of-date and based on fairly superficial summaries in the sources reviewed. Large volumes of toxicity data are on file at FDA.

The effect of substantivity after washing with both these ingredients seems to confirm the reports already in the literature. These authors have chosen only certain elements out of the original Glove Juice Protocol and based their conclusions on miscalculation. I certainly think some changes in the Glove Juice Protocol are needed, but haphazard ones do a disservice to the products and to good science.

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1. Soulsby ME, Barnett JB, Maddox S: Brief report: The antiseptic efficacy of chloroxylenol-containing vs. chlorhexidine gluconate-containing surgical scrub preparations. *Infect Control* 1986; 7(4): 223-226.
2. *Federal Register*, September 13, 1974; January 6, 1978.
3. Rotter ML: Povidone-iodine and chlorhexidine gluconate-containing detergents for disinfection of hands. *J Hosp Infect* 1981; 2:273-280.

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To the Editor:

I have recently read the article by Soulsby et al,[1] wherein they compare a chloroxylenol-containing surgical scrub to Hibiclens. Since I am a supporter of the use of chloroxylenol in the proper circumstances, I find such work distressing. Allow me to address some of the points that I feel are incorrect.

The first point is the spelling of the material known chemically as 3,5 dimethyl, p-chloro-xylenol. This is also known as *chloroxylenol*, not *chlorxylenol*.

Another point is that while chloroxylenol is indeed a phenolic, chlorhexidine gluconate is a salt of a biguanide cation. They are *not* in the same chemical family.

There is no indication of the amount of either preparation that was employed in the test scrubs. It is well known that sponge material is capable of binding ingredients that are placed in contact with the sponge. This can include the chlorhexidine.

		Log Reduction	
	Hours	Anti Sept	Hibiclens
Day 1	0	.7478	.6429
	3	.4436	.4789
	6	.0995	.1793
Day 2	0	.8920	.7353
	3	.4967	.2607
	6	.1062 (incr.)	.0424
Day 3	0	1.0953	1.0676
	3	1.4405?	.6664
	6	.1957	.2953

The most distressing issue is their results. An 82% reduction is not a 1.9 log reduction; after all, a 90% reduction is only a 1.0 log reduction (eg, 100 − 10 = 90, or log 100 − log 10 = 1). The only way that they can obtain their data in Table 2 is to take the log of 82, which indeed is 1.91. However, 82% is not 82 but 0.82, a difference of a factor of 100.

Using their data in Table 1 to construct the proper table leads to the values shown above.

After having spent the past few years dealing with the activity of various antimicrobial preparations, I would consider both of these products to be inadequate for use as a surgical scrub, or the test is suspect. The data supplied by Dexide, Inc. on their chloroxylenol preparation shows it to be substantially more efficacious than either product showed in this test. Also, there are a number of independent studies on Hibiclens that would make this study suspect.

I would hope that the authors would submit a detailed (including raw data) correction so that this study can be properly evaluated.

REFERENCES

1. Soulsby ME, Barnett JB, Maddox S: Brief report: The antiseptic efficacy of chloroxylenol-containing vs. chlorhexidine gluconate-containing surgical scrub preparations. *Infect Control* 1986; 7(4):223-226.

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To the Editor:

I was disappointed to read the report by Soulsby et al published in the April issue.[1] I was somewhat confused in my attempt to decipher the data presented in this report and question some of the conclusions based on these data. Of principal confusion were the data transformation steps performed to obtain the "log reduction" and "percent reduction" values given in Table 2 as derived from the actual log bacterial count data in Table 1.

The high initial dilution of the hand samples (ie, 1:10,000) as stated in the Methods section of the paper dictates a minimum log recovery of 4.00 per hand. From this fact and the baseline values given in Table 1, one can calculate that log reduction values of greater than 1.6 and 1.7 for Anti Sept and Hibiclens, respectively, are impossible. Yet, log reduction values of 1.9 are reported in Table 2.

Also, the authors apparently derived the percent reduction values in Table 2 by taking the antilog of the corresponding log reduction values. This is not correct. Actual numbers for this parameter should be close to 99% for all of the reductions reported. Contrary to the authors' statement in the Results section, there is no significant difference between any of these reduction values.

