

What is the most effective surgical hand antisepsis for preventing surgical site infections? A systematic review

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Introduction

- Surgical hand antisepsis (SHA) immediately before donning sterile gloves is a cornerstone for the prevention of surgical site infections (SSIs).
- SHA products are meant to eliminate the transient and significantly reduce the resident flora at the beginning of an operation and ideally, maintain the microbial release from the hands below baseline until the end of the procedure.
- SHA is usually performed by scrubbing hands with an antiseptic soap for 2-5 minutes.
- We conducted a systematic review to evaluate the evidence for using alcohol-based hand rubs instead of scrubbing with soap for SHA.

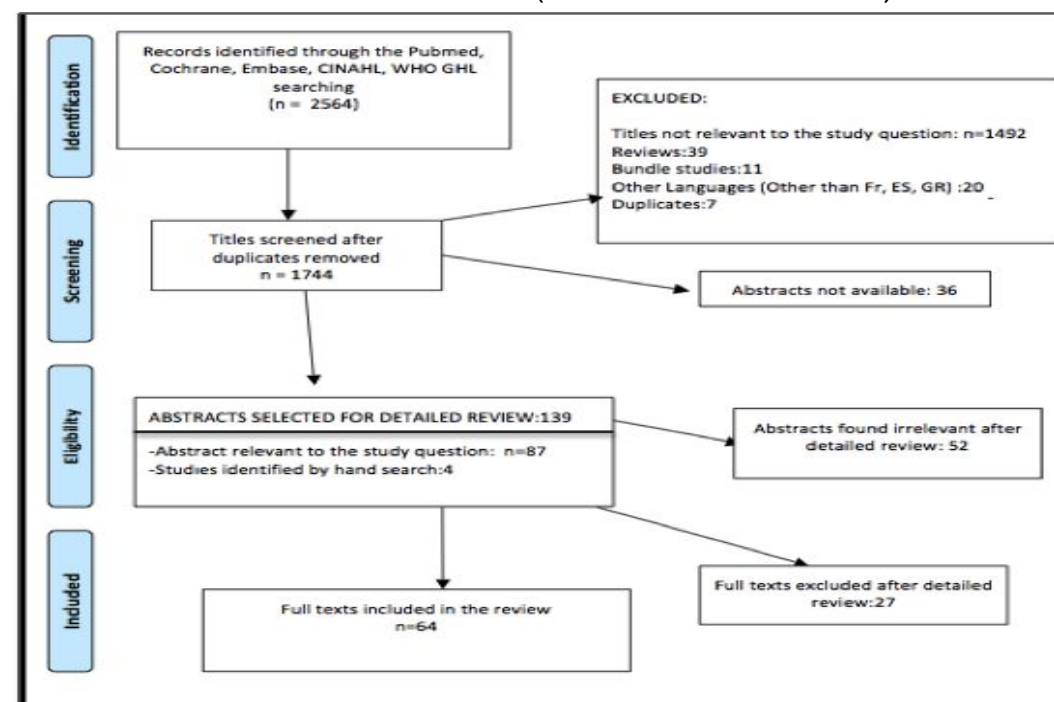
Objectives

- To evaluate the effectiveness of surgical handrubbing with alcohol-based solutions (ABHR) compared to handscrubbing with either antimicrobial or plain soap in reducing SSI.
- This is part of the effort to develop recommendations for the new World Health Organization (WHO) guidelines for SSI prevention

Methods

- Databases searched:** PubMed, EMBASE, CINAHL, Cochrane Central Register of Controlled Trials (CENTRAL), WHO Global Health Library
- Time limit:** 1990- 24/04/2014
- Language:** English, Spanish, French
- Review:** Two independent reviewers screened the titles and abstracts of retrieved references, extracted data in a predefined evidence table and critically appraised the retrieved studies.
- Quality assessment:** using the Cochrane Collaboration tool to assess the risk of bias of randomized control trials (RCTs) and the Newcastle Ottawa Quality Assessment Scale for cohort studies.

- Out of 1744 titles identified by the search, 64 papers were included, with either SSI or participants' hand microbial colonization as an outcome (see Flowchart below).



- SSI as the primary outcome:**
- Six papers were included; three RCTs and three observational studies (see Tables).
- Five studies comparing ABHR to handscrubbing with an antimicrobial soap containing either 4% povidone iodine or 4% chlorhexidine gluconate showed no significant difference in SSI.
- The same result was found in a cluster randomized cross over trial comparing ABHR to handscrubbing with plain soap.
- Most of the studies showed better skin tolerability and acceptance by surgical teams for ABHR compared to handscrubbing regardless of the product.
- No meta-analysis could be performed due to substantial heterogeneity in the concentration of products used and in the application time.
- Quality was moderate for RCTs and very low in observational studies.
- Cost analysis conducted in four of these studies showed cost benefit of handrubbing compared to handscrubbing.

