

## Quality improvement

### Handrubbing with an alcohol based solution reduced healthcare workers' hand contamination more than handwashing with antiseptic soap

Girou E, Loyeau S, Legrand P, et al. *Efficacy of handrubbing with alcohol based solution versus standard handwashing with antiseptic soap: randomised clinical trial. BMJ 2002;325:362-5.*

**QUESTION:** Is handrubbing with an alcohol based solution as effective as standard handwashing with antiseptic soap for reducing hand contamination during routine patient care?

#### Design

Randomised (unclear allocation concealment), blinded (outcome assessor), controlled trial with follow up immediately after patient care activities.

#### Setting

3 intensive care units in a university hospital in France.

#### Participants

23 permanent and temporary nurses and nursing assistants who volunteered to participate.

#### Intervention

12 healthcare workers were allocated to handrubbing with a waterless alcohol based solution (45% 2-propanol, 30% 1-propanol, 0.2% metronidazole ethyl sulphate, average 3-5 ml; Sterillium, Bode Chemie, Hamburg, Germany), and 11 were allocated to handwashing with antiseptic soap (chlorhexidine gluconate 4%; Hibiscrub, Zeneca Pharma). All participants had previously been instructed on the use of the alcohol based solution when a hospital-wide handrubbing policy was implemented 1 year previously. Each unit had a copy of the written protocol.

Patient care activities were monitored during daily sessions of 2-3 hours until a predetermined number of eligible activities (ie, direct contact with a patient's skin before invasive care, after interruption of care, and after contact with any part of a patient that was colonised with multiresistant bacteria) had been performed. 1 session

comprised 5 patient care activities that required hand hygiene before and after care. Participants in the handrubbing group were excluded if their hands became visibly soiled; they then had to wash their hands with standard antiseptic soap, and the session was stopped.

#### Main outcome measure

Bacterial contamination of healthcare workers' hands (counts of bacterial colony forming units) after 48 hours incubation. When an opportunity for hand hygiene occurred, an imprint of the fingertips and palm of the participant's dominant hand was taken before and 1 minute after the procedure. Gloves were removed before sampling.

#### Main results

Analysis was by intention to treat. 1 participant was excluded after 4 samplings instead of 5 because his hands were visibly soiled with body fluids. 114 patient care activities were performed (59 in the handrubbing group and 55 in the handwashing group). The median reduction in bacterial contamination was higher for participants in the handrubbing group (83% v 58%,  $p=0.012$ ). The groups did not differ for median time spent on hand hygiene (30 s for both groups).

#### Conclusion

Handrubbing with an alcohol based solution reduced bacterial contamination of healthcare workers' hands more than handwashing with antiseptic soap during routine patient care activities.

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## COMMENTARY

Nosocomial infection is a major cause of morbidity in hospitals. Approximately 10% of patients develop hospital acquired infection, and infected patients incur about 3 times the costs of uninfected patients.<sup>1-2</sup> Handwashing is promoted as the single most effective means of preventing infections, but maintaining adherence to handwashing regimens has proved problematic.<sup>3</sup> Hand rubs may be an alternative to handwashing, and the studies by Girou *et al* and Parienti *et al* add to the growing evidence about the effectiveness of handrubbing with alcohol based solutions compared with standard hygiene methods.

Girou *et al* conducted a trial involving permanent and temporary staff, as well as nursing assistants and nursing students. Participants were observed, a factor that may have improved compliance with hand hygiene. Despite this, 65% of handwashing procedures lasted <30 seconds, which is insufficient time to obtain optimum decontamination. The inadequacy of time devoted to handwashing is likely to have contributed to the difference in contamination rates. The time spent handrubbing after patient procedures was obviously sufficient for decontamination, reinforcing the practical implications of the result. The duration of reduced contamination and the effect of this reduction on patient outcomes were not evaluated. Bacterial contamination of hands during routine patient care is a useful surrogate outcome, but ideally a trial should focus on meaningful outcomes, such as nosocomial infection.

The study by Parienti *et al* did focus on a meaningful patient outcome (ie, SSIs), but examined the use of an alcohol based hand rub as a surgical scrub in a different context. Teaching and non-teaching hospitals were involved, and various surgical procedures were included. The main concern in interpreting this study's findings is that the study centres (cluster) were randomised, not the patients. Although randomising by cluster is legitimate, clusters may be quite different, and this can affect outcomes. For instance, teaching and non-teaching hospitals differ in the complexity of patients and the experience of members of the surgical team (many of whom may still be in training). These differences may cause differential rates of SSI among clusters, which typically inflate the numbers required in a cluster trial compared with a trial that randomises by individual patient. It is a common error, as in this study, to randomise by cluster, but to analyse by individual, and such an error leads to inaccurately smaller p values or narrower confidence intervals. Cluster

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# Handrubbing with an aqueous alcohol solution was as effective as handscrubbing with antiseptic soap for preventing surgical site infections

Parienti JJ, Thibon P, Heller R, et al. *Hand-rubbing with an aqueous alcoholic solution vs traditional surgical hand-scrubbing and 30-day surgical site infection rates: a randomized equivalence study*. JAMA 2002;288:722-7.

