Medical University of South Carolina (MUSC) Value Institute  
Evidence-Based Practice Summary  
Developed through the EBP for Health Professionals Course: Spring 2016

Effectiveness of Alcohol Foam Scrub as an Alternative to Other Alcohol-Based Products

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ASK THE QUESTION

Clinical Question: For Surgical Staff, does the use of Steris Alcare Plus alcohol foam scrub reduce the risk of bacteria on surgical staff hands as compared with other alcohol-based surgical scrub formulations available?

Objective: To look at the efficacy of Steris Alcare Plus alcohol foam as an effective surgical scrub option

Background: In the Main Operating Room at MUSC, the scrub sinks outside each operating room offer surgical staff three different options for the first water and brush scrub of the day (4%CHG, 13% Povidine-Iodine, or 3% PCMX). An alcohol based dry-fast gel (Avagard = 61% ethyl alcohol +1% CHG) is available for subsequent scrubs throughout the day.

However, located inside each OR are two Steris Alcare Plus alcohol foam dispensers, with specific surgical scrub use directions on the label. The purpose of this project is to investigate the efficacy of the Steris Alcare Plus alcohol foam as a surgical scrub option, because it would create less traffic (which indirectly can affect Surgical Site Infection rates).

SEARCH FOR EVIDENCE

Databases searched: PubMed, Scopus

Search strategies (list strategy for each database):
PubMed: ("alcohol foam" OR “antiseptic foam” OR “antibacterial foam” OR "Septisol foam") AND (disinfection OR infection OR hand OR handwashing OR scrub* OR soaps OR bacteria OR microbial)
CRITICALLY APPRAISE THE EVIDENCE

- Avagard alcohol gel versus water & brush studies: Majority of the articles compared a different alcohol based product to traditional water and brush scrub protocols (i.e. the alcohol foam of my investigation is a 62% ethyl alcohol whereas studies/trials investigated 61% ethyl alcohol + 1% chlorhexidine gluconate rub or 70% isopropanol formulations).
- Only one strong (high quality) article investigated a 62% ethyl alcohol rub, Purell (Al-Naami et al), so the inference would be an indirect one because even though Purell has the same alcohol % as Steris Alcare Foam, minor ingredients may alter the efficacy. This study was graded high in systematic reviews, but limitations included insufficient sample size, dermatological outcomes were self-reported, and there were no measurement tools or scales used.
- Only one study investigated Steris Alcare Plus (Kampf et al) which was grade of low quality because of many limitations and was inconsistent with all other studies that showed alcohol to be non-inferior to the traditional water and brush scrub methods.
- Some studies were old and examined a product called Septisol, which there remains no research on after the late 1970s, and Septisol foam was a different formulation than Steris Alcare Plus.
- All the remaining articles, except one (Kampf) showed alcohol rub formulations to be non-inferior to traditional methods and more user friendly.

| Author/Date/ Journal | Purpose of Study | Study Design | Sample and Setting | Outcomes | Design Limitations | Lower Quality Rating if:
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<td>Al-Naami et al. 2009, EWMA Journal</td>
<td>To examine the effectiveness of preoperative hand disinfection using alcohol gel preparation in comparison to traditional surgical scrub solutions to prevent SSI, and their effect on surgeons’ skin.</td>
<td>RCT</td>
<td>Interventions: Group A (228 patients) where surgeons used the traditional 3-5 minute hand scrub with 7.5% povidone iodine or 4% chlorohexidine brush and water. Group B (272 patients) where surgeons used a traditional scrub to remove dirt for the first scrub, followed by alcohol-based rub (Purell: 62% ethyl alcohol) for subsequent cases during the day using about 10 mln to cover both hands and forearms and</td>
<td>500 patients undergoing clean and clean contaminated general surgical procedures from Oct. 1 2007-June 30, 2008 (9 months) Conducted at King Khalid University Hospital, Riyadh, Saudi Arabia</td>
<td>Primary outcome: to measure incidence of SSI in each group: Group A (3-5 min traditional scrub) reported 12 (5.3%) SSIs. Group B (alcohol scrub) reported 8 (2.94%) SSIs. (p &gt; 0.05, odd ratio = 1.833 Confidence limit = 0.683-5.007) Secondary outcome: to measure surgeons’ skin reactions Total skin reactions were reported: Group A= 40 (17.5%) Group B= 31 (11.4%) (p &gt; 0.05, odd ratio=1.65408, CI = 0.97826-2.83007)</td>
<td>RCT &amp; Quasi-Experimental Studies Insufficient sample size (statistically needed 4003 patients, only 500 were in sample, due to logistic constraints) Lack of randomization Lack of blinding Stopped early for benefit Lack of allocation concealment Selective reporting of measures-incomplete outcome data Large losses to F/U</td>
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allowing it to dry before gowning. Surgical sites from a total of 500 patients undergoing “clean” or “clean contaminated operations” were examined for infection before discharge, at 1 week, and 1 month after surgery. Most surgeons (64%) preferred the alcohol rub over traditional scrub, because it is easier to use, consumes less time, and proved to be more cost-effective.

