



Compare the Traditional Brush Hand or Dry Hand Disinfection Methods: A Randomized Controlled Trial

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Objective

Effective perioperative hand antisepsis is crucial for the safety of patients and medical staff in surgical rooms. The antimicrobial effectiveness of different antiseptic methods, including conventional hand scrubs and waterless hand rubs, has not been well evaluated. design, setting, and participants. A randomized controlled trial was conducted to investigate the effectiveness of the 3 antiseptic methods among surgical staff of Taipei Medical University-Shuang Ho Hospital. For each method used, a group of 80 participants was enrolled.

Design, Setting, and Participants

A randomized controlled trial was conducted to investigate the effectiveness of the 3 antiseptic methods among surgical staff of Taipei Medical University-Shuang Ho Hospital. For each method used, a group of 80 participants was enrolled.

Interventuon

Surgical hand cleansing with conventional 10% povidone-iodine scrub, conventional 4% chlorhexidine scrub, or waterless hand rub (1% chlorhexidine gluconate and 61% ethyl alcohol).

Materials and methods

This study was a single-center, single-blind, randomized trial. Participants were recruited from the surgical staff members of Taipei Medical University-Shuang Ho Hospital between December 1, 2014 and January 31, 2015. This trial was approved by the institutional review boards of Taipei Medical University and registered with ClinicalTrials.gov, NCT02294604.

Results

Colony-forming unit (CFU) counts were collected using the hand imprinting method before and after disinfection and after surgery. After surgical hand disinfection, the mean CFU counts of the conventional chlorhexidine (0.5 ± 0.2 , $P < 0.01$) and waterless hand rub groups (1.4 ± 0.7 , $P < 0.05$) were significantly lower than that of the conventional povidone group (4.3 ± 1.3). No significant difference was observed in the mean CFU count among the groups after surgery. Similar results were obtained when preexisting differences before disinfection were considered in the analysis of covariance. Furthermore, multivariate regression indicated that the antiseptic method ($P = .0036$), but not other variables, predicted the mean CFU count.

Conclusions

Conventional chlorhexidine scrub and waterless hand rub were superior to a conventional povidone-iodine product in bacterial inhibition. We recommend using conventional chlorhexidine scrub as a standard method for preoperative hand antisepsis. Waterless hand rub may be used if the higher cost is affordable.

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Table 1. Baseline Characteristics of the Participants in the 3 Antiseptic Groups*

Variable	Total (n = 236)	Antiseptic group			P value
		Povidone scrub (n = 77) ^b	Chlorhexidine scrub (n = 80) ^c	Waterless rub (n = 79) ^d	
Healthcare workers					.1681
Attending physician	28	13	10	5	
Resident	34	12	11	11	
Nurse	174	52	59	63	
Type of surgery					.0082
General surgery	50	10	15	25	
Chest surgery	2	0	1	1	
Cardiovascular surgery	13	2	5	6	
Plastic surgery	6	3	1	2	
Neurosurgery	23	6	12	5	
Ear-nose-throat surgery	6	5	1	0	
Ophthalmologic surgery	9	2	6	1	
Orthopedic surgery	97	42	31	24	
Urologic surgery	11	1	4	6	
Oral surgery	2	0	1	1	
Gynecologic surgery	17	6	3	8	
Surgical Site					.1336
Head	40	12	17	11	
Chest	19	3	5	11	
Abdomen	51	12	16	23	
Pelvis	11	4	3	4	
Spine	29	13	8	8	
Extremities	86	33	31	22	
Wound classification					.9199
Clean	196	65	64	67	
Clean-contaminated	34	12	13	9	
Contaminated	10	3	3	4	
Duration, min					
Antisepsis		3.64±0.2	4.8±0.8	3.24±0.2	.04
Surgery		118.3±6.5	110.7±6.2	124.8±10.4	.45

*Statistical method: simple statistics were used for basic characteristics and analysis of variance was used for duration (data are expressed as the mean±standard error).

^bPovidone: hand scrubbing with 10% povidone-iodine product.

^cChlorhexidine: hand scrubbing with 4% chlorhexidine gluconate product.

^dWaterless hand rub: hand rubbing with 1% chlorhexidine gluconate and 61% ethyl alcohol products.

Table 2. Efficacy of Bacterial Inhibition Indexed by the Mean Colony Forming Unit Count Among the Antiseptic Groups*

Variable	Antiseptic group		
	Povidone scrub (n = 77) (reference) ^b	Chlorhexidine scrub (n = 80)	Waterless Hand rub (n = 79) ^d
Before surgical hand disinfection	38.6±4.4	22.9±3.6*	29.0±4.0
After hand disinfection			
Before adjustment	4.3±1.3	0.5±0.2**	1.4±0.7*
After adjustment	3.9±1.6	0.8±0.8**	1.4±0.8*
After surgical			
Before adjustment	3.9±0.8	4.1±1.9	4.7±1.8
After adjustment	3.4±1.8	4.6±1.7	4.8±1.7

*Between-group comparisons: ANCOVA, with the value before surgical hand disinfection as reference; P value:

*P<.05.

**P<.01. Data are expressed as the mean±standard error.

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Table 3. Examination of Variables Attributable to Colony-Forming Unit After Hand Disinfection Using Multivariate Regression Analysis

Variable	No.(n = 236)	Mean±SE	β	P value
Type of antiseptics				0.0036*
Povidone scrub ^a	77	4.29±1.25	Ref.	
Chlorhexidine scrub ^b	80	0.48±0.22	-4.29	
Waterless rub ^c	79	1.38±0.74	-2.81	
Role of staff				0.8333
nurse	173	2.06±0.63	1.00	
Resident	35	2.29±0.94	0.94	
Attending physician	28	1.46±0.71	Ref.	
Surgeon specialty				0.6381
General surgery	50	0.92±0.50	-2.26	
Chest surgery	2	0.50±0.50	-0.26	
Cardiovascular surgery	13	0.77±0.47	-2.40	
Plastic surgery	6	0.17±0.17	-9.84	
Neurosurgery	23	0.39±0.22	-2.43	
Ear-nose-throat surgery	6	0.83±0.48	-3.79	
Ophthalmologic surgery	9	1.00±0.76	-0.63	
Orthopedic surgery	97	3.34±1.02	-0.42	
Urologic surgery	11	0.64±0.31	-1.44	
Oral surgery	2	1.00±1.00	0.04	
Gynecologic surgery	17	3.76±3.03	Ref.	
Surgical site				0.7863
Head	40	0.55±0.20	-1.03	
Chest	19	0.89±0.60	-1.46	
Abdomen	51	2.08±1.11	0.07	
Pelvis	11	0.91±0.44	-1.84	
Spine	29	1.41±0.67	-2.12	
Extremities	86	3.28±1.14	Ref.	
Wound classification				0.066
Clean	193	1.99±0.54	-7.57	
Clean-contaminated	33	1.27±0.50	-7.61	
Contaminated	10	5.10±4.99	Ref.	
Brush time (minute)				0.1248
<3.85	130	1.54±0.49	-1.63	
≥3.85	106	2.62±0.91	Ref.	

^aPovidone scrub: hand scrubbing with 10% povidone-iodine product.

^bChlorhexidine scrub: hand scrubbing with 4% chlorhexidine gluconate product.

^cWaterless hand rub: hand rubbing with 1% chlorhexidine gluconate and 61% ethyl alcohol products.