



## TECHNICAL DATA

*ANTISEPTIC*  
2% CHLORHEXIDINE  
GLUCONATE  
SOLUTION

*ANTISEPTIC*  
4% CHLORHEXIDINE  
GLUCONATE  
SOLUTION

## Antimicrobial Skin Cleansers

Manufactured by:

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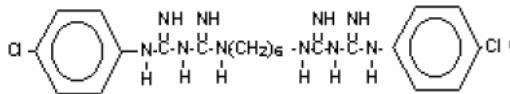
# Aplicare<sup>®</sup>

## 2% and 4% Chlorhexidine Gluconate Antimicrobial Skin Cleansers

### TECHNICAL DATA

#### BACKGROUND

Chlorhexidine Gluconate (CHG) has been used in a variety of pharmaceutical applications for over 40 years. CHG containing products have been extensively studied and are widely regarded as most effective for hand washing, surgical scrubbing, and preoperative prepping procedures. Its use in the medical, dental, veterinary and dairy industry is widespread and growing. Chemically distinct from other skin disinfectants, this cationic biguanide is effective against a broad spectrum of gram positive and gram negative bacteria at concentrations between 0.1% and 4%.



The mode of action of CHG has been shown to differ at high and low concentrations. Concentrations below 100 ppm have bacteriostatic properties that act on cell membrane components. Concentrations above this level have bactericidal effects due to rapid action on the cytoplasm.

CHG's exceptionally persistent and broad spectrum antimicrobial properties have led to its recognition as the most effective agent available for surgical scrubbing, hand washing, patient preoperative prepping, and skin wound cleansing.

#### REGULATORY STATUS

CHG is classified by the FDA as a "New Drug". Use of it as an active ingredient in original formulations for human use requires approval of a New Drug Application (NDA).

#### SAFETY

Extensive clinical testing in Europe, Canada, and the United States, plus worldwide use has demonstrated the safety of CHG. The compound has been shown to have negligible potential for skin absorption through intact skin. When used as directed, it is safe and typically does not produce clinically significant irritation or sensitization problems.

To date, there is no evidence that susceptible organisms develop a resistance to CHG.

#### THE APLICARE<sup>®</sup> ADVANTAGE

Now available in both 2% and 4% concentrations, the APLICARE CHG formulations are both approved by the FDA for use as a:

- Surgical Hand Scrub
- Patient Preoperative Skin Preparation
- Health Care Personnel Handwash (15 sec)
- Skin Wound and General Cleansing

Formulated in a relatively high-sudsing, truly emollient base, the APLICARE 2% and 4% CHG formulations have been pH adjusted for optimal antiseptic activity and stability as well as compatibility with the normal acid pH of the skin.

Designed to be the preferred antiseptic cleanser of healthcare personnel, APLICARE 2% and 4% CHG formulations combine the effectiveness of CHG with superior cosmetic acceptability.

#### EFFICACY DATA

Decades of research, published articles and clinical use have clearly established Chlorhexidine Gluconate's superiority to iodine, PCMX (chloroxylenol), alcohol, and other antimicrobials available to the healthcare market. CHG outperforms other antimicrobials along the following critical parameters:

- **BROAD SPECTRUM:** CHG is effective against gram negative and gram positive bacteria as well as fungi and yeasts.
- **FAST ACTING:** CHG acts quickly; a property that is critical for effective infection control.
- **SUBSTANTIVE:** CHG achieves an exceptionally high reduction in microbial counts on the skin.
- **PESISTENT:** CHG chemically binds to the epithelial surfaces of the skin; thus creating a persistent and residual effect not seen in alcohols, iodine, or other skin disinfectants.

### TECHNICAL DATA

#### MINIMUM INHIBITORY CONCENTRATION (MIC)

The MIC ranges for APLICARE 4% CHG scrub formulation are tabulated below.

SPECIES	MIC (ppm)
<b>Gram-Negative Bacteria</b>	
<i>Escherichia coli</i>	4.0 – 5.0
<i>Klebsiella pneumoniae</i>	4.0 – 10
<i>Neisseria species</i>	2.0 – 4.0
<i>Proteus vulgaris</i>	10
<i>Pseudomonas species</i>	10 – 40
<i>Serratia marcescens</i>	40 – 50
<b>Gram-Positive Bacteria</b>	
<i>Bacillus subtilis</i>	4.0
<i>Corynebacterium species</i>	1.0 – 2.0
<i>Micrococcus species</i>	4.0 – 5.0
<i>Mycobacterium species</i>	1.0 – 2.0
<i>Sarcina species</i>	4.0
<i>Staphylococcus albus</i>	1.0 – 2.0
<i>Staphylococcus aureus</i>	0.4 – 4.0
<i>Staphylococcus epidermidis</i>	0.2 – 5.0
<i>Streptococcus pyogenes</i>	4.0 – 6.8
<b>Fungi</b>	
<i>Allescheria boydii</i>	40
<i>Aspergillus niger</i>	500
<i>Candida species</i>	10 – 40
<i>Cladosporium species</i>	100
<i>Cryptococcus species</i>	20
<i>Debaryomyces species</i>	10
<i>Microsporium species</i>	10 – 20
<i>Nocardia species</i>	100
<i>Pityrosporum species</i>	20
<i>Streptomyces species</i>	40
<i>Torulopsis species</i>	10
<i>Trichophyton species</i>	20
<i>Trichosporon species</i>	20 – 40

Both APLICARE 2% and 4% CHG formulations are effective against Methicillin Resistant Staph aureus (MSRA).