### Studies are imprecise
- When studies include few patients and few events and thus have wide confidence intervals and the results are uncertain

<table>
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<tr>
<th>Bryce, Spence, &amp; Roberts. 2001, Infection Control and Hospital Epidemiology</th>
<th>To determine whether alcohol (compared to 4% CHG or 7.5% povidine-iodine scrubs) hand disinfection is an effective alternative to traditional agents for the pre-surgical scrub</th>
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<tr>
<td><strong>Prospective clinical trial</strong></td>
<td><strong>Conducted at operating rooms at British Columbia Cancer Agency (25 participants: 3 nurses and 22 surgeons) and in the spinal cord surgical suite at Vancouver General Hospital (16 participants: 10 nurses and 6 surgeons).</strong></td>
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<td><strong>Interventions:</strong> Phase 1 at BCCA (cases less than 2 hours), Participants scrubbed with traditional 4% CHG or 7.5% P-I based on preference for 2 weeks, 15 sets of pre and post-operative hand samples were taken. For next 2 weeks, participants scrubbed with 70% alcohol rub, pre and post op samples taken.</td>
<td>Little difference between the traditional and alcohol rinse groups were noted in either colony forming unit counts or the log10 values for cases less than 2 hours. Traditional scrub (average): Pre-op CFU/ml: 16.8 Post-op CFU/ml: 29.6 Alcohol scrub (average): Pre-op CFU/ml: 12.8 Post-op CFU/ml: 9ml For cases longer than 3 hours: Traditional Scrub Pre-op log10: 4.504+/-.6637 Post-op log10:5.197+/-.1359 Alcohol Pre-op log 10: 3.514+/-.1512 Post-op log10:4.703+/-.1397 (P=.034 and P=.017)</td>
</tr>
<tr>
<td>Phase 2 at VGH (conducted after results from BCCA showed alcohol to be just as effective as traditional scrub.), Participants scrubbed with alcohol for 2 weeks, pre and post op sampling. Then scrubbed with traditional method of choice for 2 weeks with pre and post op sampling.</td>
<td><strong>Comparison study:</strong> Insufficient sample size Sample not representative of patients in the population as a whole Variables (confounders, exposures, predictors) were not described Outcome criteria not objective or were not applied in blind fashion Insufficient follow-up, if applicable For prognostic study, sample not defined at common point in course of disease/condition For diagnostic study, gold standard not applied to all patients For diagnostic study, no independent, blind comparison be Manorapid is a different alcohol formulation than the Alcare Plus in question for my PICO indirect comparison. No outcome measurement of SSI, only measure CFU.</td>
</tr>
<tr>
<td>Alcohol rub (Manorapid) application: 1. 1 minute water and soap scrub. 2. 5ml of alcohol rub applied. 3.</td>
<td>Manorapid is a different alcohol formulation than the Alcare Plus in question for my PICO indirect comparison. No outcome measurement of SSI, only measure CFU.</td>
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</table>

