1)



All the articles are quality-reviewed and evaluated according to SBU (24) used SBU-tools for analyzing to assess the risk of bias for all included articles.

Seven RCT studies (Randomized Controlled Trials) have researched the effects of antiseptic skin disinfectants with different percentages to prepare the surgical area during the preoperative phase of care, these studies have compared CHX® and alcohol-based and water-based povidone-iodine® ((Alc-PVP-I)® & (Aqu-PVP-I)®) and Cyanoacrylate Microbial

Data analysis

Figure 1 summarizes all articles in the mentioned databases in a PRISMA flowchart (23) concerning PICO measurement.

Duplicates, guidelines, and literature studies were removed during screening. The rest of the results were then reviewed, taking into account the title and abstract of the study. The final step was removing the reports in Figure 1 about upcoming studies and conferences.

Sealant (CMS). Three studies have been retrospective analyzes of patients who suffered from SSI, in one of these studies a cohort study is also performed.

In a comparison study, the allergy level of the mentioned products was examined. The prospective cohort study was based on a quality improvement program. An observational study using propensity score matching (PCM) compared the effect of two types of skin disinfectants for patients who used and applied of EBPs routines to reduce risks of SSI.

Methods of using CHX for aseptic techniques in the obstetrics and gynecology department: To reduce the risk of infection, this study used studies that reviewed the effect of CHX separately and in a care bundle. The term bundle refers to a care bundle with 3 to 5 various EBP interventions or measures in the SSI field. This is according to articles that separately have analyzed and illustrated the effect of CHX compared to other products, for example, with PI (Povidone Iodine). However, other studies have shown the effect of CHX on care bundles.

Result

Description of studies

Thirteen articles were reviewed, eleven gynecological (25-35) and two obstetrical studies (36, 37). There are no articles describing wound washing with CHX before bandaging. It should be added that within the framework of this study, it has not been possible to find evidence regarding the routine in the OR. However, all articles show skin and vaginal disinfection with CHX is used before draping the surgical area.

Some studies analyzed and compared the effect of different antiseptic products. (25, 27, 29, 34-36, 38), while some studies implement bundles or quality improvement projects (26, 28, 30-33). According to the IHI definition, a bundle is defined as a set of 3 to 5 EBP interventions (11).

Mortality

There is no mortality in the gynecological part, but in the obstetric part, La Rosa et al. (2018) (36) reported four deaths in the intervention group that had not received preoperative vaginal preparation in neonatal care. Mortality in the control group that received preoperative vaginal preparation was zero.

Morbidity

The morbidity for these patient groups shows that diabetes is a high-risk factor, but age, BMI, tobacco, and surgery times were also analyzed there (25, 27, 39). The articles describe improvement projects or bundles as risk-reducing measures for SSI. These measures include surgical preparation with CHX, a standardized aseptic technique, shaving, and skin washing with CHX before surgery. It was also shown that an improvement project or

bundle effectively reduced SSI, according to Table 2, Diagram 1 (26-28, 30-35).

Bundle

EBP bundles contain other proven interventions to improve quality. When these interventions are used in the bundle plus using preoperative disinfection solutions, they provide a better outcome for infection prevention measures in perioperative care (28, 30-33, 40) (See table 2).

These interventions include patient education about skin disinfection with CHX at home before surgery (31-33, 40), shaving before arrival in the OR (28, 30, 31, 40), and keeping the sterile bandage for 24 - 48 hours to reduce SSI risk (32, 33, 40). In addition, it is important with up-to-date staff how-know with re-educating and the choice of antibiotics with the right timing and dosage (28, 30, 32, 33, 40). It is also of great importance to remove urinary catheters and maintain normothermia in intraoperative care (28, 30, 40) (see Table 2).

There are also other factors to consider in preventing SSI. These include blood loss, surgery time, and diabetes control before surgery. Due to impaired immune systems, great attention is shown to cancer patients in adjuvant treatment (28, 31, 40).

In obstetrics, it is also very important to combine skin and vaginal disinfection to achieve the desired effect, according to Diagram 2 (36, 37). Patients who undergo vaginal disinfection with CHX solution 2% have few allergic reactions compared with 4% solution, according to Diagram 3 (27, 34, 35).

Discussion

Preventing SSIs in obstetrics and gynecological surgeries will pose challenges because infectious agents can originate from both the patient's skin (23, 24, 28, 29, 34) and vaginal canals (27, 28, 31, 37), also from the healthcare staffs (24, 29, 34). Therefore, involving patients and staff in this work is important to reduce SSI (24, 32, 34).

SSIs can lead to mortality (27), and morbidity, leading to increased hospital stays or readmissions. Therefore, these infections mean extra patient suffering and a financial burden for the individual and society (25, 29, 32). This study evaluated the effect of CHX on the surgical wound before bandaging in perioperative care, for which there is no evidence. Furthermore, the study showed that comprehensive measures and

EBP routines are needed rather than just wound disinfection.

