Name(s)

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Project Number

S1509

Project Title

A Preliminary Assessment of Surgical Site Infection Prophylaxis with Topical Micronutrients

Abstract

Objectives

Surgical site infection (SSI) is the most common and costly healthcare-associated infection. Strategies to reduce SSI have been focused on antibiotics and intraoperative changes. Topical prophylactic measures have not been extensively studied. Currently, topical antimicrobials are applied to surgical sites as a standard of care. Anecdotal evidence suggests antimicrobial properties of micronutrients such as vitamin A, vitamin D, zinc oxide, and silver. This study examined antimicrobial properties of micronutrients using commercially available topical products on colonized simulated surgical incisions.

Methods

Agar well diffusion assays and surface assays were used. Bacitracin was used as the control as the current standard of care. Calcipotriene, Desitin, Acticoat, silver sulfadiazine (SSD), Tretinoin were used as proxies for vitamin D, zinc oxide, silver, and vitamin A. In the well diffusion trial, each product was dispensed into a 6mm well created on an agar plate inoculated with Staphylococcus epidermidis (S epi) For the surface assay, a one-inch slit was made in the agar inoculated with S epi in order to simulate a surgical incision site. Topical product was applied over the slit. The plates were stored at 37?C and the bacteria were measured at 24h and 72h.

Results

Well diffusion trial results showed that SSD had the largest zone of inhibition and zone of suppression. T-test data between experimental groups indicated that SSD had a significantly larger zone of inhibition than Desitin on day 1 and day 3. SSD also showed a significantly larger zone of suppression than calcipotriene in day 3. Surface trial results indicated that silver containing agents, Acticoat and SSD, showed significantly larger zones of inhibition than those of Bacitracin, Calcipotriene, Desitin, and Tretinoin on day 1 and day 3.

Conclusions

Antimicrobial properties of topical products with micronutrients appear to be equal to that of the standard of care in the well trial. Acticoat and SSD, silver containing products, showed promising results when applied on the surface as superior to the standard of care. Further testing with larger sample sizes needs to be done along with assessing the duration of effect of each agent before consideration of clinical use.

Summary Statement

This study examined antimicrobial properties of micronutrients using commercially available topical products on colonized simulated surgical incisions.

Help Received

I used lab equipment at Loma Linda University under the supervision of Dr Y Cho. Statistical analysis was done with my mathematics teacher.