(*) Manorapid alcohol rub = 70% isopropanol, 0.1% butanediol, 0.06% lanolin)
| Chen et al. 2014, Nursing & Health Sciences | To determine the rapid and sustained effects of waterless dry-fast and traditional water-based hand-washing surgical scrubbing methods on the growth of bacteria on the hands of operating room staff. | Static Group Comparison Study over 5 months. Interventions: Participants selected a scrub method of preference, with sampling done immediately after scrubbing before gloving and immediately after surgery was completed. Dry-fast scrub: 61% ethyl alcohol and 1% chlorhexidine gluconate applied for approximately 2 minutes till dried. Water-based scrub: 7.5% povidine-iodine for 5 minutes. | 156 operating room staff members from 2 surgical units of a medical center located in southern Taiwan (a statistical test was done to show a sample size of at least 63 was sufficient) | Number of colonies for both groups showed no significant difference at the beginning of study (p=0.133). Dry-fast alcohol scrub had more sustained antimicrobial effects as compared to the traditional water-based scrubbing methods, although the number of bacterial colonies increased between the first and second sampling, the rate of increase was comparatively low. \( B=196.52, \text{Wald} \chi^2=10.08, P=0.001 \) Average # of colonies for surgeons was 160,000 less than nurses at both sample points \( B=157.68, \text{Wald} \chi^2=9.09, P = 0.003 \) and the degree of change in the # of colonies for traditional scrub and dry-fast groups remained significantly different \( B=196.99, \text{Wald} \chi^2=10.09, P=0.001 \). Post-scrub number of colonies for nurses was nearly 200,000 higher than for surgeons.-needs further investigation as to why. More nurses in this study used the dry-fast alcohol scrub compared to surgeons, because of convenience. Nurses also scrubbed 10-15 x per week vs surgeons at 4-8 x per week. | Comparison study: Insufficient sample size Sample not representative of patients in the population as a whole Variables (confounders, exposures, predictors) were not described Outcome criteria not objective or were not applied in blind fashion Insufficient follow-up, if applicable For prognostic study, sample not defined at common point in course of disease/condition For diagnostic study, gold standard not applied to all patients For diagnostic study, no independent, blind comparison between index test and gold standard No information regarding infection types was included |

| Dewar & Gravens October 1973 Applied Microbiology | To verify the efficacy of septisol (.23% hexachlorophene in 46% ethyl alcohol base) antiseptic foam in reducing resident and antiseptic foam in reducing resident and RCT 8 week study Interventions: Part 1: subjects performed 3 surgical scrubs per day in a standard manner with septisol antiseptic foam or 3% phisohex for 5 days, with sampling before and | 12 participants, randomly divided into 2 groups, assigned to septisol or 3% phisohex, followed by 8 weeks of scrubbing with | Septisol efficacy in reducing resident skin flora = a range of 83%-98% for immediate bacterial reduction each day. Septisol efficacy in eliminating transient skin flora: average baseline counts were reduced to zero by a single scrub with Septisol = 100% kill. | RCT & Quasi-Experimental Studies small sample size Lack of blinding Lack of allocation concealment Not representative of surgical staff hand activity and flora difficult to compare septisol (.23% hexachlorophene in 46% ethyl alcohol) to Steris Alcare Plus alcohol foam (62% ethyl alcohol) | Insufficient sample size Sample not representative of patients in the population as a whole Variables (confounders, exposures, predictors) were not described Outcome criteria not objective or were not applied in blind fashion Insufficient follow-up, if applicable For prognostic study, sample not defined at common point in course of disease/condition For diagnostic study, gold standard not applied to all patients For diagnostic study, no independent, blind comparison between index test and gold standard No information regarding infection types was included |
transient microbial flora of the skin to a low level, as compared to phisohex (3% hexachlorophene scrub) and an unmedicated liquid soap. Immediately after scrubbing and 1 hour after wearing gloves.

Part 2: hands of 8 subjects were artificially contaminated with transient bacteria then sampled immediately before and after a single septisol scrub.

These products, in a controlled lab setting, were compared with phisohex. 8 wk mean average bacterial reductions:

- Septisol: (95% immediately after scrubbing) (96% after wearing gloves for 1 hour)
- Phisohex: (93% immediately after scrubbing) (98% after wearing gloves for 1 hour)

P > 0.05 = not significantly different

Conclusion: Septisol was just as effective in reducing skin bacteria compared to Phisohex.

Comparison study
Interventions:
- Scrub 1: 10 mins with betadine brush scrub
- Scrub 2: 5 mins brushless scrub with iodophor iodine scrub
- Scrub 3: No brush scrub with bland soap followed by septisol foam.

Sampling done at before scrubbing, immediately after scrubbing, and 1 hour after gowning and gloving.

