

Routine infection control using a proprietary range of combined antiseptic emollients and soap substitutes – their effectiveness against MRSA and FRSA

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Staphylococcus aureus, infection control and antibiotic resistance

Staphylococcus aureus (SA) is carried by up to 40% of individuals and in certain circumstances, particularly where the skin is broken, can cause local and systemic infections. Frequent use of antibiotics has led to bacterial resistance. SA is strongly implicated in the pathogenesis of atopic dermatitis, and in dermatological patients fusidic acid-resistant SA (FRSA) levels are estimated to be as high as 50%¹, whilst estimates of methicillin-resistant SA (MRSA) levels have been around 11%². Although resistant strains of SA are no more intrinsically pathogenic, they can be more difficult to treat because there are fewer effective antibiotics available. SA transmission occurs chiefly by hand contact, and the highest levels of dispersal come from certain patient groups including those with extensive desquamating skin conditions such as eczema or psoriasis. Routine infection control measures rely on the ubiquitous and frequent use of antiseptic hand washes/rubs, but many of these tend to be harsh on the skin and so can be unpopular. Where indicated for colonised patients, topical eradication therapy includes all-over-body washing with antiseptic products and the use of antibiotic creams. However, these regimes can only be used for limited periods – owing to their harshness in the case of the washes (especially on eczematous skin) and, for the antibiotics, due to the risk of resistance. There is therefore a strong clinical need for non-antibiotic, 'skin-friendly' yet strongly antiseptic products that may be used for as long as necessary. The Dermal antiseptic emollients may meet this need as they were specially formulated to combat *S. aureus* on dermatologically sensitive skin, e.g. atopic dermatitis. The range comprises cream, lotion and shower presentations for use as both leave-on treatments and soap substitutes, and a bath product for application via patients' bath water.

Aim

The aim was to test the Dermal range against FRSA and MRSA, according to the stringent criteria normally applied to disinfectants and antiseptics used in non-clinically sensitive circumstances (which are much more severe than normally expected of antiseptic skin washes).

Methods

The test was based on the rigorous European Standard for evaluating the bactericidal activity of chemical disinfectants and antiseptics (EN 1276:1997)

- Dermal Cream, Lotion and Shower were tested as undiluted formulations
- Dermal Bath was tested at a 1% dilution to mimic use during bathing
- In summary, 1ml of each antibiotic resistant *S. aureus* suspension (containing 1.5 to 5 x 10⁸ cfu/ml) was added to 1ml of 0.3% bovine serum albumin (BSA) to mimic 'clean' conditions or 3.0% BSA to mimic 'dirty' conditions. Following incubation for 2 minutes, 8 ml of each Dermal product was then added to each challenge and mixed. After specified contact times, aliquots were added to neutraliser, mixed, left for 5 minutes, then the number of surviving bacteria determined and the reduction in viable counts calculated
- Control tests for bacterial suspension, neutraliser and BSA were conducted in parallel

Results

Dermal Cream, Lotion and Shower met the EN 1276 criteria of ≥5 log reduction in microbial counts within 5 mins against both FRSA and MRSA under 'clean' conditions, and even in 'dirty' conditions achieved the 5 log reduction within 10 minutes (Table 1).

Table 1: Activity of Dermal Cream, Dermal Lotion and Dermal Shower against FRSA and MRSA

	Contact time (min)	FRSA		MRSA	
		Log kill (clean)	Log kill (dirty)	Log kill (clean)	Log kill (dirty)
Dermal Cream (undiluted)	0	<4.6*	<3.5*	<3.6	<3.6
	5	>6.4*	4.2*	5.7	4.8
	10	>6.4*	5.6*	6.0	6.0
	20	>6.4*	5.6*	>6.0	>6.0
	30	>6.4*	>6.5*	>6.0	>6.0
Dermal Lotion/ Dermal Shower (undiluted)	0	<2.9	<2.9	<3.6	<3.6
	5	>6.4	>6.4	5.3	3.9
	10	>6.4	>6.4	>6.0	>6.0
	20	>6.4	>6.4	>6.0	>6.0
	30	>6.4	>6.4	>6.0	>6.0

■ ≥ 99.999% (5 log) reduction

■ ≥ 99.99% (4 log) reduction

*mean result of two tests

Table 2: Activity of Dermal Bath (1% dilution) against FRSA and MRSA

	Contact time (min)	FRSA		MRSA	
		Log kill (clean)	Log kill (dirty)	Log kill (clean)	Log kill (dirty)
Dermal Bath (1% dilution)	0	<4.1	<4.1	<3.6	<3.6
	5	4.8	<4.1	<3.6	<3.6
	10	4.8	<4.1	4.1	<3.6
	20	5.0	4.4	4.3	3.7
	30	5.3	4.6	4.4	3.8

■ ≥ 99.999% (5 log) reduction

■ ≥ 99.99% (4 log) reduction

Dermal Bath, even at 1% dilution, achieved the ≥5 log reduction against FRSA (and very nearly against MRSA) after 20 minutes under 'clean' conditions, and a reasonable kill of close to a 4 log reduction by 20 minutes under 'dirty' conditions (Table 2).

