Rate of bacterial recolonization of the skin after preparation: four methods compared


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Previous studies have shown that recolonization of the skin surface occurs after disinfection but there has been little investigation of this phenomenon. We have studied the rate of recolonization of the skin surface after preparation by the methods in most frequent use and under plastic adhesive drapes with and without slow-release iodophor.

Methods

Fifteen volunteers lay supine for 3 hours in an empty operating theatre. Five rectangular areas were marked on the abdomen of each volunteer and a different antiseptic preparation was applied to four of the five areas. These were: 3 min painting with chlorhexidine in 70 per cent alcohol; 3 min painting with povidone-iodine in 70 percent alcohol; 1 min painting with 70 percent isopropyl alcohol and application of a plastic adhesive drape (‘Opsite’, Smith and Nephew Ltd); and 1 min painting with 70 percent isopropyl alcohol and application of a plastic adhesive drape containing slow-release iodophor (‘Ioban drape’ 3M Health Care). The fifth area was used as a control.

Samples were taken from a different part of each area after 5, 30, 60 and 180 min, using Rodac contact sampling plates containing oxoid columbia agar with 10 per cent horse blood, 1 per cent Tween 80, 0.3 per cent azolectin and 0.3 per cent sodium thiosulphate. After aerobic incubation the bacterial count on each plate was recorded.

Results

The control values showed a truncated log normal distribution. Initially the methods were equally effective in removing bacteria, each showing a median bacterial reduction of 100 percent. Recolonization of the skin surface occurred progressively. The distributions of successive samples from prepared areas showed a progressive increase toward the distribution of control values. The rate of recolonization depended upon the preparation used. Differences were apparent at 30 and 60 min and increased at 180 min (Figure 1). Recolonization was less after preparation with the slow-release iodophor drape then with the other methods. This difference was significant at 60 min (P=0.05, Friedman test) and highly significant (P=0.01, Friedman test) at 180 min.
Discussion

It has been shown that seeded organisms are removed by antiseptics and do not re-establish themselves\textsuperscript{2}. The behaviour of normal flora may be more relevant to the maintenance of asepsis. Normal skin bacteria can only be reduced to a certain level after which re-emergence from deeper layers, and recolonization of the surface occurs.

The contact-culture method employed\textsuperscript{3} samples organisms on the skin surface which could be mechanically transmitted into a wound. This sampling method is simple and provides a basis for comparing forms of disinfection.

All four methods of skin preparation were effective in removing bacteria from the skin surface. Thereafter recolonization proceeded at different rates. Within the duration of the study the slow-release iodophor drape was more effective than the other regimens in delaying bacterial recolonization. Further studies are indicated to determine whether any clinical benefit arises from the apparent superiority of this method of pre-operative skin preparation.

References


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