Observational Studies (comparison study)
- Insufficient sample size
- Sample not representative of patients in the population as a whole
- Variables (confounders, exposures, predictors) were not described
- Outcome criteria not objective or were not applied in blind fashion
- Insufficient follow-up, if applicable
- For prognostic study, sample not defined at common point in course of disease/condition
- For diagnostic study, gold standard not applied to all patients
- For diagnostic study, no independent, blind comparison between index test and gold standard
- Indirect study – different alcohol product formulation
Shahrokhi, Soltani, Molapour, & Shafikhani 2012, *Journal of Perioperative Practice*

**Efficacy of two different surgical hand hygiene procedures on reducing the microbial burden on operating room staff hands**

| Interventions: | Samples taken from fingertips of operating room staff in 2 operating rooms at Barnes Hospital in St. Louis, MO between 11/9/1970-3/26/1971: 191 scrubs with hexachlorophene soap. 318 scrubs with Septisol Antiseptic Foam. Samples were taken 5 days a week from 7 am – 3:30 pm or until surgery was completed. | "Insufficient sample size" "Lack of randomization" "Lack of blinding" "Stopped early for benefit" "Lack of allocation concealment" "Selective reporting of measures" "Large losses to F/U" |
| Scrub 1 method (control group): Washing hands with water & brush and povidine iodine solution for 6 minutes | Scrub 2 method (case group): washing hands with liquid soap for 30 seconds, followed by applying a hand rub with 70% ethanol for 3 minutes | "Hand scrub, the microorganisms removed was significant. For the control group (brush and water povidine iodine) P= 0.016. For the case group (70% ethanol rub, P= 0.004) These results showed that bacteria had been eliminated after both methods at a statistically significant point (p<0.001) The mean reduction log 10 for the 70% alcohol rub group was 0.47. The mean reduction log10 for the water & brush povidine iodine group was 0.5 with a p<0.001, showing no significant difference between the efficacy of the water & brush method versus the 70% ethanol hand rub for 3 minutes."

Gravens, Butcher, Ballinger & Dewar March 1973 *Surgery*

**To determine if antiseptic alcohol foam is an effective antibacterial agent for operating room personnel**

| Comparison Study | The total bacterial average for Septisol Foam after scrubbing was 21.8% compared to hexachlorophene soap (35.9%) And at the end of the procedure for Septisol Foam (5.7%) compared to hexachlorophene soap (25.9%), which was significant at a 90% confidence level. All end of procedures, bacterial averages using septisol foam were lower than those after hexachlorophene soap. At change of gloves, septisol foam showed a 78% no bacterial growth compared to only 52.4% with the hexachlorophene soap. *Note: hexachlorophene is now banned internationally due to its systemic toxicity." | "Insufficient sample size" "Sample not representative of patients in the population as a whole" "Variables (confounders, exposures, predictors) were not described" "Outcome criteria not objective or were not applied in blind fashion" "Insufficient follow-up, if applicable" "For prognostic study, sample not defined at common point in course of disease/condition" "For diagnostic study, gold standard not applied to all patients" "For diagnostic study, no independent, blind comparison between index test and gold standard" |
| Interventions: Fingertips were cultured before and after scrubbing, at the change of gloves, and at the end of the surgery with either hexachlorophene soap and brush for 10 minutes, or hexachlorophene soap for 3 minutes for the first scrub of the day, followed by septisol antiseptic foam | Samples taken from fingertips of operating room staff in two operating rooms at Barnes Hospital in St. Louis, MO between 11/9/1970-3/26/1971: 191 scrubs with hexachlorophene soap. 318 scrubs with Septisol Antiseptic Foam. Samples were taken 5 days a week from 7 am – 3:30 pm or until surgery was completed. | The total bacterial average for Septisol Foam after scrubbing was 21.8% compared to hexachlorophene soap (35.9%) And at the end of the procedure for Septisol Foam (5.7%) compared to hexachlorophene soap (25.9%), which was significant at a 90% confidence level. All end of procedures, bacterial averages using septisol foam were lower than those after hexachlorophene soap. At change of gloves, septisol foam showed a 78% no bacterial growth compared to only 52.4% with the hexachlorophene soap. *Note: hexachlorophene is now banned internationally due to its systemic toxicity."
To determine whether or not an alcohol/chlorhexidine rub is as efficacious as a traditional surgical scrub using a novel method.

**RCT**

Interventions: Each participant was his/her own control.

No prior hand prep was required, but baseline microbial counts were taken from each hand. Hands were randomly assigned to the alcohol scrub with the other hand receiving the 4% CHG scrub.

