

# Practical experience in a surgical unit when changing from scrub to rub

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## SUMMARY

Concurring with the move to a new facility at the end of 2008, alcohol-based hand rub (AHR) dispensers were allocated in all anterooms of operating theatres in a tertiary care hospital in Madrid, Spain. Routine educational sessions on surgical hand disinfection (SHD) were performed by infection control personnel, emphasizing the preferred method of AHR. Our aim was to evaluate the knowledge about SHD, as well as the performance of SHD and perceptions concerning the use of AHR or antiseptic soap hand scrub (ASHS) by surgeons and operating room nurses (ORNs). An anonymous survey on SHD was circulated to the surgeons, resident surgeons and nurses who perform SHD in our hospital. In all, 70 surveys were completed, corresponding to 27 ORNs (38.6%), 20 resident surgeons (29%), and 23 staff surgeons (33%), 41 (59%) of them being females. Forty percent of them perform mostly disinfectant soap hand scrub (DSHS) and 19% mostly hand rubs; 41% perform both methods. AHR rub is believed to be more efficacious than DSHS in reducing hand contamination (mean 6.5 vs 5.6;  $P < 0.001$ ). Almost half of the personnel (49%) perform AHR >50% of the time (AHR users). AHR use is associated with ORNs (odds ratio: 3.4; 95% confidence interval [CI] 1.2–9.3;  $P = 0.018$ ) but not with resident surgeons (odds ratio: 4.1; 95% CI 1.3–13.2;  $P = 0.017$ ). When comparing both methods of SHD, personnel favour AHR for its colour ( $P < 0.01$ ) and speed of drying ( $P < 0.01$ ). Compared with surgeons, ORNs scored DSHS as more skin-irritating (4.1 vs 5.2;  $P = 0.013$ ), more associated with skin dryness (3.2 vs 4.7;  $P < 0.001$ ), and inferior overall score (4.7 vs 5.6;  $P < 0.005$ ). Most of the personnel agree that AHR (85%) improves compliance with SHD. Nevertheless ASHS is the method preferred for surgeons (63%) whereas AHR is the method preferred by nurses (70%;  $P < 0.001$ ). According to auto-evaluation of hand skin after use, AHR has better outcomes in terms of lack of dryness (5.3 vs 4.6;  $P < 0.05$ ). In addition, nurses scored ASHS lower than did surgeons in terms of skin redness (4.7 vs 6.0;  $P < 0.001$ ), lack of skin integrity (4.8 vs 5.9;  $P = 0.004$ ), skin dryness (3.6 vs 5.4;  $P < 0.001$ ), and overall score (4.0 vs 5.2;  $P < 0.002$ ). Change of perceptions and behaviours about SHD can be accomplished, and the AHR method is better adhered to by nursing personnel.

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## Introduction

Preoperative cleansing of hands and forearms with an antiseptic agent has been an accepted practice since Lister promoted the application of carbolic acid to the hands of surgeons before procedures, in the late 1800s. Although no randomized,

controlled trials have been conducted to indicate that surgical site infection rates are substantially lower when preoperative scrubbing is performed with an antiseptic agent rather than with a non-antimicrobial soap, preoperative cleansing of hands and forearms with an antiseptic agent has been an accepted practice.<sup>1</sup> The purpose of surgical scrub (wash) or surgical hand rub is to remove and/or kill transient organisms and to reduce resident flora for the duration of a surgical procedure. The goal is to prevent patient-wound contamination by micro-organisms present on the hands of the surgical staff. Even micro-organisms with low pathogenicity may trigger infections,

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especially in implant surgery. Therefore, the antimicrobial effect of the surgical scrub or rub should delay regrowth under the gloved hand. Bacteria on the hands of surgeons can cause wound infections if introduced into the operative field during surgery.<sup>2</sup> Rapid multiplication of bacteria occurs under surgical gloves if hands are washed with a non-antimicrobial soap. However, bacterial growth is slowed after preoperative scrubbing with an antiseptic agent.<sup>3</sup> Reducing resident skin flora on the hands of the surgical team for the duration of a procedure reduces the risk of bacteria being released into the surgical field if gloves become punctured or torn during surgery.<sup>4–6</sup>

