In-vitro Evaluation of Moisture Vapor Transmission Rate of Cyanoacrylate Skin Protectant

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INTRODUCTION

The epidermis needs to maintain an adequate hydration so as not to dry, crack, and become ineffective, even beneath a barrier. Resulting skin breakdown from improper hydration can cause significant pain, suffering, and a subsequently increase in morbidity.°

Skin breakdown in healthcare settings is common and constitutes a massive financial burden on patients and medical institutions alike. Overly moist skin, often associated with caustic fluids from wound dressings, is indicative of high breathability of a film. MVTR (Moisture Vapor Transmission Rate) was calculated from the water volume losses. A high value in the breathability of the novel cyanoacrylate liquid skin protectant, assessed through Moisture Vapor Transmission Rate (MVTR).

METHODS

A gelatin solution was created using a warmed phosphate buffer; gelatin powder was then added and the solution was stirred vigorously until homogenized. The solution was allowed to set evenly in multiple weigh boats for one hour until solid. A single layer of the cyanoacrylate liquid skin protectant was tested on the gelatin surfaces using the provided ampule in accordance with manufacturer instructions and allowed to dry for one hour. The coated gelatin was then removed from the weigh boats and placed in heated distilled water, leaving the cyanoacrylate films intact as the gelatin dissolved into solution. The films were allowed to dry at room temperature for 24 hours.

Cylinders were filled with a solution of deionized water and calcium chloride, in order to maintain humidity (below 20%RH) in a heated environment. The dried protectant films were cut into disks to cover the cross section of the cylinders and secured to the cylinders to prevent leakage. The initial weight of the cylindrical systems was taken to establish a baseline, and the systems were inverted so the solution was in contact with the film. Cylinders were heated at 37°C for 4 hours and then reweighed to determine water volume loss. The average Moisture Vapor Transmission Rate (MVTR) was calculated from the water volume losses. A high value is indicative of high breathability of a film.

DISCUSSION

An MVTR of 2000–2500 g/m²/day has been suggested to provide adequate moisture levels beneath a dressing without risk of wound dehydration to promote a moist wound healing environment.° The significantly greater breathability of the cyanoacrylate barrier film, 4351.80 + 948.77 g/m²/day, compared to the barrier disruption with repeated tape stripping: an emerging pathophysiological paradigm in aortic aneurysm. Circulation, 1997;96(1):211-7.

REFERENCES