20 anesthesia staff at Princess Alexandra Hospital, Queensland, Australia

In a functioning operating room environment, the alcohol-based hand rub (70% isopropyl/.5% CHG) is not inferior to a conventional scrub with 4% CHG water and brush after 30 mins.

Mean reduction from baseline (log10) +/- SD

4% CHG: 1.45+/-0.50 (0.80-2.52)

Alcohol/CHG: 2.01+/-0.98 (0.35-3.48)

P > 0.05

**RCT & Quasi-Experimental Studies**

- Insufficient sample size
- Lack of randomization
- Lack of blinding
- Stopped early for benefit
- Lack of allocation concealment
- Selective reporting of measures
- Large losses to F/U

To investigate the correlation between the applied amount of ethanol-based hand foams (62% ethanol) and drying time. Further to investigate the efficacy of the established amount of foam for a 30s application of two foams (Alcare Plus and Purell) versus plain water.

**Cross-over controlled study**

Interventions: 4 alcohol foams (Alcare plus, Avagard foam, Bode test foam, Purell Instant Hand sanitizer) containing 62% ethanol were applied using various different methods without specific instructions for rubbing in, and the dry time was measured. Then the efficacy of the established amount of foam (1. Alcare Plus and 2. Purell) applied for 30 seconds was compared to water (negative control) alone in reducing the bacterial counts on hands artificially contaminated with E.coli.

*only study that investigates Steris Alcare Plus alcohol foam - the foam in my PICO investigation.*

14 participants in a lab setting.

Outcomes:

- The linear correlation showed that an amount of 1.6g gave an intercept of 30s application time, which is the time necessary to ensure adequate quality of hand coverage.
- Correlation between the applied amount of foam and time until hands felt dry was highly significant (P<.001, 95% CI (0.52-0.93) showing that an amount of 1.6 g = 30 second dry time.
- Efficacy of 2 foams (Alcare and Purell) was determined using a 1.6 g application for 30 seconds. Both foams were significantly less effective than the reference of 2 x 3 ml of 60% isopropanol for 60 seconds, and only slightly higher in efficacy than the application of just water for 30 seconds. Therefore, the alcohol foams tested failed to meet European efficacy requirements for hygienic hand disinfection at the application of 1.6g for 30 seconds of dry time.

**Non-Experimental/Observational Studies**

- Insufficient sample size
- Sample not representative of patients in the population as a whole
- Variables (confounders, exposures, predictors) were not described
- Outcome criteria not objective or were not applied in blind fashion
- Insufficient follow-up, if applicable
- For prognostic study, sample not defined at common point in course of disease/condition
- For diagnostic study, gold standard not applied to all patients
- For diagnostic study, no independent, blind comparison between index test and gold standard. Comparison was to water (negative control). Also no tests were done on a bigger amount of applied foam, or a longer drying time, which could affect the efficacy.
<table>
<thead>
<tr>
<th>Liu &amp; Mehigan</th>
<th>2016</th>
<th>AORN Journal</th>
<th>To critically appraise and synthesize the evidence regarding the effects of various surgical scrub protocols on skin integrity and their effectiveness in preventing SSIs</th>
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<td>Searched all relevant literature published from 1990-2015 in 4 databases (MEDLINE, CINAHL, Embase &amp; Cochrane), as well as NICE, AORN, Scottish Intercollegiate Guidelines Network, and WHO for relevant published guidelines.</td>
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<td>2 reviewers independently assessed the methodological quality of each study.</td>
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<td>Effective Public Health Practice Project (EPHPP) quality assessment tool was used to assess: selection bias, study design, confounders, blinding, data collection method, and withdrawals/dropouts.</td>
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<td>Inclusion criteria: RCTs and nonRCTs that compared any type of surgical scrub protocol as a procedure for preventing SSIs. Other study criteria included: * primary studies * studies with target population that included any personnel who worked in OR or surgery center * studies with interventions that included any surgical hand scrubbing protocols used for preventing SSIs. * studies with outcome parameters that included SSI rates resulting from surgery and skin integrity assessments.</td>
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<td>10 studies met inclusion criteria (8 RCTs, 2 non-RCTs)</td>
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<td>1. Using the EPHPP tool, more than half the studies were classified as low methodological quality, 3 studies as moderate quality, and only 1 as high methodological quality (Al-Naami).</td>
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<td>2. 2 out of 10 measured SSI rates, the SSI rate did not differ significantly between a traditional scrub (4%CHG or 4% povidone-iodine) and a hand rub with alcohol. (risk ratio 1.17, 95% CI, 0.72-1.88, P=.53) heterogeneity was small (I² = 26%)</td>
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<td>3. More participants across studies preferred using the alcohol rub, suggesting that a brush-less based scrubbing protocol may have potential to increase compliance.</td>
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<td>Macinga, Edmonds, Campbell &amp; McCormack</td>
<td>To determine the influence of alcohol-based surgical</td>
<td>RCT</td>
<td>The immediate log₁₀ reduction for alcohol rub A (70% ethanol leave-on gel) was significantly higher than for CHG scrub (4% CHG) on day 1</td>
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<td></td>
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<td>Interventions: All participants refrained</td>
<td>18 healthy participants from general</td>
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| Systematic Review | Review did not address focused clinical question |
| Search was not detailed or exhaustive |
| Quality of the studies was not appraised or studies were of low – moderate quality, except for one graded for high quality |
| Methods and/or results were inconsistent across studies |