Certain statements in the report raise several other questions that should have been corrected or clarified prior to publication. These relate primarily to test methodology and data analysis which leave the reader wondering how specific conclusions were drawn. For example, 1 mL from a 50 mL sample into 299 mL does not

TABLE 2
IMMEDIATE POST-WASH REDUCTIONS IN MEAN BACTERIAL COUNT

	Anti Sept		Hibiclens	
	Log Reduction	% Reduction	Log Reduction	% Reduction
Day 1	.7478	82.1234 ± 3.4	.6429	77.2443 ± 5.7
Day 2	.8920	87.1762 ± 3.0	.7383	81.7329 ± 3.4
Day 3	1.0953	91.9688 ± 2.4	1.0676	91.4404 ± 1.5

effect a 1:10,000 dilution. Simple inconsistencies such as this should have been detected and corrected prior to publication.

While it's possible that Anti Sept and Hibiclens are equivalent in their skin degerming activity, a more thorough data review and analysis from this study would serve to support this claim better than the existing report.

REFERENCES

1. Soulsby ME, Barnett JB, Maddox S: Brief report: The antiseptic efficacy of chloroxylenol-containing vs. chlorhexidine gluconate-containing surgical scrub preparations. *Infect Control* 1986; 7(4):223-226.

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Dr. Soulsby replies:

This letter is in response to concerns expressed about an article appearing in the April 1986 issue of *Infection Control.*[1] I shall address the concerns in the order in which they were expressed.

The initial concern is over the statement "a modification of the glove juice test as developed by Peterson." According to Rosenberg et al[2] and our literature search, the glove juice test was initially described by Peterson in the referenced text of 1973. Modifications to the original test were subsequently published in the *Federal Register.*[3]

The second question is whether chloroxylenol and chlorhexidine gluconate are of the same chemical family. Indeed, chloroxylenol is a chlorine-substituted xylenol and chlorhexidine is a biguanide, but in each molecule the active entity is an aromatic ring chlorinated in the para-position. Hence, resolution of the concern depends upon the reader's perspective.

Concern was expressed over our decision not to use neutralizers for the agents. This decision was made after minimum inhibitory concentration (MIC) studies demonstrated that neither antimicrobial was effective on the organisms encountered at the 1:10,000 dilution used in this study.

Since the two surgical scrub preparations used contain different weight per volume amounts of their respective active agents, and since no two participants wash in exactly the same manner, no attempt was made to assure equivalent dosages. Attention was devoted to the time spent lathering the hands and to the efficiency of the rinsing process. Volunteers were allowed to use as much of the preparation as they deemed necessary.

Considerable attention was focused on the numerical column in Table 2 representing the common logarithms of the percent reductions, and labeled "Log_{10} Reductions." Apparently this column was thought to represent the log reduction which, for a given day, would be calculated by subtracting the log of the mean immediate post-wash counts on that day from the log of the mean baseline count of day 1. To elaborate, I shall provide one example:

5.6324 (day 1 baseline average)
4.8846 (day 1 immediate post-wash average)
0.7478 log reduction

Verification of figures may be accomplished by calculating the antilogarithm of these values:

428,943 mean colonies (antilogarithm of 5.6324)
76,666 mean colonies (antilogarithm of 4.8846)
352,277 mean difference which calculates out to an 82.12 percent reduction

Using data contained in Table 1 to construct the anticipated values would lead to the results found in the revised Table 2 above.

The only remaining concern that has not been addressed deals with the misspelling of the active ingredient in the Anti Sept preparation. The second *o* in the name *chloroxylenol* was inadvertently omitted at some point in the rewriting of the initial manuscript. We thank you for bringing this error to our attention.

We wish to thank the editor of *Infection Control* for the opportunity to respond to concerns about our results; not only because we hope our explanations will eliminate those concerns, but so we may adhere to our original results—which indicate that under the conditions of this study there is no significant difference in efficacy between these two surgical scrub preparations.

REFERENCES

1. Soulsby ME, Barnett JB, Maddox S: Brief report: The antiseptic efficacy of chloroxylenol-containing vs. chlorhexidine gluconate-containing surgical scrub preparations. *Infect Control* 1986; 7(4):223-226.
2. Rosenberg et al: *Surg Gynecol Obstet* 1976; 143:789-792.
3. *Federal Register,* September 13, 1974; January 6, 1978.

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