INTRODUCTION EN CLINIQUE D'UN BROSSAGE PRÉ-CHIRURGICAL SANS BROSSE À BASE DE CHLORHEXIDINE/ÉTHANOL

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RÉSUMÉ

L'objectif du brossage chirurgical est de réduire la biocontamination des mains de l'équipe chirurgicale dans l'espoir de réduire également le nombre de bactéries introduites dans le champ opératoire et le risque d'infection dans le cas de perforation ou de déchirure des gants. Le brossage répété lors de longues procédures, cependant, peut être improductif car il a tendance à endommager la peau et à causer des blessures sans toutefois réduire davantage le risque d'introduction de bactéries. Au sein d'une révision générale des procédures de salle d'opération, le brossage chirurgical a été remplacé par une «nouvelle» procédure de brossage pré-chirurgical sans brosse. Cet article en résume les résultats.

Les normes recommandées relatives au lavage chirurgical des mains sont présentées dans le module 2 de l'Association des infirmières et infirmiers de salle d'opération du Canada (*ORNAC Recommended Standards, Guidelines and Position Statements for Perioperative Registered Nursing Practice*) (8e édition). Association des infirmières et infirmiers de salle d'opération du Canada (2006).

CLINICAL IMPLEMENTATION OF A SCRUBLESS CHLORHEXIDINE/ETHANOL PRE-OPERATIVE SURGICAL HAND RUB

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ABSTRACT

The objective of surgical scrubbing is to reduce the bioburden on the hands of the surgical team in hope that if gloves are punctured or torn, the number of bacteria released at the operation site will be minimal and therefore reduce the risk of site infection. Long procedures with scrubbing and soaping can, however, be counterproductive because with repetition they tend to cause skin abrasions, damages and injuries without further reducing the risk of bacterial release. Within a general review of OR processes, it was decided to substitute to the standard surgical scrub a "new" scrubless pre-op surgical hand rub procedure. This article summarizes the results.

INTRODUCTION

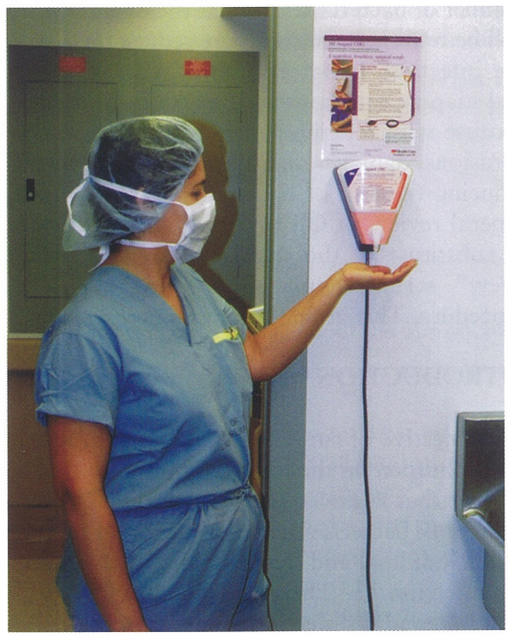
The objective of surgical scrubbing is to reduce the bioburden on the hands of the surgical team in hope that if gloves are punctured or torn, the number of bacteria released at the operation site will be minimal and therefore reduce the risk of site infection.[4,13] Therefore the objective of the surgical hand disinfection is to obtain the lowest achievable skin bacterial count after the cleaning, and if possible for it to be maintained as low as possible during the whole procedure.[3]

Scrubless Pre-Op Hand Rub (cont.)

Although many studies have proven the relative high incidence of glove punctures,[6,7,8,12] fortunately all leaks do not result in infections since normal host defence mechanisms can take care of the glove juice inoculum, especially if it is kept low. However the risk of infection is much greater when these mechanisms are lessened by diseases like diabetes, cancer or HIV, but also when circulation is impaired by necrotic tissues or implants.