| RCT & Quasi-Experimental Studies | small sample size |
| Lack of randomization |
| Lack of blinding |
| December 2014 | AORN Journal | Scrubs (ABSS) product formulation on efficacy | From chemicals or antimicrobial products for 2 weeks to get baseline microbial counts. During a 5 day trial, participants (randomly assigned) used a product 11 times: Day 1: 1x Day 2, 3, 4: 3x Day 5: 1x Products: 4% CHG Alcohol + CHG (61% ethanol/1% CHG) 70% ethanol rub A 80% ethanol rub B Alcohol control (70% ethanol) Hands were sampled after first scrub, at 3 hour mark, and at 6 hour mark. Population. | (P \textless .0001) and on day 2 (P \textless .05) showing superior immediate activity. Efficacy of CHG scrub was inferior to Alcohol rub A until the 5th day of application. All test products met FDA immediate \( \log_{10} \) reduction requirements on days 1 + 2, but only alcohol rub A (70% ethanol) met FDA requirements of a 3-log10 reduction immediately after use on day 5. The inclusion of 1% CHG in the alcohol plus CHG rub did not enhance immediate efficacy, as immediate log10 reductions were not significantly different from those of the alcohol control on any of the test days. In fact, alcohol + CHG rub failed to meet FDA efficacy requirements for immediate kill on day 5, corroborating previous reports that the immediate efficacy of this product may be inadequate. ABSS formulations demonstrate superior immediate activity and are more effective at reducing bacterial counts on hands for surgeries lasting more than 3 hours. | Stopped early for benefit Lack of allocation concealment Selective reporting of measures Large losses to F/U Note: these were commercial products containing different alcohol concentrations and different nonreactive ingredients, - investigating the presence or absence of alcohol and CHG at fixed concentrations would be needed. No other properties beyond antimicrobial efficacy were investigated (which might affect end-user compliance and indirectly SSI rates). |
| Olson, Morse, Duley & Savell 2012 | American Journal of Infection Control | To compare the immediate and persistent antimicrobial activity of an alcohol plus CHG product with that of 2 alcohol-only products | RCT Interventions: Participants agreed to a 1 week period without exposure to chemicals or antimicrobials, then baseline samples taken on M, W, F. Participants randomly assigned to use 1 of 3 products with random sampling of either hand, for 5 days, where products were applied 12x. Samples 82 healthy volunteers 18 years old and older with no dermatological conditions, injuries, or medical conditions. Performed at an independent research facility. Outcomes: All products tested showed immediate efficacy. Alcohol + CHG (Avagard, 3M, 61% alcohol/1% CHG) was shown to be non inferior to both alcohol-only products at both 6 hour sampling times, based on a noninferiority margin of 20%. Day 1, 6 hour: (P \textless .0001) Day 2, 6 hour: (P \textless .026) | RCT & Quasi-Experimental Studies Insufficient sample size Lack of randomization \checkmark Lack of blinding Stopped early for benefit Lack of allocation concealment Selective reporting of measures Large losses to F/U Note: Subjects not representative of operating room personnel hands, and the activity during surgery. |
| Shen et al. 2013, Science Direct | To compare a conventional surgical scrub to an alcohol-based hand rub to evaluate antimicrobial efficacy. | Prospective observational study | 128 healthy doctors and nurses.  
Interventions: Participants were assigned to either traditional or alcohol scrub groups based on preference, with sampling done immediately after scrubbing and post-op  
Conducted from June 1, 2010 to July 31, 2011 at The National Taiwan University Hospital, including over 140 surgeries during this time. | No significant differences in participants demographically.  
Only the alcohol rub was a protective factor in the positive sample cultures (p<0.001) showing that a 2 minute, 3-step alcohol rub had a lower culture positive rate before and after operations.  
The culture positive rate of alcohol rub was 6.2% pre-op and 10.8% post-op. Both rates were lower than the conventional scrub (47.6% pre-op (p<0.001) and 25.4% post-op (p=0.03). The most identified pathogens were gram-positive staph. Multi-variate analysis showed that prior hand condition (p=0.21) and type of surgery such as cardiovascular surgery (p=0.12) were less relevant, but the alcohol rub was a significant protectant factor for positive hand cultures. | Non-Experimental/Observational Studies  
☒ small sample size  
☐ Sample not representative of patients in the population as a whole  
☐ Variables (confounders, exposures, predictors) were not described  
☐ Outcome criteria not objective or were not applied in blind fashion  
☐ Insufficient follow-up, if applicable  
☐ For prognostic study, sample not defined at common point in course of disease/condition  
☐ For diagnostic study, gold standard not applied to all patients  
☐ For diagnostic study, no independent, blind comparison between index test and gold standard. Comparison was to water (negative control). Also no tests were done on a bigger amount of applied foam, or a longer drying time, which could affect the efficacy. |
To assess the effects of surgical hand antisepsis on preventing SSI in patients treated in any setting. To determine the effects of surgical hand antisepsis on the numbers of colony-forming units (CFUs) of bacteria on the hands of the surgical team.

