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Research paper

An intervention to improve patient understanding and use of preoperative chlorhexidine washes

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Abstract *Background:* Despite a lack of consensus around which type of preoperative wash is most effect in preventing surgical site infection, their use in clinical practice remains common. Chlorhexidine gluconate (CHG) is widely used however a previous study indicated issues with patient understanding and use of CHG. In response an intervention was developed which aimed to improve patient understanding and compliance with CHG.
Methods: A patient information sheet and a standardised script to guide preadmission phone calls were developed to improve the delivery of information to patients at the study hospital. These interventions were implemented for four months with adult surgical inpatients. A cross-sectional survey was then conducted to assess the effectiveness of the intervention.
Results: A 75% (n = 226) response rate was attained. The majority of participants (86%, n = 189) used CHG prior to their surgical procedure and of these 71% (n = 129) used CHG the recommended two times. The quality of information received from the preadmissions nurses was rated more highly than information delivered by other hospital staff. Openended questions revealed key issues including lack of information, time and access issues, and inconsistencies in CHG use.
Conclusion: The value of standardised calls and information sheets was evident in participants who reported receiving these measures. A moderate increase was seen from the original study in the number of participants who used CHG washes the recommended two times. However, issues remained with inconsistent information across the hospital. Clinicians need to draw on high quality, contemporary research to inform clinical practice.

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Highlights

- A targeted intervention to improve patient understanding and use of CHG washes.
- 71% (n = 129) of participants used CHG the recommended two times.
- Information received from the preadmissions nurses was highly rated.
- Inconsistent information across the hospital remained an issue.

Introduction

Although pre-operative washing has been part of patient care for several decades there is a lack of consensus as to which type of wash is most effective [1], which concentration and volume should be used and the best method of application [2]. There is evidence that preoperative chlorhexidine gluconate (CHG) washes reduce colony forming units on the skin [3] however, its role in preventing surgical site infections remains inconclusive [4]. This is in part due to the weak design of trials included in meta-analyses such as the widely cited Chlebicki et al. [5], and Webster & Osborne [6—8]. Both included studies published over 30 years ago in their analysis and many of the studies did not give details of a standardised process for CHG application. These are limitations acknowledged by the authors however, this has not prevented their conclusions that CHG is no more effective than other types of washes including soap and water, being applied in practice. It is also important to note that studies which tested the delivery of CHG by wipes were excluded in these meta-analyses. Edmiston et al. [1], and Tanner et al. [3], raised concerns that guidelines and recommendations by organisations such as the Association of Preoperative Registered Nurses and the Center for Disease Control and Prevention have been based on out-dated, methodologically weak research and evidence from more recent studies has not been utilised. However, contemporary studies have found CHG washes are effective in reducing surgical site infections and treatment of the colonisation of staphylococcus aureus, when used in conjunction with nasal screening and surgical care bundles [9—15]. Given that this is the current evidence, there should be a focus on facilitating optimal use of CHG by surgical patients.

Background

In 2016 a study was conducted by the authors to explore patient experiences and understanding of Chlorhexidine Gluconate (CHG) preoperative washes (X et al., 2017). The impetus for this study was an awareness of inconsistency in delivery of information from nursing and medical staff to patients regarding CHG washes. The study hospital policy stated:

"Where possible, elective surgical and obstetric patients (excluding paediatrics) should have at least [1] preoperative antiseptic shower prior to surgery, including hair washing if appropriate." (SJGSH, 2012, p. 3).

Due to the limited direction in the policy it was standard care for the preadmission clinic nursing staff to advise all elective surgical patients to undertake two preoperative CHG washes, one the night before surgery and one the morning of surgery. As well as verbal instructions, patients were provided with a copy of the manufacturer's instructions for CHG washes. Some patients were provided with CHG by their surgeon, while others were required to source their own. Patients who are required to source their own CHG are advised to purchase 4% Chlorhexidine Gluconate liquid wash from their local pharmacist. The results of the study demonstrated that over a third of patients reported they had only used CHG once, rather than the recommended two times. Issues were also identified with a lack of information, timing of information, access to CHG and inconsistencies with CHG use across surgical patients. These findings were the impetus for a project to improve the delivery of information regarding CHG washes to patients. The aim of this project was improve patient understanding of and increase patient compliance with evidence based guidelines for CHG preoperative washes. This paper reports the process undertaken as well as the results achieved.

