

The *in vivo* effects on stratum corneum of choice of an antimicrobial hand wash used to supplement alcohol rub in professional hand cleansing

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Hand cleansing

Frequent and diligent hand cleansing by healthcare professionals is an important infection control measure. Hand cleansing protocols typically combine repeated application of alcohol gels or rubs supplemented with washing with soap or liquid products that are often antiseptic. Such intensive hand cleansing can be drying and irritant to the skin.

Dermol Wash (DERL-02) is a new hand wash product specially designed to confer skin protectant properties. The particular combination of antibacterial agents used, a mixture of benzalkonium chloride and chlorhexidine dihydrochloride, acts synergistically, and therefore each agent is present at the low concentration of 0.1%. Cleansing action is achieved using a non-ionic soap substitute, cetomacrogol 1000, which is intended to avoid the irritancy problems that arise with ordinary anionic soaps and detergents. The wash also contains two emollient ingredients, liquid paraffin and isopropyl myristate, to form a physical barrier within the stratum corneum, thereby helping to maintain the skin's normal barrier function.

Objectives

This study compared the effects on the skin condition of a 5 day semi-intensive hand cleansing protocol comprising repeated use of alcohol cleansing rub (Spirigel Alcohol Hand Gel) supplemented with either DERL-02 or a comparator antimicrobial wash, Hibiscrub. The latter was chosen because it too is antiseptic (in this case containing 4% chlorhexidine gluconate), contains a surface active cleanser and is reported by its manufacturer to have been reformulated to make it gentle on the skin. The primary objective was to compare changes in skin condition assessed by subjects in terms of how their skin feels. A secondary objective was to compare changes in skin condition measured by corneometry.

Methods

- This was a single-centre, assessor-blind, parallel group comparison conducted in a panel of 40 healthy adult volunteers.
- Subjects were screened 7 days prior to commencement when they were asked to refrain from using moisturisers on their hands until completion of the study.
- 20 subjects cleansed their hands using the alcoholic rub in combination with DERL-02, and the other 20 cleansed their hands using the alcoholic rub in combination with the marketed comparator.
- On days 1, 3 and 5, subjects attended the test centre for the whole day. Hand washing was repeated 13 times at approximately half-hourly intervals. Alcohol rub was used 24 times - 10 and 20 minutes after each wash.
- Prior to the first wash of the day and circa 1 hour after the final wash of the day, a trained investigator measured skin hydration using triplicate corneometry measurements (Courage-Khazaka electronic).
- At the end of days 1, 3, and 5, subjects were asked to score how their skin felt compared to before the study, whether 'much worse' (-2), 'slightly worse' (-1), 'the same' (0), 'slightly better' (+1) or 'much better' (+2).
- On days 2 and 4 subjects did not attend the test centre and performed a less intensive cleansing routine at home, comprising 7 washes performed hourly and 12 applications of alcoholic rub.

Results

Six subjects were withdrawn owing to skin discomfort; five in the marketed comparator group and one in the DERL-02 group. Stopping scores/assessments were carried forward for all time point analyses. Subjects' scores of how their skin felt after repeated use of the alcohol rub supplemented with the allocated hand wash product are presented in Table 1. By the end of day 5, scores of 'much worse' were recorded by 70% in the comparator group and in 15% of the DERL-02 group. This difference is significant in favour of the DERL-02 group ($p < 0.001$ Wilcoxon rank-sum test).

Table 1: Subjects' assessment of how skin felt. Parentheses indicate cumulative numbers of withdrawn subjects.

Category	End day 1		End day 3		End day 5	
	Alcohol rub/DERL-02	Alcohol rub/marked comp	Alcohol rub/DERL-02	Alcohol rub/marked comp	Alcohol rub/DERL-02	Alcohol rub/marked comp
-2: Skin feels much worse than before study	1	4	2 (1)	8 (2)	3 (1)	14 (4)
-1: Skin feels slightly worse than before study	8	11	13	11	10	4 (1)
0: Skin feels the same as before study	9	5	5	1	7	2
1: Skin feels slightly better than before study	1	0	0	0	0	0
2: Skin feels much better than before study	1	0	0	0	0	0

Corneometry measurements for the DERL-02 group showed statistically significant ($p < 0.009$, paired Student's t-test) improvement in skin hydration at all time points, showing an **increase of 19%** by the end of day 5 (Figure 1). The reverse occurred for the comparator group, where skin hydration values deteriorated from baseline, with a final **reduction of 18%** ($p = 0.002$). The difference between DERL-02 and comparator group was highly significant ($p < 0.0006$) at all time points, except for the start of day 3.

