Uncertainty Modeling and Simulation Highlighting on Tail Probability in Biomechanics

Study on Pressure Ulcer

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This paper aims at building up a computational procedure to study the bio-mechanism of pressure ulcer using the finite element method. Pressure ulcer is a disease that occurs in the human body after 2 hours of continuous external force. This study assumes that tension and/or shear strain will cause damage to loose fibril tissue between the bone and muscle and that propagation of damaged area will lead to fatal stage. Analysis was performed using the finite element method by modeling the damaged fibril tissue as a cutout. Various uncertainties such as the material properties, loading condition, location of cutout, the length of cutout and configuration of the human buttock were considered in this analysis. By watching both tensile and shear strains, the risk of fibril tissue damage and propagation of the damaged area is discussed and the results may give new insights for careful nursing of patients.

Keywords: FEM, Pressure ulcer, Interface strain, Tail probability, Monte Carlo simulation