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DEVELOPMENT OF PRESSURE-DISPERSING CUSHIONS FOR PREVENTING PRESSURE ULCER

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Abstract

Preventing pressure ulcers is an urgent issue in an aging society. Currently, repositioning patients every few hours is the basic approach. However, to reduce the burden on caregivers, the development of pressure-dispersing cushions is desired. Air cells are a promising candidate for such cushions, due to their high dispersion and variability of body pressure. However, an

optimal design that takes into account the user's body physique has not yet been established. Therefore, we have conducted experiments and numerical simulations to clarify the effects of cushion and body specifications on pressure distribution, with the aim of developing a cushion that achieves high pressure dispersion tailored to the user's physique. In experiments, we measure pressure distribution using a pressure sensor sheet sandwiched between the body and the cushion. In numerical simulations, we calculate the cushion shape and pressure distribution based on some equations, including the force balance equation at each point on the air-cell surface.

The experiments so far have shown that the body pressure increases with the mass and the surface curvature of the body, that air cells with appropriately adjusted internal air pressure exhibit superior pressure dispersion compared to conventional cushioning materials such as urethane foam, and that bottoming out, which occurs when the internal air pressure is low, can be prevented by using air cells in combination with urethane foam. Numerical simulations have also produced results that qualitatively agree with these experimental results.

These results demonstrate the promise of air cells as a pressure-dispersing cushion and suggest that using them in combination with urethane foam may provide even greater functionality. In the future, we will conduct more detailed experiments and numerical simulations, aiming to establish a method for quickly and inexpensively designing cushions that are optimal for each individual user's physique.

Keywords:

Air-Cell Cushion, Bedsore Prevention, Body-Pressure Distribution, Personalized Design