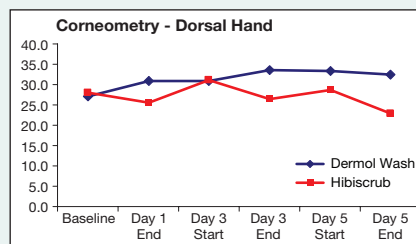


Figure 1: Corneometry measurements (units)

Discussion and Conclusion

Increasingly healthcare workers are experiencing skin drying and irritation as a result of repeated hand washing. This problem occurs for a variety of reasons; a) frequent washing removes natural oils from the skin, thereby compromising the normal barrier function, b) conventional soaps and washes are anionic and so act as primary irritants, c) antiseptic ingredients and the alcohols used in alcohol gels/rubs can be drying and quite harsh on the skin when used frequently. We have shown in this study that the use of an appropriate hand wash product, such as DERL-02, even in conjunction with ubiquitous alcohol rubs which are notoriously problematic, can achieve significant benefits – assessed in terms of subjects' own assessments of how their skin feels, and measured by corneometry. The former is especially relevant to hand cleansing adherence because it has a direct influence on the extent to which individuals are prepared to persevere with the cleansing regimen.

Dermol Wash and Alcohol Rub for Routine Hand Cleansing

Dermol Wash is a new hand wash product specially designed to confer skin protectant properties. This is achieved by the synergistic combination of two antiseptics, benzalkonium chloride and chlorhexidine dihydrochloride, both present at the low concentration of 0.1%, plus two emollients to maintain the skin's normal barrier function and the presence of cetomacrogol, a non-ionic soap substitute for cleansing.

Frequent and diligent hand cleansing by healthcare professionals is an important infection control measure. Hand cleansing protocols typically combine repeated application of alcohol gels or rubs supplemented with washing with soap or liquid products that are antiseptic. Such intensive hand cleansing can be drying and irritant to the skin.

The trial summarised overleaf shows that Dermol Wash even when used in conjunction with alcohol rubs can achieve significant benefits in skin condition and hydration.

Summary of Poster Overleaf:

- The study compared the effects on the skin of a 5 day semi-intensive hand cleansing protocol comprising repeated use of alcohol cleansing rub supplemented with either Dermol Wash or a comparator antimicrobial wash (Hibiscrub).
- The primary objective was to compare changes in skin condition, as a result of the hand cleansing protocol, assessed by subjects. By the end of day 5, scores of 'much worse' were recorded by 70% in the comparator group and in 15% of the Dermol Wash group ($p < 0.001$).
- When skin condition was assessed by corneometry, Dermol Wash showed statistically significant ($p \leq 0.009$) improvement in skin hydration at all time points showing an **increase of 19%** by the end of day 5.
- For the comparator group, skin hydration values deteriorated from baseline with a final **reduction of 18%** ($p = 0.002$). The difference between Dermol Wash and the comparator group was highly significant ($p < 0.0006$) at all time points, except for the start of day 3.

Conclusion:

Increasingly healthcare workers are experiencing skin drying and irritation as a result of repeated hand washing. This problem occurs for a variety of reasons; a) frequent washing removes natural oils from the skin, thereby compromising the normal barrier function, b) conventional soaps and washes are anionic and so act as primary irritants, c) antiseptic ingredients and the alcohols used in alcohol gels/rubs can be drying and quite harsh on the skin when used frequently. We have shown in this study that the use of an appropriate hand wash product, such as Dermol Wash, even in conjunction with ubiquitous alcohol rubs which are notoriously problematic, can achieve significant benefits – assessed in terms of subjects' own assessments of how their skin feels, and measured by corneometry. The former is especially relevant to hand cleansing adherence because it has a direct influence on the extent to which individuals are prepared to persevere with the cleansing regimen.