

## **Effects of the Valsalva Maneuver on the Core Muscle Groups and Injury Reduction: EMS Lifting Simulations**

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About 60% of EMS personnel have claimed a Work-Related Musculoskeletal Disorder caused by scenarios in which a patient or heavy equipment needed to be lifted from the ground, off of a bed, and from a vehicle. Therefore, the purpose of this study was to explore the potential of a breathing pattern called the Valsalva maneuver in improving abdominopelvic stability when lifting from two different positions. We hypothesized that the Valsalva maneuver, if performed correctly, would increase the recruitment of specific core muscle groups, thus, providing a more stable abdominopelvic environment for the purposes of lifting. In this preliminary study, two subjects were selected by the criteria of being inexperienced with the Valsalva maneuver and an additional subject was used as a makeshift control unit due to prior knowledge on the breathing pattern and its function. Muscle activation of abdominis rectus and erector spinae of all three subjects was measured using surface electromyography (EMG) while performing an EMS (emergency medical services) simulation exercise resembling the action of lifting a patient from the floor and an equipment bag from a waist height surface. The root-mean-square EMG values of muscle activation was normalized as a percentage of the Maximum Voluntary Contraction (MVC). Normalized EMG values indicated an increase in core muscle recruitment with the employment of the Valsalva maneuver. Moving forward, qualitatively, each subject experienced "core tightness" upon execution of the Valsalva maneuver with a decreased Rate of Perceived Exertion specific to lifting the designated loads. However, findings also indicated that the learning effect might contribute to a further increased EMG values of measured muscle groups after consecutive trials are performed.