Proceedings of the 2nd Annual World Conference
of the Society for Industrial And Systems Engineering
Las Vegas, NV, USA
November 5-7, 2013

A Digital Human Modeling of the Australian Lifting Technique for Obese Patients

D DeGennaro, Y Han, MT Khasawneh, and K Srihari

Department of Systems Science and Industrial Engineering
State University of New York at Binghamton
Binghamton, NY 13902, USA

Corresponding author's Email: mkhasawn@binghamton.edu

Abstract: Obesity is a growing problem in the American lifestyle. According to some research, nurses perform daily patient lifts and transfers that are very stressful on their bodies, especially when the patient is obese. In this study, the effectiveness of the Australian lifting technique for lifting obese patients was evaluated using a digital human modeling software, Jack 7.0. Experiments were conducted to analyze the effects of the nurse gender and percentile, as well as the patient's body mass index (BMI), on the nurse's lower back compression force. The study considered five different patients with BMIs between 30.0 and 50, which is the normal range of BMIs for obese people. In each environment, two nurses organized by gender and percentile (5th, 50th, 95th) were evaluated performing the Australian lifting technique on the patient. The Analysis of Variance (ANOVA) showed that all variables were significant at the 5% significance level, including the nurse percentile and gender interaction. The results of this study revealed that a male nurse of 95th percentile had a maximum compression force of 14,134 N on his lower back when lifting a patient of a BMI of 50. A 5th percentile female nurse had a minimum compression force of 771 N on her lower back occur when lifting the patient with the BMI of 30. Also, the compression force over time was observed. The results of this showed that the maximum compression force for different groupings of patient BMI and nurse percentile, occurred after 13 seconds from the start of the Australian lift. This study reveals that manual lifting tasks of obese patients are dangerous to nursing staff. Future studies should be conducted to assess other manual lifting techniques. Assessments on how helpful and effective lifting machines can be to nurses and other healthcare workers when lifting obese patients in the hospital can be conducted as well.

Keywords: Australian Lifting, Obese Patient Lifting, Digital Human Modeling, Lower Back Compression Force