Included: RCTs comparing surgical hand antisepsis of varying duration, methods and antiseptic solutions.
3 authors independently assessed studies for inclusion and trial quality and extracted data.

14 RCTs.
4 trials reported rates of SSIs;
10 trials reported # of CFUs but not SSI rates.

Most studies were of very low to low quality evidence.
There is no firm evidence that one type of hand antisepsis is better than another in reducing SSIs.

Systematic Review
☐ Review did not address focused clinical question
☐ Search was not detailed or exhaustive
☒ Quality of the studies was not appraised or studies were of low quality
☒ Methods and/or results were inconsistent across studies

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**APPLY THE EVIDENCE**

Practice recommendation:

Evidence shows that more RCTs need to be conducted to prove Steris Alcare Plus alcohol foam to be as efficacious as other dry-fast alcohol based formulations. The evidence shows that alcohol scrub formulations are definitely more preferred for various reasons.

Based on current research, which is low in quality, a recommendation to investigate the option of using alcohol foam products, such as Steris Alcare, for a surgical dry-fast scrub is a viable one (as non-inferiority was proven for alcohol rubs when compared to brush & water scrubs). Alternatively, the option to move the Avagard dispensers inside the operating rooms to decrease traffic flow would be an immediate call to action.

**EVALUATE THE EVIDENCE**

- Alcohol rubs have improved over the years to include formulations that are more skin tolerant
- It has been shown that 50-70% alcohol formulations produce the greatest and most rapid reduction in bacterial counts on clean skin.
Evidence for alcohol scrub formulations with 61% ethyl alcohol or higher confirms they are not inferior to other surgical hand scrub options, at this time.

Implementation Plan:

More RCTs are needed to study the efficacy, efficiency, and effectiveness specifically of Steris Alcare alcohol foam as compared to Avagard gel before an implementation plan can be introduced. However, based on the body of research available, a change in nursing practice would be viable. Another immediate option would be to place the Avagard alcohol gel dispensers inside the operating rooms to decrease traffic sterile surgical areas. Should a change in practice move to a new policy on scrubbing technique, continuing education would need to be provided to teach proper methods for scrubbing with Steris Alcare Plus alcohol foam. This education would need to be a hands-on simulation and check off on proper scrubbing technique in order to comply with governing standards, MUSC policy and the product’s directions for use. Outcome measures could be looked at by recording traffic patterns and surgical site infections to see if there is indeed a reduction with the change in practice. The cost effectiveness, user-friendliness, and accessibility of Steris Alcare Plus affect compliance in use.

REFERENCES