Discussion

EN 1276 is a particularly stringent standard as it requires a very significant reduction in microbial count (≥5 log) within only 5 minutes. To put this into perspective, this equates to reducing an initial bacterial count of one hundred and fifty million cfu/ml by 99.999%. This standard is normally applied to disinfectants used in non clinically-sensitive circumstances where 'skin friendliness' is not a priority. The performance of the Dermal range is therefore all the more remarkable because the formulations were specially developed for chronic use on sensitive skin owing to their lack of irritancy. For the cream, lotion and shower product, this is achieved by the inclusion of two antiseptics, chlorhexidine dihydrochloride and benzalkonium chloride which, owing to their synergistic activity, are included at a relatively low concentration of 0.1% w/w. For the bath presentation, because benzalkonium chloride is cationic when diluted in water and therefore has a strong affinity for submerged skin and bacterial surfaces, this antiseptic is formulated on its own, at 0.5% w/w.

Conclusion

The Dermal range exhibited significant antimicrobial activity against FRSA and MRSA. Combined with their established 'skin friendliness' and the diverse, and appealing ways in which they can be used as soap substitutes, body washes, leave-on preparations and even for bathing (whether whole body or prior to wound dressing), this makes the Dermal range a useful addition to the infection control armamentarium, even against FRSA and MRSA. Being antiseptic, rather than antibiotic, they are unlikely to induce bacterial resistance.

References:

1. Shah M, *BJD*, 2003; 148: 1018-1020.
2. Mitra A, *Clin&Exp Dermatology*, 2008; 34: 136-139.

Dermol antimicrobial emollients for routine use against MRSA and FRSA

The Dermol range of antimicrobial emollients contains both emollients and antimicrobial agents. The emollients help to relieve dryness, whilst the antimicrobials are effective in combating *Staphylococcus aureus* while avoiding bacterial resistance.

S. aureus is strongly implicated in the pathogenesis of atopic dermatitis, and in dermatological patients fusidic acid-resistant *S. aureus* (FRSA) levels are estimated to be as high as 50%¹, whilst estimates of methicillin-resistant *S. aureus* (MRSA) levels have been around 11%².

The poster overleaf shows that the Dermol range of antimicrobial emollients demonstrated significant antimicrobial activity against FRSA and MRSA.

Summary of poster overleaf:

- Routine infection control measures rely on the ubiquitous and frequent use of antiseptic hand washes/rubs, but many of these tend to be harsh on the skin and so can be unpopular.
- The Dermol antiseptic emollients were specially formulated to combat *S. aureus* on dermatologically sensitive skin e.g. atopic dermatitis.
- The aim of this study was to test the Dermol range of antimicrobial emollients against FRSA and MRSA against the rigorous European Standard for evaluating the bactericidal activity of chemical disinfectants and antiseptics (EN 1276:1997). This standard is normally applied to disinfectants used in non-clinically-sensitive circumstances where 'skin friendliness' is not a priority.
- Dermol Cream, Lotion and Shower met the stringent EN 1276 criteria of ≥ 5 log reduction against both FRSA and MRSA under 'clean' conditions within 5 minutes, and even in 'dirty' conditions achieved the required ≥ 5 log reduction within 10 minutes (5 log reduction = 99.999%).
- Dermol Bath, even at 1% dilution, achieved the ≥ 5 log reduction against FRSA (and very nearly against MRSA) after 20 minutes under 'clean' conditions, and a reasonable kill of close to a 4 log reduction by 20 minutes under 'dirty' conditions (4 log reduction = 99.99%).

Conclusion

"The Dermol range exhibited significant antimicrobial activity against FRSA and MRSA. Combined with their established 'skin friendliness' and the diverse, and appealing ways in which they can be used as soap substitutes, body washes, leave-on preparations and even for bathing (whether whole body or prior to wound dressing), this makes the Dermol range a useful addition to the infection control armamentarium, even against FRSA and MRSA. Being antiseptic, rather than antibiotic, they are unlikely to induce bacterial resistance."