For obvious ethical reasons, there had been no well controlled studies conducted to compare the effectiveness of different surgical hand preparation methods. Nevertheless indirect evidences had been collected over the years to support their use.[1,4]

The "standard hand scrub is performed with an antiseptic detergent and a scrub brush." The hands are dried with a sterile towel (or drape) in the OR before donning the surgical gloves. However long procedures with soap and scrubbing can be counterproductive because with repetition they tend to cause skin injuries, abrasions and damages without further reducing the release of bacteria. In fact the opposite can be observed when irritated skin inflammatory responses may exhibit an increase in bacterial count.[9] Skin damages being often increased by alcohol, it was not generally recommended to scrub hands before applying an alcohol rub.



By/Par: J. Porteous

Karen Church, ORT, prepares to begin the waterless surgical hand "scrub" procedure

In response to healthcare workers frequent complaints of skin irritation, some alcohol and alcohol based antiseptic combination rinses or gels with different emollients had been developed. Their sustained antimicrobial efficacy has been well proven, in particular for the alcohol/chlorhexidine gluconate (CHG) combination.[2,10,11] Furthermore, these waterless gels have been found quite acceptable to healthcare personnel and in many studies demonstrate much less drying effect than chlorhexidine detergents.

In 1990, Rotter and Koller[14] proposed a sequential combination using chlorhexidine gluconate detergent as a first step for a surgical hand wash. Since then, many institutions – mostly in Europe – have implemented, or adapted with some modifications, the hand preparation, but only a few published a description of their clinical experience and outcome.[5]

Typically waterless surgical hand disinfection is used following a "first case" hand wash. The hands are gently but thoroughly washed with an antiseptic or a mild soap and dried with a soft paper towel before applying the hand rub. The hand rub methods that had been developed are generally performed using small volumes (approx. 3 to 5 mL) of antiseptic poured into one cupped hand, dipping the nails of the other hand then rubbing it onto the entire surface of hand and forearm. This is repeated on the other side. A third final application (for a total of approximately 9 to 15 mL) is used to complete the exposure of the hands. To prevent an "occlusive" type of irritative dermatitis it is imperative to let the alcohol evaporate before donning gloves. For the following cases, unless the surgeon left the OR, no other hand wash but the hand rub will be systematically required.

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L'équipe de rédaction de la revue de l'Association des infirmières et infirmiers de salle d'opération du Canada se fait un plaisir de vous présenter une nouvelle chronique d'information :

POSEZ UNE QUESTION : NORMES DE L'AIISOC

QUESTION :
Dans le cas d'un incendie dans l'hôpital, que devrait faire le personnel infirmier en service interne et externe s'il est au milieu d'une procédure chirurgicale (une laparotomie, par exemple)?

RÉPONSE :
Toute salle d'opération doit avoir un plan de sécurité-incendie dont les exercices d'évacuation sont régulièrement pratiqués. Si un incendie se déclare dans un hôpital, aucun nouveau patient ne doit être admis ni transféré à la salle d'opération avant que la fin de l'alerte ne soit annoncée. Le plan de sécurité-incendie dans un hôpital sera coordonnée par une personne désignée telle qu'un commissaire des incendies ou un spécialiste de secours d'urgence. Cette personne décidera s'il est nécessaire d'évacuer les différentes sections de l'hôpital, y compris la salle d'opération. Pour prendre cette décision, le lieu du feu, l'étendue de l'incendie et la proximité de celui-ci à la salle d'opération seront tous considérés.

Les chirurgiens en cours de procédure doivent être informés de la situation afin de pouvoir prendre des décisions sur comment procéder. La décision du chirurgien dépend principalement du progrès de la procédure, de la stabilité du patient et de la proximité de la fumée ou de l'incendie. Le chirurgien peut décider de fermer l'abdomen si le temps permet. Si le temps ne permet pas, le chirurgien pourrait remplir la plaie de gaze humide, couvrir l'incision et continuer la chirurgie une fois le patient transféré dans un lieu sécuritaire. Si l'évacuation de la salle d'opération est jugée nécessaire, le patient doit être évacué de manière aussi sécuritaire que possible. Dans la plupart des cas, l'anesthésiologiste mène l'équipe en ce qui concerne le déplacement physique du patient vers le lieu plus sécuritaire.