Methods

Intervention

The information provided to patients at the study hospital pertaining to CHG pre-operative washes was reviewed (in line with the existing evidence) and interventions were developed to improve the delivery of information. This included the development of a patient information sheet (Fig. 1) by the preadmissions team in consultation with the hospital consumer advisory group, infection control and surgeons. A standardised script (Fig. 2) was also developed for use during preadmission phone calls, to ensure consistency in the information delivered. Preadmission team members discussed current practice with phone calls to patients to identify any discrepancies and inconsistencies in the information communicated regarding CHG preoperative washes. Issues with a lack of knowledge and understanding around CHG washes identified in the previous study (X et al., 2017) were taken in consideration in the development of standardised scripting. The wording for the standardised script was designed to reflect and reaffirm the content of the newly created patient information sheet. This resulted in a concise scripting document which was used by all preadmission nurses to guide patient interviews either by phone or in person. The information sheet was emailed to patients and hard copies were provided to patients who had a face-to-face

[redacted]

PRE OPERATIVE SKIN PREPARATION

To assist in the reduction of surgical site infections by reducing the micro-organisms that live on the skin, it is a recommended that you thoroughly cleanse and disinfect your skin prior to your admission to hospital for your operation.

It is also recommended, to remove all jewellery and nail polish.

The preferred solution to use for skin cleansing is Chlorhexidine Gluconate 4% Pre op Wash.

It's a 50 ml tube of liquid soap. If it has not been provided by your surgeon, it can be purchased from a pharmacy. One tube should be enough for the cleansing process.

PRE OP WASH APPLICATION INSTRUCTIONS:

It has been shown that the best results are achieved when the process is carried out more than once; the evening prior to surgery and just prior to leaving home on the day of your surgery.

Please use a clean sponge or flanel to apply.

1. Wet your whole body in the shower, including face and hair.
2. Apply a small amount of the Pre Op Wash to your HAIR. Lather and rinse.
3. Applying a small amount to your FACE. Pay special attention to the NOSE area. Avoid contact with eyes (shut lids tightly). Rinse with water.
4. Work down the NECK and ARMS. Pay special attention to the UNDERARMS and NAVEL. Using a sponge can assist.
5. Now cleanse the GENITAL area, BUTTOCKS and ANAL area.
6. Work down cleansing the THIGHS, LEGS and FEET.
7. Rinse your entire body.
8. Now wash the whole body again using the same cleansing process.
9. Dry yourself thoroughly with a freshly laundered towel.
10. Do not use any further products on your body after your final shower.
11. Freshly laundered clothes should be worn afterwards.

[redacted]

Figure 1 Patient information sheet.

Pre-Operative Preparation

"The hospital recommends you have two showers at home using an antiseptic soap before you come into hospital for surgery. The one recommended is Chlorhexidine pre-op. You can purchase this from a pharmacy.
It is recommended to buy one tube, use half of the tube for each shower, the night prior and just before coming into hospital.
I will email you with the instructions to follow on it's use.
Do not apply anything to the skin following your final shower. Wear clean clothes. It is preferable not to wear nail polish, or jewellery...

Figure 2 Standardised script for preoperative CHG washes.

preadmission appointment. Email templates were also created to ensure consistency in the information patients received via email after their phone call. This included advising patients of the requirement to use CHG pre-operative washes in the body of the email as well as the patient information sheet as an attachment. These interventions were implemented for four months with all adult patients admitted for an inpatient surgical procedure.