**QUESTION:** Is a protocol of handrubbing with an aqueous alcohol solution (AAS) as effective as a protocol of handscrubbing with an antiseptic soap for decreasing surgical site infections (SSIs) in routine surgical practice?

## Design

Cluster randomised (unclear allocation concealment), unblinded, crossover controlled equivalence trial with follow up at 30 days.

## Setting

6 surgical services in France.

## Patients

4823 consecutive patients having surgery. Patients who had contaminated or dirty procedures and those having a second surgery < 15 days after a first surgery were excluded. 4387 patients (91%) were included in the as-treated analysis (mean age 50 y).

## Intervention

3 surgical services were allocated to begin with the handrubbing protocol (75% AAS containing propanol-1, propanol-2, and mecetronium etilsulfate [Stérillium, Rivadis Laboratories, Thouard, France]), and 3 were allocated to begin with the handscrubbing protocol (4% povidone iodine [Betadine, Asta Medica, Merignac, France] or 4% chlorhexidine gluconate [Hibiscrub, AstraZeneca, Rueil-Malmaison, France]). At the end of 1 month, each service switched to the alternative antiseptic product. Services alternated protocols monthly for 16 months. Standard surgical scrubbing was done according to Centers for Disease Control Guidelines ( $\geq 5$  min systematic handscrubbing with a sterile sponge and brush). Surgical personnel in the handrubbing group were instructed to do a 1 minute hand wash (including subungual space cleaning with a brush) with non-antiseptic soap before the first procedure of the day, or if the hands were visibly

soiled. The hands and forearms were then rinsed with non-sterile tap water and wiped with non-sterile paper. Participants were then instructed to take enough AAS to fully cover their hands and forearms ( $\geq 5$  ml) and apply it twice for 2 minutes 30 seconds without drying. When changing gloves, participants were instructed to rub their hands with AAS for 30 seconds.

## Main outcome measure

Nosocomial SSIs in patients.

## Main results

99 in-hospital and 9 post-discharge SSIs were identified (global SSI rate at 30 d 2.46%, 95% CI 1.81 to 3.11). Patients in the handrubbing and handscrubbing groups did not differ for SSIs at 30 days (table). Surgical personnel in the handrubbing group spent more time on hand antisepsis in the first procedure of the day than personnel in the handscrubbing group (mean 313 v 287 s,  $p=0.01$ ).

## Conclusion

Routine surgical practice using a protocol of handrubbing with an aqueous alcohol solution was as effective as a protocol of handscrubbing with antiseptic soap for preventing surgical site infections at 30 days.

*Handrubbing with aqueous alcohol solution v handscrubbing with antiseptic soap during routine surgical care\**

Outcome at 30 days	Handrubbing	Handscrubbing	RRR (95% CI)	NNT (CI)
Surgical site infection	2.44%	2.48%	1.6% (-43 to 32)	Not significant

\*Abbreviations defined in glossary; RRR and CI calculated from data in article.

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## COMMENTARY—continued from previous page

randomised trials should report baseline differences and treatment effects by cluster, allowing readers to interpret just how different clusters are. While the study by Parienti *et al* is an intriguing trial, whether hand rubs and handwashing are truly equivalent remains unclear.

Parienti *et al* also examined compliance with time devoted to the 2 hand hygiene protocols in a subset of procedures. Adherence was poor in both groups, but similar to the findings of Girou *et al*, compliance was worse in the handwashing group (44% v 28%). The argument for no difference between protocols would be strengthened if SSI rates were similar when adherence to protocols was high.

Overall, the findings of these 2 studies tend to support the conclusion that alcohol based preparations are at least equivalent to, if not more effective than, traditional hand hygiene methods. Practitioners in all settings could use these studies as a basis for considering the introduction of alcohol based hand rubs. However, before applying these findings, factors such as cost and clinician acceptance should be considered. Anecdotal reports of dermatitis and eczema being relieved when healthcare workers switched to alcohol based rubs conflict with entrenched views that hand rubs are likely to increase such occupational hazards. If hand rubs are introduced, practitioners need to consider how they can best promote compliance with the new protocol and evaluate changes in nosocomial infection rates.

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