Results and Conclusions

RCTs with SSI outcome

Author, Year, Ref	Country/ Study period	Type of study/ Setting	Intervention	Comparator	Primary Outcome- SSI rate	Difference B/t Groups	Cost analysis
Panenti ¹ 2002	France, 16 mo	Multicenter Randomized Equivalence Trial	Hand Rubbing Protocol with ABHR (Sterilium®) for 5 min (n=2252)	Hand scrubbing with 4% povidone iodine or 4% chlorhexidine gluconate for 5 mins (n=2135)	2.44 % hand rubbing group; 2.48 % in the hand scrubbing group	0.04 % (95% CI, -0.88%-0.96%) NS difference	
Nthumba ² 2010	Kenya, 11 mo	Longitudinal Comparative Cluster randomized cross over trial in a Rural hospital	ABHR procedure w/ WHO formula II for 3 min (n=1537)	Hand scrubbing w/ plain soap and water for 4-5 min (n= 1596)	8.3 % in ABHR (%95 CI 6.7 to 9.5) 8.0 % in plain soap & water group (95% CI 6,9 to 9,8)	Crude OR 1.03 (95% CI 0,80-1,33; P = 0,804) NS difference	The approximate total weekly cost of ABHR was €4,60 compared with €3,30 for plain soap and water (cost ratio 1 : 1.4).
Al-Naami ³ 2009	Saudi Arabia, 9mo	Randomized Equivalence Trial in an university hosp.	Handrubbing with alcohol gel (Purrel®) (n=272)	Handscrubbing with 4% povidone iodine or 4% chlorhexidine gluconate 3-5 min (n=228)	2.94% in ABHR; 5.26% in traditional hand scrub group	OR=1.833, (95% CI 0.683-5.007 p= 0.27547) NS difference	

* ABHR: Alcohol Based Hand Rub; Sterilium® 75% AAS propanol-1, propanol-2, and metcetrinium; WHO recommended formulation II (75 per cent (v/v) isopropyl alcohol, 1.45 per cent (v/v) glycerol, 0.125 per cent (w/v) hydrogen peroxide); Purrel®: 62% ethyl alcohol as an active ingredient; water, aminomethyl propanol, isopropyl myristate, propylene glycol, glycerin, tocopheryl acetate, carbomer, and fragrance (perfume) as inactive ingredients.

Observational studies with SSI outcome

Authors, Ref	Country/ Study period	Type of study/ Setting	Intervention	Comparator	Primary Outcome- SSI rate	Difference B/t Groups	Cost Analysis
Weight ⁴ 2010	USA Study period not stated	Retrospective Comparative study in a ped urology clinic	Hand Rubbing Protocol with Avagard®* for 2min (n=1800)	Hand scrubbing with antiseptic impregnated hand brush for 6 min. (n=1800)	0.11% hand rubbing group; 0.17% in the hand scrubbing group	NS difference (p>.99)	Avagard® costs \$0.59 per application and the antiseptic-impregnated hand-brushes cost \$1.04 per application
Marchand ⁵ 2008	Canada, 2 years	Retrospective observational before /after study in a heart institute, cardiovascular surgery pts	Handrubbing w/ 70% ethyl alcohol / 0.5% chlorhexidine gluconate hand rub rinse (n=2174)	Handscrubbing w/ antiseptic detergent (n= 2084)	3,59 % in handrubbing group 3,33 % in handscrubbing group	NS difference**	The standard hand scrub= \$6,000/year for 2,000 surgeries Handrub = \$2,531/year for an annual savings of approximately \$3,500
Adjoussou ⁶ 2009	Cote d'Ivoire 5 mo	Comparative Study in a university hosp, gynecology pts	Handrubbing with (Sterilium®) (n=113)	Handscrubbing w/ w/ povidone iodine (n=205)	11.5% in ABHR; 13.2 % in traditional hand scrub group	NS difference (p=0.8)	1 dose of PVPI= €0.2, 1 dose of ABHR= €0.1

* Avagard® : 61% ethanol and 1% CHG ** p not provided

- Fifty eight studies were conducted either in laboratory or hospital settings and evaluated participants' hand microbial colonization following SHA with different products and techniques. There was high variability in the study setting, microbiological methods used, type of product, and time of sampling.
- Of these studies, 17 compared ABHR vs. handscrubbing. Eight were RCTs and showed heterogeneous results, at variable times of the sampling (i.e. immediate effect, sustainable effect).
- Most of the studies conducted in hospital settings showed no significant difference, whereas two RCTs in the laboratory setting showed that handrubbing was more effective than handscrubbing.

Conclusions

- Moderate quality of evidence from three RCTs showed equivalence of ABHR and handscrubbing in preventing SSI.
- However, the overall evidence remains extremely limited; well designed RCTs comparing efficacy of products, technique and duration of SHA with SSI as the primary outcome are warranted.
- Surgical teams preference for ABHR is attributable to higher tolerability and acceptability generally due to less time needed to prepare and fewer skin reactions.

References:

- WHO Guidelines on Hand Hygiene in Health Care. Geneva: World Health Organization; 2009. Available from: http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf
- Tanner J, et al. Surgical hand antisepsis to reduce surgical site infection. Cochrane Database of Systematic Reviews 2008, Issue 1. Art. No.: CD004288. DOI: 10.1002/14651858.CD004288.pub2.