Instrument and data collection

Following this period data were collected to assess the effectiveness of these interventions. Data was captured via paper-based surveys, distributed to patients meeting the inclusion criteria, who had undergone a surgical procedure. The questionnaire utilised in the original study which explored patient experience and understanding of CHG washes, was adapted and employed to allow comparison of results (X et al., 2017). Two additional questions were added to the original survey to ascertain what information participants received about CHG washes and how they rated the information they received from the hospital. The questionnaire consisted of 19 questions:

1. Age
2. Gender
3. Type of surgery
4. Who told you about preoperative washing with chlorhexidine before your surgery?
5. Were you provided with chlorhexidine wash before your admission to the hospital? (If yes, please skip to question 9)
6. Were you instructed to buy your own chlorhexidine wash? (If no, please skip to question 9)
7. If you needed to buy chlorhexidine were you able to find and purchase the required wash?
8. If you needed to buy chlorhexidine how difficult was it for you to find?
9. Did you use chlorhexidine wash before your operation? (If no, please skip to question 11)
10. How many times did you use the chlorhexidine wash before your operation?
11. What type of wash did you use before your operation? (If you did not use chlorhexidine please skip to question 18)
12. Were the instructions to use the chlorhexidine easy to follow?
13. I understood the reasons for using chlorhexidine wash before my operation: Fully/Mostly/A little/Not at all
14. In your own words explain the reasons for using chlorhexidine wash before surgery
15. What information did you receive about chlorhexidine washes?
16. The information I received from the hospital on chlorhexidine washes was: Very good/Good/Average/Poor/Very poor
17. The amount of information I received about using chlorhexidine washes before surgery was: Too little/Just right/Too much
18. If you didn't use chlorhexidine wash before your operation please state the reasons why
19. Any other comments?

The survey was conducted over a five week period from September to October 2017. Adult patients from all surgical specialities were invited to participate. Participants were provided with an information letter which outlined the purpose and nature of the research, along with a questionnaire and envelope in which to seal and return their completed survey. Potential participants were made aware that participation was voluntary and their decision to participate or not participate would not impact on their care in anyway [16].

Sample and inclusion criteria

Patients aged 18 years or over, who had been admitted to the study hospital for an inpatient surgical procedure and could speak English, were eligible to participate in the study. Patients who were under 18 years of age, patients who did not have a surgical procedure, patients who had dental surgery, patients who had eye surgery and non-English speaking patients were excluded from the study. The study site sees very few patients who are not fluent in English and the study did not have funding to translate materials into other languages.

Results

A total of n = 300 questionnaires were distributed to potential participants and a 75% (n = 226) response rate was achieved. Of the questionnaires returned four were excluded from the final analysis, n = 2 were indecipherable, n = 1 returned blank and n = 1 ineligible due to meeting exclusion criteria, the participant had day surgery and did not have an inpatient surgical procedure. This left n = 222 questionnaires which were suitable for analysis.

Demographics

Of the 222 respondents, 221 provided responses to the demographic questions included in the questionnaire. There were respondents in all of the defined age categories with an age range of 18—97 years. The majority of respondents were female (60% n = 133). Orthopaedic (29% n = 65) and neurosurgery (20% n = 44) were the most common surgical procedures although all other surgical specialities were represented (see Table 1).

Main results

The majority of participants, (56%, n = 148), reported they were informed by the preadmissions team, while 17% (n = 45) reported they were informed by a surgeon and 11% (n = 28) by a nurse on the ward. A small number of participants (9%, n = 28) had no recollection of being informed about CHG washes and 7% (n = 18) of participants gained information from other sources including their surgeon's receptionist, their surgeon's nurse and prior knowledge from previous admissions.

The majority of participants, (70%, n = 155), were not provided with CHG prior to admission. These participants were then asked if they were instructed to purchase their own CHG. Of the 155 participants that responded, 68% (n = 107) reported they had been instructed and 32% (n = 48) that they had not been instructed. The vast majority of participants (96%, n = 101) who were asked to purchase CHG were able to obtain the required wash.

All participants were asked if they used CHG before their surgery. Of the 219 participants that responded, 86%

Table 1 Surgical speciality.

