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## Background

- Community-associated methicillin resistant *S. aureus* (CA-MRSA) is an increasingly important pathogen in skin and soft tissue infections. Strains characterized as USA 300 and USA 400 are the primary community pathogens:
  - Risk factors for CA-MRSA infection include younger age, and a lower number of comorbidities.
  - At a single center, 63% of all *S. aureus* emergency department skin infections were USA 300/400 clones.
  - 97% of all purulent MRSA skin infections were USA 300.
  - Nationwide CA-MRSA exhibits different resistance patterns than healthcare-associated MRSA.
- Topical wound care products are designed to reduce bacterial populations and help prevent infection.
- No data are available on the *in vitro* activity of commonly used over-the-counter wound care products against CA-MRSA.

- Clin Infect Dis 2007;44:471-82.
- Ann Intern Med 2006;144:309-17
- N Engl J Med 2006;355:666-74.

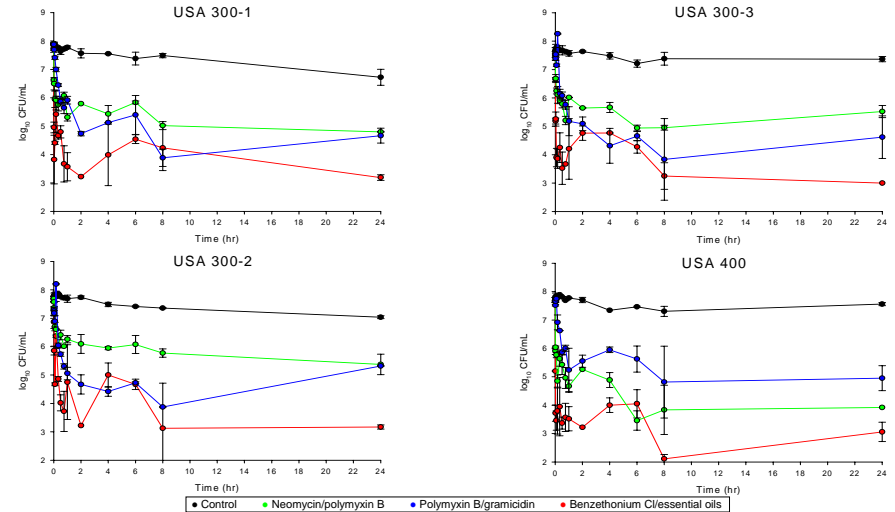
## Objectives

- To determine the differential *in vitro* activity of three topical wound care products against four strains of CA-MRSA using a modified Food and Drug Administration (FDA) established time-kill technique.

## Methods

- Organisms: Three unique USA 300 strains (300-1, 300-2, 300-3), one USA 400 strain.
- Topical wound care products containing:
  - neomycin 3.5mg/g, polymyxin B sulfate 10,000U/g (Maximum Strength Antibiotic Cream, Rite Aid Corporation, Harrisburg, PA)
  - polymyxin B sulfate 10,000U/g, gramicidin 0.25mg/g (Polysporin cream, Pfizer, Markham, ON)
  - benzethonium chloride 0.2% with tea tree and white thyme oil (Staphaseptic, Tec Laboratories, Albany, OR)
- Time-kill studies were performed at 14 time points over 24 hours with a modified FDA Bactericidal Assay procedure (Federal Register Vol. 56, No. 140, July 22, 1991)
- Briefly, 0.5mL bacterial suspension (final tested concentration  $\sim 10^8$  CFU/mL) and 0.5mL 10% fetal bovine serum were added to 4mL of each topical agent in 50mL screw top tubes, manually mixed, vortexed, and incubated at 35°C. Normal saline was used as a control.
- At each time point, the samples were inactivated with a 1:10 addition of Dey/Engley (D/E) broth to quench further antibacterial activity.
- Samples were further diluted in D/E broth, plated on D/E agar plates, and incubated at 35°C. Colonies were enumerated. Samples were tested in duplicate.
- Bactericidal activity was defined as a sustained 3- $\log_{10}$  reduction in colony forming units (CFU)/mL.

## Results



## Conclusions

- All three topical agents demonstrated antibacterial activity against the strains of CA-MRSA.
- Within the first 10 minutes, the reduction (mean  $\pm$  standard deviation) in  $\log_{10}$  CFU/mL for all strains was  $2.87 \pm 1.22$ ,  $1.86 \pm 0.76$ , and  $0.143 \pm 0.82$  for benzethonium Cl/essential oils, neomycin/polymyxin B, and polymyxin B/gramicidin, respectively.
- Only benzethonium Cl/essential oils was bactericidal against all CA-MRSA. Benzethonium Cl/essential oils was more rapidly bactericidal than neomycin/polymyxin B and polymyxin B/gramicidin against 4 of 4 CA-MRSA strains and 3 of 4 CA-MRSA strains, respectively.
- The benzethonium Cl/essential oil formulation may be a preferable agent for wound care as CA-MRSA continues to increase in frequency. Clinical testing of topical wound care products is warranted.