Some authors have advocated the switch from hand washing to hand rub with an alcoholic compound because of the advantages in terms of better efficacy against bacteria both *in vitro* and *in vivo*, time consumption, overall and maintenance cost, risk of contamination, accessibility, no need of towel use, and side-effects.<sup>6</sup>

At the end of 2008 our tertiary care hospital in Madrid, Spain moved to a new facility. Surgical personnel were allowed to perform either an antiseptic soap hand scrub (ASHS) or an alcohol-based hand rub (AHR) with persistent activity before donning sterile gloves when performing surgical procedures, as recommended by HICPAC.<sup>7</sup> We aimed to evaluate the knowledge about surgical hand disinfection (SHD), as well as the performance of SHD, and perceptions regarding the use of AHR or ASHS by surgeons and operating room nurses (ORNs) in our hospital.

## Methods

Concurring with the move to a new facility in September 2008, AHR dispensers were placed in all anterooms of operating theatres in Puerta de Hierro-Majadahonda University Hospital in Madrid, Spain. This facility is a tertiary care hospital with more than 700 beds. It is comprised of three surgical blocks and 19 functioning operating rooms. More than 14,000 surgical procedures are performed per year, including solid organ transplantation (i.e. heart, lung, liver, kidney), and most surgical specialties are represented.

Routine educational sessions on SHD were performed by infection control personnel, emphasizing the preferred method of AHR. Procedures recommended included both the use of an alcohol solution (propanol 75%, Sterillium®) for hand rubbing for 90 s, and hand scrubbing with an antimicrobial soap based on chlorhexidine or povidone-iodine for 2–3 min.

In the third quarter of 2010 an anonymous survey on SHD was circulated to the surgeons, resident surgeons and nurses who perform SHD in our hospital. A questionnaire based on WHO recommendations for hygiene assessments was developed. The survey included scored items about the knowledge on SHD (effectiveness of hand hygiene to prevent surgical site infections, efficacy of both methods of hand hygiene to reduce hand contamination), as well as the performance (frequency of use and difficulties in performing SHD), and the perceptions (acceptability of the products, preferred method, and self-assessment after use of the products).

A consecutive sample of attending surgeons, both staff and resident surgeons, as well as operating room nurses who

perform SHD was selected. The questionnaire was delivered without asking for personnel identification and returned anonymously. Comparison of scored items (on a scale of 1–7) was performed by Student's *t*-test, paired Student's *t*-test or Kruskal–Wallis test when appropriate. Odds ratios (OR) and 95% confidence intervals (CI) were calculated as association measures.

## Results

A total of 70 surveys were returned (92.1% of response), corresponding to 27 ORN (38.6%), 20 resident surgeons (29%), and 23 staff surgeons (33%), 41 (59%) of them being females. The mean length of experience was 13.4 years. Ninety-seven percent of the personnel believed that hand hygiene is very efficacious to prevent surgical site infections. Forty percent of them perform mostly hand scrub and 19% mostly hand rubs; 41% perform both methods. AHR was believed to be more efficacious than hand scrub to reduce hand contamination (mean score: 6.5 vs 5.6;  $P < 0.001$ ). Almost half of the personnel (49%) perform AHR >50% of the time (AHR users). AHR use was associated with ORNs (OR: 3.4; 95% CI: 1.2–9.3;  $P = 0.018$ ) and not being a resident surgeon (OR: 4.1; 1.3–13.2;  $P = 0.017$ ). The main reason for not using AHR was having skin lesions (34% scored >4 on a scale of 1–7), while lack of AHR or not being accustomed was scarcely reported.

When comparing both methods of SHD, surgical personnel favoured AHR for its colour (mean score: 6.3 vs 5.8;  $P < 0.01$ ), and speed of drying (5.4 vs 4.2;  $P < 0.001$ ). No differences were found regarding smell (5.8 vs 5.8;  $P = 0.46$ ), skin irritation (4.8 vs 4.8;  $P = 0.92$ ), and ease of use (6.1 vs 5.9;  $P < 0.29$ ); but scores were better for AHR, though not reaching statistical significance, in terms of drying effect on the skin (4.8 vs 4.2;  $P = 0.09$ ), ease of application (5.6 vs 5.3;  $P = 0.09$ ) and overall evaluation of the method (5.6 vs 5.2;  $P = 0.14$ ).