Surgical area	Frequency (n)	Percent (%)
Orthopaedics	65	29%
Neurosurgery	44	20%
Obstetric	31	14%
General Surgery	20	9%
Cardiac	10	5%
Colorectal	10	5%
Gynaecological	8	4%
Urology	7	4%
Vascular	6	3%
ENT	5	2%
Plastics	5	2%
Other	4	2%
Unknown	3	1%
Gastroenterological	2	1%

(n = 189) reported that they had used CHG. Most participants who did not use CHG prior to surgery reported using their usual soap or shower gel and one participant reported using an antibacterial soap. Participants who did not use CHG were asked to state the reasons why. Participants responses included not being informed about CHG, not having enough time to source or being told they did not need to use CHG:

Participant 222: 'I didn't know about it'
Participant 68: 'Didn't have time to get it'
Participant 136: 'Was told it wasn't needed'

A small number of patients expressed that they felt CHG washes should be provided by the hospital:

Participant 184: 'Should be part of surgeon's package issued at time of booking'
Participant 127: 'All patients should be given information sheet and tube of wash'

A number of patients who managed to obtain CHG described how they were informed very late and this caused additional stress leading up to their surgery:

Participant 52: 'A bit more notice about needing to wash with this would be beneficial. I was told on the afternoon only one day before surgery, so I had to race out and buy one at the last minute'
Participant 161: 'I was informed to use and purchase the wash at 4.30pm the day before surgery which was very late, so earlier notice would have been better as my mobility is restricted and I had just returned home from the shops'

The 189 participants who used CHG prior to surgery were asked how many times they used the wash. In total 183 participants responded to this question with 30% (n = 54) using CHG once and 71% (n = 129) using CHG two or more times. Of the 141 participants who were informed of CHG washes by the preadmissions team 77% (n = 108) used CHG two or more times. Most participants, (92%, n = 175), found the instructions for the CHG washes very easy or quite easy to follow. A small number of participants (4%, n = 8) reported they did not read the instructions.

Participants were asked to what extent they understood the reasons for using CHG 199 participants responded with 93% (n = 185) reporting they fully or mostly understood and 6% (n = 11) reported they had no understanding. In the open-ended responses to the question asking participants to explain in their own words the reasons for using CHG washes the majority of participants displayed a good understanding that they were advised to use CHG to reduce the risk of infection:

Participant 39: 'To help prevent infection'

Other participants described how CHG washes reduced bacteria on the skin and that this could help prevent infections:

Participant 70: 'Minimise risk of infection from bacteria on the skin'

A small number of participants did not offer an explanation of the reasons CHG washes are used and simply stated they had been told to use the washes:

Participant 194: 'Instructed by hospital staff to do so'
Participant 73: 'I just had to wash in it'

In a multiple choice question where participants could select all options that applied, participants were asked what information they received about CHG washes. This elicited 263 responses. The most commonly recalled source of information for CHG washes was the phone call from the preadmission team 44% (n = 117). Participants were then asked to rate the quality of information and materials they received. In total 186 responses were received, with 77% (n = 147) rating the information as very good or good, 12% (n = 23) rated the quality as average and 11% (n = 21) rated it as poor or very poor. When considering information received from hospital staff 85% (n = 91) of participants who recalled receiving a phone call from a preadmission nurse rated the call as very good or good and 4% (n = 8) as poor or very poor. In contrast participants who received information from other hospital staff, including ward nurses, surgeons and receptionists, 61% (n = 30) rated the information they received as very good or good and 31% (n = 15) as poor or very poor. A number of patients remarked on the quality of the information they received from the preadmission nurses when they had the opportunity to add any other comments at the end of the questionnaire:

Participant 75: I experienced superb advice from the preadmissions staff who rang me'
Participant 46: 'Excellent information from preadmission nurse'
Participant 155: 'Excellent telephone information which allayed my concerns about the procedure'

The majority, 77% (n = 161) of the 201 participants, who responded believed the amount of information they

Table 2 Comparison of original study and current study results.*

	Original study	Current study
Response rate	74% (n = 194) 191 eligible	75% (n = 226) 222 eligible
Gender female	59% (n = 112) 190 responses 1 missing	60% (n = 133) 221 responses 1 missing
Age range	19–93 years	18–97 years
Participants not provided with CHG preadmission	71% (n = 135) 190 responses 1 missing	70% (n = 155) 222 responses 0 missing
Participants able to purchase CHG (if required)	94% (n = 72) 77 responses 0 missing	96% (n = 101) 105 responses 0 missing
Used CHG >2 times	63% (n = 101) 160 responses 0 missing	71% (n = 129) 183 responses 6 missing
Found instructions easy to follow	88% (n = 143) 162 responses 0 missing	92% (n = 175) 190 responses 0 missing
Did not read instructions	9% (n = 15) 162 responses 0 missing	4% (n = 8) 190 responses 0 missing

* Questions were not applicable to all participants total number of responses and missing responses indicated for each item.

received was just right. Only one participant felt they received too much information and 22% (n = 46) said they had too little information.