#### CLINICAL STUDIES

Because of the limited value of *in vitro* studies in assessing the efficacy of antimicrobial products in a health care setting, the following FDA recommended *in vivo* studies, intended to simulate actual use conditions, were conducted:

##### GLOVE JUICE STUDY

The FDA recommended Glove Juice Study measures the immediate, persistent, and residual effects of the product tested. Spanning a five-day period of repeated usage to assess the residual capabilities of the product, bacterial counts are measured immediately, 3 hours, and 6 hours after scrubbing. Both APLICARE 2% and 4% CHG scrub formulations consistently pass this demanding test.

APLICARE 2% and 4% CHG scrub formulations were tested against Hibiclens® 4% CHG at an independent laboratory using the FDA recommended glove juice protocol.

##### GLOVE JUICE TEST COMPARISON OF APLICARE 2% AND 4% CHG vs. HIBICLENS

###### Log<sub>10</sub> Reduction Data

Product	Day 1			Day 2			Day 5		
	0 hr	3 hr	6 hr	0 hr	3 hr	6 hr	0 hr	3 hr	6 hr
APLICARE 2%	1.10	1.52	1.47	1.98	1.73	2.84	3.57	2.84	4.89
APLICARE 4%	2.80	1.94	2.59	3.17	2.25	3.51	4.18	4.46	4.79
Hibiclens 4%	0.00	0.57	0.08	0.88	1.46	1.15	1.33	3.01	2.23

###### Comparable Percent Reduction Data

Product	Day 1			Day 2			Day 5		
	0 hr	3 hr	6 hr	0 hr	3 hr	6 hr	0 hr	3 hr	6 hr
APLICARE 2%	96.56	97.53	98.26	99.21	98.27	99.83	99.73	99.68	99.98
APLICARE 4%	99.66	99.24	99.76	99.85	99.70	99.98	99.92	99.85	99.99
Hibiclens 4%	45.64	80.29	72.55	78.49	87.19	96.83	87.25	99.91	99.55

##### Conclusion:

APLICARE 4% CHG performed significantly better than Hibiclens 4% CHG. The performance of APLICARE 2% CHG was statistically equivalent to Hibiclens 4% CHG.

### TECHNICAL DATA

#### HEALTHCARE PERSONNEL HANDWASH STUDY

In the FDA recommended protocol to assess efficacy of a healthcare personnel handwash, subjects' hands are contaminated with *Serratia marcescens* or *Bacillus subtilis* var. *niger* (globigii) and a baseline count is taken. This contamination followed by a handwash is carried out 25 consecutive times. Log<sub>10</sub> and percent microbial reduction is measured after the 1<sup>st</sup>, 4<sup>th</sup>, 7<sup>th</sup>, and 10<sup>th</sup> washes and compared to the baseline count. The 11<sup>th</sup> and 25<sup>th</sup> washes are carried out to assess irritancy potential.

Performance of APLICARE 2% and 4% CHG products vs. Hibiclens, as a 15 second wash is summarized below.

#### 15 SECOND HANDWASH STUDY

Product	1 <sup>st</sup> Wash		4 <sup>th</sup> Wash		7 <sup>th</sup> Wash		10 <sup>th</sup> Wash	
	Log <sub>10</sub>	Percent	Log <sub>10</sub>	Percent	Log <sub>10</sub>	Percent	Log <sub>10</sub>	Percent
APLICARE 2%	1.882	98.69	2.389	99.59	2.770	99.83	3.307	99.95
APLICARE 4%	2.050	99.11	2.563	99.73	2.696	99.80	3.289	99.95
Hibiclens 4%	1.629	97.65	2.097	99.20	2.501	99.68	3.115	99.92

#### PATIENT PREOPERATIVE PREP STUDY

The preoperative patient prep study measures the immediate and persistent effect of the product at two (2) different anatomical sites (abdomen and inner thigh). Baseline counts are taken. Both sites are prepped according to label directions and microbial counts measured at 10 minutes, 30 minutes, and four (4) hours.

APLICARE 2% and 4% CHG formulations were directly tested against Hibiclens 4% CHG. Both APLICARE formulations achieved reductions equivalent to Hibiclens 4% CHG, both immediately and over the four (4) hour time period.