Nous espérons tous ne jamais avoir à faire face à une telle situation, mais en cas d'incendie, avoir un plan de sécurité-incendie est essentiel. Le plan de sécurité-incendie doit préciser le rôle de chaque membre de l'équipe chirurgicale en cas d'incendie. Un plan bien défini et bien pratiqué limitera la confusion d'une telle situation, ce qui favorise le meilleur résultat possible pour le patient ainsi que pour le personnel de soins de santé.

Les normes relatives aux incendies se trouvent dans le Module 4 (2003) de l'Association des infirmières et infirmiers de salle d'opération du Canada (AIISOC - *Operating Room Nurses Association of Canada [ORNAC]*) (2007). *ORNAC Recommended Standards, Guidelines and position Statements for Perioperative Registered Nursing Practice.* (8e édition).

Avez-vous des questions sur les normes de l'AIISOC?
Soumettez vos questions à
www.ORNAC.ca
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Canadian Operating Room Nursing Journal is pleased to introduce a new information feature from ORNAC:

ASK A QUESTION - ORNAC STANDARDS

QUESTION:
In the event of a hospital fire, what should the scrub and circulating nurses do if they are in the midst of a surgical procedure i.e. laparotomy?

RESPONSE:
Every operating room shall have a Fire Safety Plan with practice drills conducted on a routine basis. If a fire alarm sounds in a hospital, there should be an immediate hold put on any patients entering the operating room or sending for any further patients until the all clear is sounded. The response to a fire in the hospital will be coordinated by a designated person such as a Fire Marshall or Emergency Response Officer.

Scrubless Pre-Op Hand Rub (cont.)

Within a general modernization and review of OR processes – with the recommendation and support of the institution infection control committee – it was decided to replace the "working" standard surgical scrub with a "new" scrubless pre-op surgical hand rub procedure.

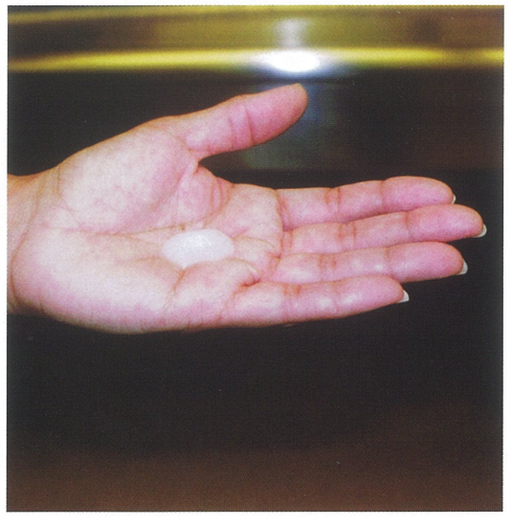
OBJECTIVES

The main objective of this study was to compare and measure the impacts of the implementation of a scrubless, waterless (except the first case) chlorhexidine/ethanol pre-operative surgical decontamination on the incidence of surgical site infection rates, reported skin irritations and healthcare personnel acceptance in a 160-bed university affiliated heart institute. An informal cost analysis would complete the study.

METHOD

Study Design: a one year retrospective data analysis of infection rates, staff appreciation and cost analysis

The principal hypothesis was that a scrubless surgical decontamination with a proven sustained activity would be equal to the standard preparation as measured by compiled infection rates, since it would not influence the major factors of acquisition (the patients themselves and the nature of the treatments they received). At best, because the hand skin flora is maintained low, the unknown fractional of infections which could be attributed to per operative glove leakage could be lessened. In corollary to this hypothesis, if an increase of post-op infectious rates was to be observed and attributed to a failure of the new surgical decontamination, it would require that the implicated germs were proven to be acquired from elsewhere than the patient's own flora. Consequently any suspicious increase in post-op infection rates would result in the Infection Control Committee ordering a laboratory investigation that could go as far if needed as to phylogenic typing and DNA profiling to eliminate the possibility of transmission from the surgical staff. For such, strains from all significant infections would continue to be banked (as it is actually part of normal epidemiology surveillance routine) and processed only if needed.



