

## **Effects of Valsalva Maneuver on Myoelectrical Activities of Trunk Muscles during the Transferring of Patients between Hospital Bed and Wheelchair**

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### **ABSTRACT**

Nurses are reported to have an increased risk of lower back pain and injury associated with the various patient handling tasks, especially patient transfers. In this study, Valsalva maneuver, the action of attempting to exhale with the nostrils and mouth closed, is hypothesized to contribute to prevention and rehabilitation of low back injury by promoting spinal stability. **PURPOSE:** To identify the effects of Valsalva maneuver on the recruitment of core trunk muscle groups in lifting patients and on low-back disorders among nursing personnel. **METHODS:** A total of 7 college students with no previous history of low back disorder (20-25 years old; 4 females and 3 males) volunteered to perform the patient transferring tasks. After being instructed on lifting technique and Valsalva maneuver, all subjects were asked to transfer the same "patient" from a hospital bed to a wheelchair using proper lifting technique with and without Valsalva maneuver, 3 trials respectively. During the course of lifting, surface electromyography (EMG) data were utilized to measure the activity of the left and right rectus abdominis and erector spinae muscles, and videos were taken to gather visual data on subject performance for a synchronized analysis. EMG data were filtered in order to eliminate the ECG contamination on the left and right rectus abdominis and were processed with the Root Mean Square method with a window of 100ms to calculate the mean voltage output of the highest visual spike on the graphical representation of muscle recruitment. Finally, EMG data were normalized to the EMG activity recorded during the maximum voluntary contractions (MVC) and paired t-tests were performed between with- and without- Valsalva maneuver trials. **RESULTS:** The RMS of right rectus abdominis in trials with Valsalva maneuver was significantly greater than that without Valsalva maneuver ( $61.9 \pm 136.3\%$  vs.  $29.1 \pm 39.2\%$ ,  $p < 0.001$ ), whereas no significant differences were observed for left rectus abdominis between with- and without- Valsalva maneuver trials ( $7.1 \pm 4.1\%$  vs.  $12.7 \pm 12.7\%$ ,  $p = 0.439$ ). In addition, in trials with Valsalva maneuver, the RMS of left and right erector spinae was significantly less than without Valsalva maneuver ( $82.0 \pm 68.1\%$  vs.  $116.1 \pm 150.8\%$ ,  $p = 0.038$ ;  $81.6 \pm 39.5\%$  vs.  $113.0 \pm 66.9\%$ ,  $p = 0.010$ ). **CONCLUSION:** Valsalva maneuver during the patient transferring can redistribute the spinal load by decreasing the recruitment of erector spinae and increasing the recruitment of other muscles, such as rectus abdominis, suggesting that the Valsalva maneuver can promote spine stability and may contribute to the reduction of chronic low back pain in nursing profession.