Discussion

The survey achieved a high response rate of 75% which is a far higher response rate than is usually obtained in patient populations [17]. This was similar to the 74% response rate in the original study and we attribute these high response rates to; 1) the time at which we elected to provide potential participants with the surveys i.e. whilst they were postsurgical inpatients and had time to complete the questionnaires, 2) the approach, whereby potential participants for each study were invited to participate by a member of the research team and 3) the anonymity of the surveys, with returns in sealed envelopes via internal mail rather than being directly handed back to researchers or other hospital staff.

The demographics of respondents in the current study were similar to the original study with both samples being predominately female and the most common type of surgeries were orthopaedic and neurosurgery. The majority of participants in both samples as shown in Table 2 were not provided with CHG, most participants reported they were required to purchase their own CHG and nearly all participants who were instructed to buy CHG were able to obtain the product. The issues for participants who did not use CHG washes were similar across both studies and included late notification about the need for CHG washes, not being aware of the CHG washes and being told they did not need to use CHG. In both studies a small number of participants expressed that they felt the CHG washes should be provided by the hospital. There was also a number of participants in both samples who described being informed of CHG washes very late and the stress and inconvenience this caused leading up to their surgery.

Following the implementation of the interventions the number of participants using CHG washes the recommended two times or more increased from 63% to 71% (Table 2). Suggesting that the use of a standardised script and patient information sheet in the intervention increased patient understanding and compliance with CHG washes. Slightly more participants 92% found the instructions for CHG washes easy to follow compared to 88% with the materials provided prior to the intervention (Table 2). There was also a decrease in the number of participants who stated they did not read the instructions for CHG washes from 9% to 4% (Table 2). The information received by participants was well rated overall. When comparing participants rating of information received from the preadmissions team and other hospital staff it was evident participants felt the quality of information they received from the preadmissions nurses was much higher with 85% (n = 91) of participants rating information from the preadmissions nurses as very good or good compared to only 61% (n = 30) from other hospital staff. This indicates both the value of the scripted phone call developed for the study by the preadmissions nurses and their knowledge and experience in delivering this information to patients.

The development of the patient information sheet and standardised script for preadmissions phone calls resulted in evidence based, high quality information delivery which was valued by participants who recalled receiving it. However, despite the improvements through the intervention issues with inconsistent information, access to CHG and late notification of the need for CHG remained. The inconsistent delivery of information, with some participants reporting they weren't aware of CHG washes or were told they didn't need to use them, reflects the lack of consensus in the literature which health professionals draw upon as to the effectiveness of CHG washes. The practice where the majority of patients who were told to use CHG were required to source their own rather than being provided at their surgical consult, caused access issues. Given the high patient turnover and often short waiting times for surgery in the private hospital setting, this left little time for patients to purchase CHG which could cause additional stress and inconvenience. To improve patient satisfaction and optimal use of CHG a standardised approach is needed, this can only be fully achieved when all clinicians utilise high quality, contemporary research to inform their practice.

Ethics

An application to undertake this study was submitted to the study hospital research ethics committee (1146) and University human research ethics committee (HRE2017-0221). Potential participants were fully informed about the

research via a participant information sheet and consent was inferred through the completion and return of the questionnaire [16].

Authorship statement

AC contributed to the design of the study, conducted the analysis of the data, drafted and revised the paper.

JB contributed to the design of the study, interpretation of data and critically revised the paper.

JS contributed to the design of the study, acquired data and critically revised the paper.

SG contributed to the design of the study, acquired data and critically revised the paper.

Conflict of interest

No conflict of interest to declare.

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