By/Par: J. Porteous

One pump from the dispenser of waterless hand scrub

Because a parallel, prospective comparison was impractical in our setup, it was decided before implementation to compare retrospectively the infectious rates of the last full year of the standard surgical scrub preparation to the full first year of the new method. It was hoped that a whole year comparison would minimize seasonal fluctuations rates and forward comparable data about types and numbers of surgical interventions, operation duration, ICU stay and pathogen profiles. Infection surveillance and rates calculation would be maintained as part of the normal routine activities. Any other modification to OR processes would be noted in order to assess its potential effect on infection risks. To minimize paperwork, consensus was not to implement any formal complaints collect mechanism to record skin problems. However to evaluate acceptance and compliance, a questionnaire would be sent to all OR personnel in the few weeks following the introduction of the scrubless procedure. Staffs were encouraged to report all noted skin problems before and after the change of procedure.

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The secondary hypothesis was that the scrubless surgical decontamination would be associated with fewer complaints about irritation and would enjoy a high level of compliance/acceptance by the involved healthcare workers.

Subjects

The Montréal Heart Institute performs approximately 2000 heart surgeries per year. About two thirds are coronary artery bypass grafts (CABG) using venous grafts and/or mammary arteries (in half of the cases). The remaining one third involve valvular (aortic, mitral, tricuspid) surgery with or without CABG. Venous harvesting is endoscopic in approximately one third of the cases. Data from all surgeries were used.

Protocol and Measures

The chosen protocol was one of a first-case initial hand wash plus alcohol/CHG hand rub followed by "waterless" hand rub disinfections only for the subsequent cases. A sterile scrub brush would be used "on demand" for heavily soiled hands, generally at the first case.

The antiseptic hand rub product used was part of a commercial package which included a slightly acidic soap, single use nail cleaners, touchless infrared (IR) activated dispensers, a combined 70% ethyl alcohol / 0.5% chlorhexidine gluconate hand rub rinse, and a moisturising hand cream for very dry skins. Also if needed, option was given to use dry sterile sponge-brushes for scrubbing.

Procedure

The different OR groups were met during one of their usual scientific or management activities at least one month before the implementation. Four meetings were organized (surgeons, anaesthesiologists, nurses, and technical support). They were informed of the planned change and the reasons why. Questions were addressed. Every individual received a letter restating the date of implementation and the procedure. To replace the tissue towel drying step, the OR antechamber old paper dispensers were replaced by new "M-fold" individual sheet delivery dispensers for softer paper towels. The antiseptic IR activated dispensers were installed a week ahead and the technical staffs were informed on battery and antiseptic re-supply procedures. As of the first day of implementation, demonstration charts were hung on the walls and, for 2 weeks, all staff members were trained and monitored to ascertain the proper steps of application.

Any problems – from the personnel's comprehension of the application method, acceptability skin irritation, or mechanical troubles with the dispensers – were reported immediately to the head of OR and to the supplier.

Within a week or two of the training, a written questionnaire was sent to all personnel involved with the procedural change. The responses were compiled. Related cost and budget impact were calculated after a full year of implementation.

RESULTS

The data of the pre- and post-implementation years – twenty six (26) consecutive administrative time periods of four weeks (13 x 4 = 52 weeks x 2 for a total of 104 weeks) – were analyzed. Standard scrubbing periods: July 2002 to June 2003 and new scrubless protocol periods: July 2003 to June 2004.

Almost concomitantly to this study, the ongoing OR modernisation and process review implemented a rapid post-operative extubation and early ICU discharge with practice with a "tight systematic follow-up" policy. To ascertain comparability of the two years, the overall rates of all infections, numbers and types of surgeries were looked at through common denominators.

Surgical Site Infection Rates

During the last year of the standard scrub preparation, 2,084 operations were performed followed by 69 in situ infections for an infectious rate of 3.31 percent. Half of these surgeries involved one or two mammary artery(ies). At the end of the new "scrubless" year there were 2,175 compiled surgeries followed by 78 in situ infections for a rate of

3.59 percent. Surgical types, patients' characteristics, mean pro-operative stay (3.63 vs 3.87), mean operation duration (03:26 vs 03:11 hours) and mean total hospital stay were statistically comparable (5 days). The difference in the surgical site infectious rates is not statistically significant. Because of the implementation of the policy of rapid post-op extubation and discharge from ICU, the mean ICU stay felt from 4.94 days to 2.9 days and constituted the only significant different variation for the two periods and was maintained since. No modification in pathogen types or profiles was reported by the microbiology lab.