#### COMPARISON OF APLICARE 2% CHG AND HIBICLENS IRRITATION POTENTIAL

The irritation potential of APLICARE 2% and Hibiclens was compared under use conditions. At least 12 subjects were randomly assigned to each product. There were a total of 10 washes per day with one to two hour intervals between washes. The onset of irritation and the cumulative irritation scoring, after equal numbers of washes, are presented in the table below.

Product	Onset of Irritation at Wash	Cumulative Irritation Score
APLICARE 2%	19	33
Hibiclens	14	45

The study indicates the relative irritation potential of APLICARE 2% CHG to be lower than Hibiclens.

The advent of APLICARE 2% and 4% CHG scrub formulations sets new standards for skin disinfection products.

The choice of APLICARE 2% CHG now enables the Health Care market to realize significant cost savings and lower irritation potential without sacrificing clinical efficacy.

### TECHNICAL DATA

<b>Drug Facts</b>	
<b>Active ingredient</b> chlorhexidine gluconate 4% solution	<b>Purposes</b> surgical hand scrub healthcare personnel handwash patient preoperative skin preparation skin wound and general skin cleansing
<b>Uses</b>	
<ul style="list-style-type: none"> <li>■ <b>surgical hand scrub:</b> significantly reduces the number of microorganisms on the hands and forearms prior to surgery or patient care</li> <li>■ <b>healthcare personnel handwash:</b> handwash to help reduce bacteria that potentially can cause disease</li> <li>■ <b>patient preoperative skin preparation:</b> for the preparation of the patient's skin prior to surgery</li> <li>■ <b>skin wound and general skin cleansing</b></li> </ul>	
<b>Warnings</b>	
<b>For external use only</b>	
<b>Do not use</b>	
<ul style="list-style-type: none"> <li>■ if you are allergic to chlorhexidine gluconate or any other ingredients</li> <li>■ in contact with meninges</li> <li>■ in the genital area</li> <li>■ as a preoperative skin preparation of the head of face</li> </ul>	
<b>When using this product</b>	
<ul style="list-style-type: none"> <li>■ keep out of eyes, ears, and mouth. May cause serious and permanent eye injury if placed or kept in the eye during surgical procedures or may cause deafness when instilled in the middle ear through perforated eardrums</li> <li>■ if solution should contact these areas, rinse out promptly and thoroughly with water</li> <li>■ wounds which involve more than the superficial layers of the skin should be routinely treated</li> <li>■ repeated general skin cleansing of large body areas should not be done except when the underlying condition makes it necessary to reduce the bacterial population of the skin</li> </ul>	
<b>Stop use and ask a doctor if</b> irritation, sensitization or allergic reaction occurs. These may be signs of a serious condition.	
<b>Keep out of reach of children.</b> If swallowed, get medical help or contact a Poison Control Center right away.	
<b>Directions</b>	
<b>Surgical hand scrub</b>	
<ul style="list-style-type: none"> <li>■ wet hands and forearms under running water for 30 seconds</li> <li>■ scrub for 3 minutes with about 5 ml of product with or without a wet brush, paying close attention to the nails, cuticles, and interdigital spaces</li> <li>■ rinse thoroughly under running water for 30 seconds</li> <li>■ dry thoroughly</li> </ul>	
<b>Healthcare personnel handwash</b>	
<ul style="list-style-type: none"> <li>■ wet hands with water</li> <li>■ dispense about 5 ml of product into cupped hands and wash in a vigorous manner for 15 seconds</li> <li>■ rinse and dry thoroughly</li> </ul>	
<b>Patient preoperative skin preparation</b>	
<ul style="list-style-type: none"> <li>■ apply product liberally to surgical site and swab for at least 2 minutes</li> <li>■ dry with a sterile towel</li> <li>■ repeat procedure for an additional 2 minutes and dry with a sterile towel</li> </ul>	
<b>Skin wound and general skin cleansing</b>	
<ul style="list-style-type: none"> <li>■ thoroughly rinse the area to be cleaned with water</li> <li>■ apply the minimum amount of product necessary to cover the skin or wound area and wash gently</li> <li>■ rinse again thoroughly</li> </ul>	
<b>Other information</b>	
<ul style="list-style-type: none"> <li>■ store at 20-25 °C (68-77 °F)</li> <li>■ avoid excessive heat above 40 °C (104 °F)</li> </ul>	
<b>Inactive ingredients</b> cocamide DEA, fragrance POFL 147, glucono-delta-lactone, hydroxyethylcellulose, isopropyl alcohol, lauramine oxide, PEG-75 lanolin, purified water, tridecyl alcohol	
<b>Questions or comments?</b>	
☎ 1-800-760-3236 (Monday - Friday 8:30 AM - 5:00 PM EST)	

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