In all included articles on patient treatment with CHX in perioperative care, which reviewed the effect between CHX in separated- and bundle-form, it is shown that the improvement project or bundle is a more effective way to reduce SSI (32, 35, 39). This study shows that when EBP measures in bundle form are implemented and coordinated, it leads to better results in preventing SSI. Andiman et al. (2016) (32) presented a statistically significant reduction in SSI by 2.64% after their bundle. Johnson et al. (2016) (34) also showed a significant reduction in SSI by 4.9% in gynecological cancer surgery. Burgess et al. (2020) (35) emphasized that CHX and the bundle are excellent methods to reduce SSI. It should be noted that cancer patients must receive more attention to avoid SSI (34, 38).

Evidence shows that bundles lead to better patient outcomes and quality improvements in healthcare (40). Marja Boermeester (2018), president of the Surgical Infections Society Europe (SIS-E) and responsible for the World Health Organization guidelines (41), emphasizes that EBP bundles can reduce SSIs in perioperative care. Multiple interventions can also prevent SSI. This includes, among others, antiseptic techniques and determining the correct time and appropriate dosage of surgical antibiotic prophylaxis. The study shows reduced SSI incidence before and after bundle implementation (40).

Conclusion

Important topics include patient education, shaving before entering the OR, normothermia, keeping the dressing sterile for 24-48 hours, and staff re-education.

SSI requires a series of measures and comprehensive routines to prevent risks. Furthermore, providing everyone with the knowledge and information that healthcare staff needs to deal with SSI is important. This also applies to patients in the HAI risk zone. To respond to HAI, it is important to have a holistic approach. This means having a comprehensive perspective on all HAI factors/circumstances in the system and at the individual level.

Patients and relatives should be informed about the intervention and recovery process in perioperative care before surgery. In infections, choosing the right antibiotic with the correct dosage and timing is important. Excessive

consumption or overuse of antibiotics without considering timing and dosage is a global problem that must be solved with bundle implementation.

In other words, these measures can prevent antibiotic-resistant bacteria and prevent and control infections.

This type of study has no conflict.

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Attachments

Table
EBP measures in bundles

2

Level of article		High	Low	Middle	Low	High	High
Article		12	13	6	2	7	8
Phase of care		Method					
1	Preparation surgery with CHX	*	*	*	*	*	*
2	Warming devices		*	*			
3	Standardized aseptic surgical preparation			*			
4	Sterile dressing 24–48 h	*		*		*	
5	Maintenance of normothermia	*	*	*			
6	Preoperative and intraoperative antibiotic administration and redosing standardization	*	*	*		*	*
7	Patient education on wound care and infection symptoms	*		*	*	*	
8	Enhanced Recovery After Surgery (ERAS®) program				*		*
9	Re-educating staff operating room	*	*	*		*	*
10	Removal of a urinary catheter after 2 days	*	*				*
11	Shave before entering OR	*	*		*		*
		1	2	3	4	5	6
SSI (Pre-Full Bundle Implementation)		44,00 %	11,50 %	4,51 %	9,87 %	5,90 %	19,00 %
SSI (Post-Full Bundle Implementation)		54,00 %	4,80 %	1,87 %	3,70 %	1,10 %	3,30 %
Percentage reduction in infection		22,73 %	- 58,26 %	- 58,54 %	- 62,51 %	- 81,36 %	- 82,63 %