Acceptability, Compliance and Subjective Skin Assessments

Forty-nine (49) questionnaires were sent from July 21st to August 10th, 2003 (3 weeks to a month after the beginning of the project). Thirty-eight (38) questionnaires were received from surgeons and assistant staff (14/17), anaesthesiologists (9/14), nurses (15/18), for a response rate of 77 percent. Ninety seven (97) percent of the responders approved of the change and would recommend it to others. Four (4) persons noted an improvement in their skin condition including one that was quite dramatic. One had no opinion (pro or con). Five (5) said that the gel emollient was leaving a transient "sticky oily feeling" after application. However this did not prompt any of the latter five to state that they would prefer to return to the standard scrub technique. At the time of writing the present report, no member of the staff mentioned they would like to return to the standard hand rub.

Adverse Event

One major skin problem incident came from a surgeon who presented a mild to severe irritative dermatitis during the second month of implementation. A quick examination of his doings showed that his major skin problems appeared when he decided to use twice the prescribed volume of antiseptic rinse and in order to save time, he began donning the gloves before a full drying of the alcohol. The dermatitis cleared up following a quick return to the recommended procedure.

Related Costs

The "standard hand scrub" related costs of direct supplies were evaluated to be around $6,000 per year for 2,000 surgeries, not including the cost of cleaning and sterilizing surgical towels. The predicted cost of the new procedure before implementation was to be $2,875 plus an initial non-recurrent investment of $1,920 for the new paper towels and infrared dispensers. The actual expenses incurred after a full year were $2,531 dollars, for an annual savings of approximately $3,500. A dramatic decrease in surgical towel usage (an average of 300 fewer towels per week or 1,200 per period) added to the savings.

DISCUSSION AND CONCLUSION

In vitro assays estimate the extent of the chosen antiseptic residual activity to be at least three hours.[13] This coverage is believed appropriate for most surgeries. For longer surgeries, a new gel with an increased concentration of chlorhexidine gluconate may show a longer residual activity but also more irritation.

The implementation of the scrubless preoperative hand rub decontamination using a chlorhexidine gluconate/alcohol based emollient rinse gel – as reported in previously cited studies – did not seem to have any significant influence on surgical site infectious rates. The small increase noted during the first year of the new procedure is not statistically significant.

In terms of toxicity assessment, it is one thing to apply an antiseptic on the skin of a patient once for a surgical intervention while it is another thing to apply it 10 to 15 times a day, everyday of the week, all year round, on healthcare workers' hands.

The major adverse event observed confirmed that surgical gloves constitute a form of "occlusive" dressing enabling the alcohol to induce a dermatitis if not completely dried before donning the gloves. To minimize the risks of toxic dermatitis for the staff, we therefore tend to favour the lowest CHG concentration providing 2 to 3 hours of sustained protection and maintain the regular glove replacement directive. When used as directed, the appreciation and the level of acceptance were high because of the general impression of the reduction of skin irritation and dryness problems. In one instance the improvement was spectacular. The introduction of this new procedure was not associated with an increase in costs.

The new scrubless pre-op hand preparation was associated with a decrease in informal complaints about skin irritation while skin improvement was noted in four cases and it had no deleterious impact on the site infection rates or the budget. An alcohol/gel hand rub procedure can be a cheaper, safe and welcomed alternative to the standard surgical scrub.

Competing interests: Dr. Marchand had received consultant fees from SoluMed for medical advices on previous research protocols. None declared by the other co-authors.

The recommended standards for Scrubbing are covered in Module 2 of the *ORNAC Recommended Standards, Guidelines and Position Statements for Perioperative Registered Nursing Practice* (8th edition). Operating Room Nurses Association of Canada (2006).

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