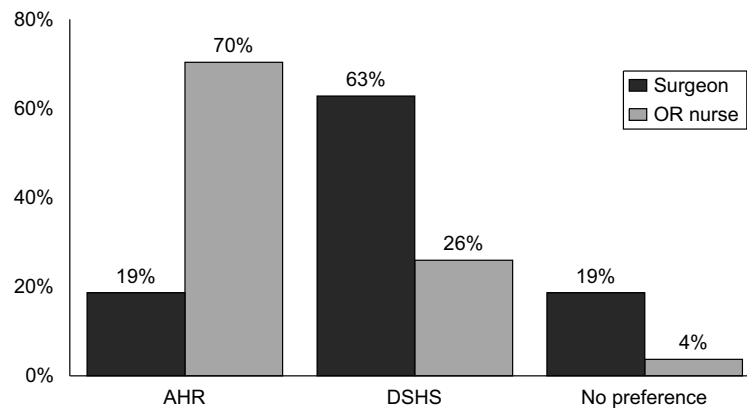
Compared with surgeons, operating room nurses scored ASHS as more skin-irritating (5.2 vs 4.1;  $P = 0.013$ ), more skin-drying (4.7 vs 3.2;  $P < 0.001$ ), and inferior overall score (4.7 vs 5.6;  $P = 0.005$ ).

Sixty-two percent of the surgical personnel agreed that AHR improves compliance with SHD (scores >4 in a 1–7 scale). Regarding the preferred method for SHD differences were found for surgeons and nurses. ASHS is the method preferred for surgeons (63%) whereas AHR is the method preferred by nurses (70%;  $P < 0.001$ ) (Figure 1).

When comparing auto-evaluation of hand skin after use of each method, AHR has better outcomes in terms of lack of dryness (5.3 vs 4.6;  $P = 0.05$ ), and shows a trend toward a higher skin integrity (5.9 vs 5.4;  $P = 0.17$ ), and less skin sensitivity (5.6 vs 5.1;  $P = 0.17$ ). In addition, nurses scored ASHS lower than did surgeons in terms of skin redness (4.7 vs 6.0;  $P < 0.001$ ), lack of skin integrity (4.8 vs 5.9;  $P = 0.004$ ), skin dryness (3.6 vs 5.4;  $P < 0.001$ ), and overall score (4.0 vs 5.2;  $P = 0.002$ ).

## Discussion

The experience in our hospital highlights the success of our personnel in changing their SHD culture from hand scrub to alcohol-based rub, though ORNs have met the challenge best.



**Figure 1.** Preferred method for surgical hand antisepsis by surgeons and operating room nurses. AHR, alcohol-based hand rub. DSHS, disinfectant soap hand scrub.  $P < 0.001$ .

Surgical personnel acknowledge not only that AHR is more efficacious than hand scrub reducing hand contamination, and that AHR improves compliance with SHD, but they also accept alcohol compounds better than antimicrobial soaps in terms of pleasant colour and speed of drying. Furthermore, after performing hand disinfection AHR is better-tolerated in terms of lack of skin dryness and shows a trend towards better care of the skin.

Nevertheless, we have found significant differences between surgeons and nurses. Operating room nurses favour the use of AHR and they also report poorer results, in contrast with surgeons, in terms of side-effects for soap compounds.

On the other hand, surgeons, and specifically resident surgeons, are more reluctant to change to the AHR culture. Hand washing might be regarded by them in part as a ritual and the long tradition of hand scrubbing by surgeons in Spain could be an obstacle. Therefore, it may be crucial that the heads of departments support the switch from washing to a rubbing method.

Besides the scientific evidence of greater efficacy, ease of use and tolerability of AHR, the economic advantages in terms of water, sterile towels and price of the alcohol products should also be emphasized when trying to modify the habits of the surgical personnel moving from ASHS to AHR in the surgical setting.

In summary, our experience demonstrates that the culture of SHD can be changed in a country with a deep-rooted tradition of hand washing, and that special efforts should be implemented when trying to modify the habits of the surgical personnel, specifically that of surgeons and resident surgeons.

#### Conflict of interest statement

A. Asensio declares receiving fees for conferences from BODE, and fees for advising services from Hartmann. L. de Gregorio has nothing to disclose.

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