Diagram 1
Effect of bundle

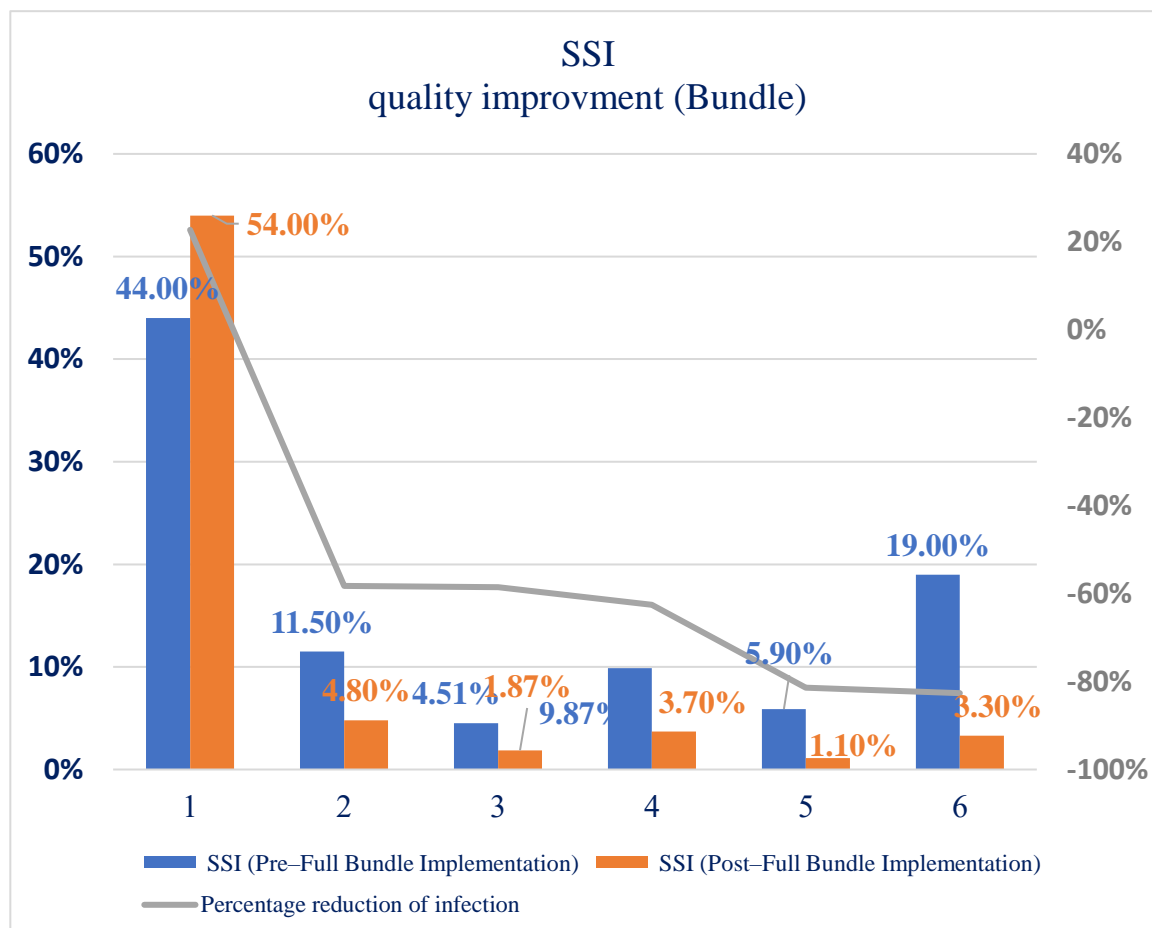


Diagram 2
Effect of CHX on obstetric

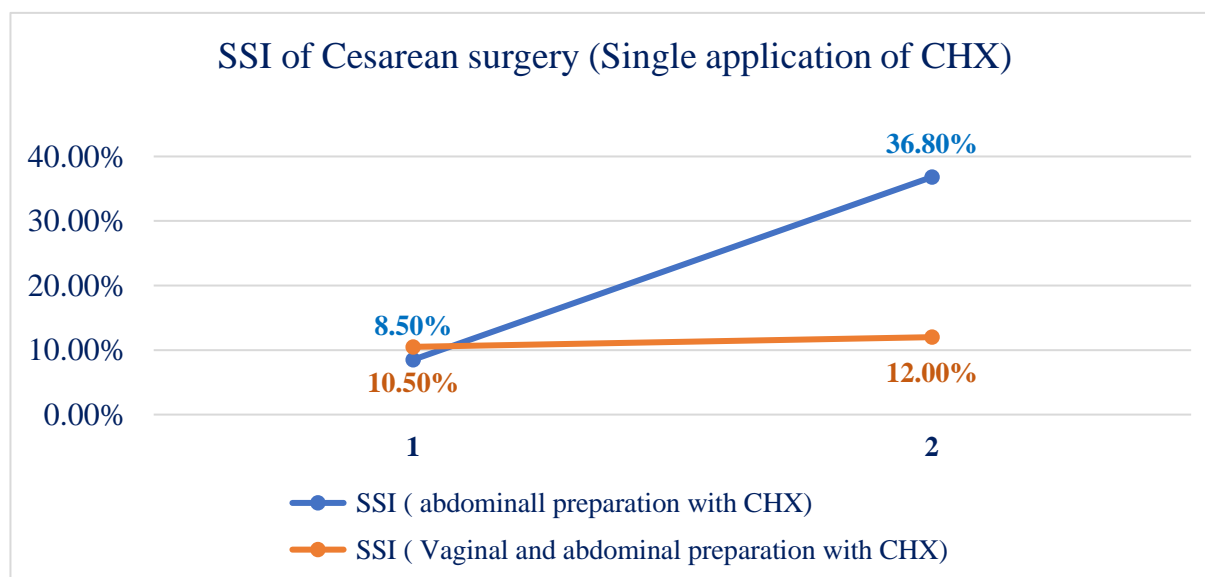


Diagram 3
Allergy reaction to CHX

