

COMPARISON OF MUSCULOSKELETAL STRESS ON LUMBAR, SHOULDER, AND WRIST JOINTS WHILE MAKING A BED USING INSTANT TUCK (R) PAD VERSUS OTHER BED-MAKING TOOLS

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ABSTRACT

Objective: Currently, there are multiple bed-making tools utilized by consumers and businesses with the intention of increasing safety and reducing time to make a bed. In this study, we will compare musculoskeletal stress, time, and preference of making a bed using the INSTANT TUCK (R) pad versus three other bed-making tools and making a bed without any bed-making tool.

Methods: A sample of ten subjects performed the task of making a queen size mattress bed with one bottom fitted sheet and one top flat sheet, using the INSTANT TUCK (R) pad versus three other bed-making tools, and making a bed without any bed-making tool, in a random order. Time to make the bed, forces on the low back, shoulders and wrist, and the number of times each individual bent forward were measured during each trial. In addition, subjective preferences were measured using a simple questionnaire.

Results: Repeated measures analysis of variance was used to analyze the differences between the five different procedures. There were significant differences for all the measured variables. Regarding the time needed to make one bed, the INSTANT TUCK (R) pad had the least time range (80.6 s±4.3), which was approximately 40 s less than making the bed with no tool (p<0.001). Furthermore, for the overall lumbar spine impulse force, the INSTANT TUCK (R) pad had the largest overall reduction in this category (90.6%). Regarding the subjective data, the INSTANT TUCK (R) pad had an overall rating of 9.4 out of 10, compared to the other tools with ratings of 5.9, 5.1, and 3.4 out of 10, which was a statistically significant difference (p<0.001).

Conclusion: Making beds on a regular basis poses risk of injury, especially for those who are required to perform this for their occupation. However, using assistive tools for bed-making, could minimize, and prevent injuries and overload to the lower back, and other parts of the body, making the bed-making task safer. Based on our findings, the INSTANT TUCK (R) pad was by far the most efficient and safest tool to assist in making beds, with the lowest possible risk of injury when compared to all the other tools tested.

Keywords: Core muscles, Low back, Low back injury, Low back pain, Shoulder, Shoulder injury, Shoulder pain, Wrist, Wrist injury, Wrist pain, Muscle force, Force gauge, Stress, Threshold, INSTANT TUCK (R) Mat, BedMadeEZ, Bed tucker, ErgoTuck.

INTRODUCTION

Safety when making a bed is a major concern as there is currently no safe way to make a bed, which poses a significant risk of injury and can create lifelong disabilities for certain professions such as hotel housekeepers, hospital staff, nursing home and in-home caregivers, and even for individual consumers.

“Seminal studies demonstrate that work-related bodily pain and injuries are significant problems. Very high proportions (77–91%) of housekeeper’s self-report pain primarily in their lower backs” [1]. “In 2010, housekeepers had the highest rates of workers for overall injuries (7.9/100) and musculoskeletal disorders (3.2/100)” [2,3]. “Analyses of Workers Compensation data from a subset of unionized hotels revealed housekeepers’ annual claims cost upward of \$4.7 million” [4,5].

Currently, there are multiple bed-making tools utilized by consumers, and businesses with the intention of increasing safety, and reducing time to make a bed. In this study, we compared musculoskeletal stress on the low back, shoulders, and wrists while using four different bed-making tools as well as making a bed without an assistive bed-making tool. We also compared the time, and steps needed to accomplish the bed-making task using each method. Subjects then filled out a questionnaire on their preference of methods.

METHODOLOGY

Design

Quantitative study

Participants

The study consisted of ten subjects.

Inclusion criteria

Healthy individuals between the ages of 20 and 60 years old were randomly recruited into this study. Demographics of the participants is shown in Table 1.

Exclusion criteria

Participants who had current symptoms in their upper extremities, and lower backs or had experienced back pain during the previous 3 months or had a history of the upper extremity or spinal surgery were excluded from the study. Furthermore, any subject on pain killers, or who were currently using any type of NSAID’s was excluded from the study.

Outcome measures

The measurements of interest related to this study were: Low back, shoulder, and wrist extensors impulse forces to lift a queen size mattress to tuck in a fitted bed sheet and a flatbed sheet. The number of times needed to bend the low back, shoulders, and wrists to make the bed. The number of lifts needed to make the bed and the length of time for each lift. The steps needed to utilize each tool, the time to make a bed with each tool, and the subjective preference of the tools were also measured. These outcomes were collected while making a queen size bed with four bed-making tools as well as without any bed-making tool.

Impulse force

A force gauge was used to determine the pressure needed to lift the mattress, to tuck in the sheets while making the bed. Each participant’s height (in cm’s) and weight (in lbs) were collected. This data were used to determine the impulse forces with each lift using formula’s A, B, and C, as listed in Fig. 1. [6] This formula is used for

4. Utterback DF, Schnorr TM. Use of Workers' Compensation Data for Occupational Safety and Health. United States: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health; 2013.
5. Meyers A, Wurzelbacher S, Bertke S, Lampl M, Robins D, Bell J. Using Workers Compensation Data for Surveillance of Occupational Injuries and Illnesses, Ohio, 2005-2009. Atlanta, Georgia: Centers for Disease Control and Prevention, NIOSH; 2009.
6. Cornell University Ergonomics; 2019. Available from: <http://www.ergo.human.cornell.edu/dea3250flipbook/dea3250notes/lifting.html>.