

Ergonomic Benefits of Clorox® Total 360® and Clorox® TurboPro™ Electrostatic Sprayers

CLOROXPRO



Objective

To compare ergonomic risk factors between using a manual trigger spray and two Clorox electrostatic sprayers ([Clorox® Total 360®](#) and [Clorox® TurboPro™](#)) and to test the hypothesis that electrostatic sprayers pose less ergonomic risks for routine disinfecting.

Background and Scope

Musculoskeletal injuries are one of the top three injuries affecting custodial workers. Of these, back and shoulder injuries are the most common, and are often related to the ergonomic risks of the job such as repeated bending and twisting at the waist, and repetitive motions from the shoulders and wrists. In one study of school workers, custodians were injured at a rate 4 times higher than across all the other occupations. (Village 2009)¹

Electrostatic sprayers are a relatively new technology in the cleaning industry but have become more widely used in the past two years. Some benefits of electrostatic technology are clear: by applying a charge through disinfectant droplets, electrostatics achieve greater surface coverage and can be applied quickly, providing enhanced disinfection at a faster rate. In addition, electrostatic devices may also present ergonomic benefits by reducing repetitive motions needed to spray surfaces.

Eight custodians at Mt. San Antonio College volunteered to participate in a research study using the Clorox® Total 360® System, Clorox® TurboPro™ Electrostatic Sprayer, and a manual trigger spray to disinfect high-touch surfaces.

Before beginning the testing, we provided [hands on training](#) on how to best use the devices to ensure proper and efficient use. The protocol consisted of each participant applying the disinfectant to high-touch surfaces using both devices and a manual trigger spray in a classroom. We captured the tests on video and hired an ergonomist to review the videos and provide a score on the Rapid Entire Body Assessment (REBA) scale for each participant while they used the devices and trigger spray. REBA is a test method designed to rapidly assess ergonomic risks for workers and is used to identify and fix issues that may lead to musculoskeletal injuries.

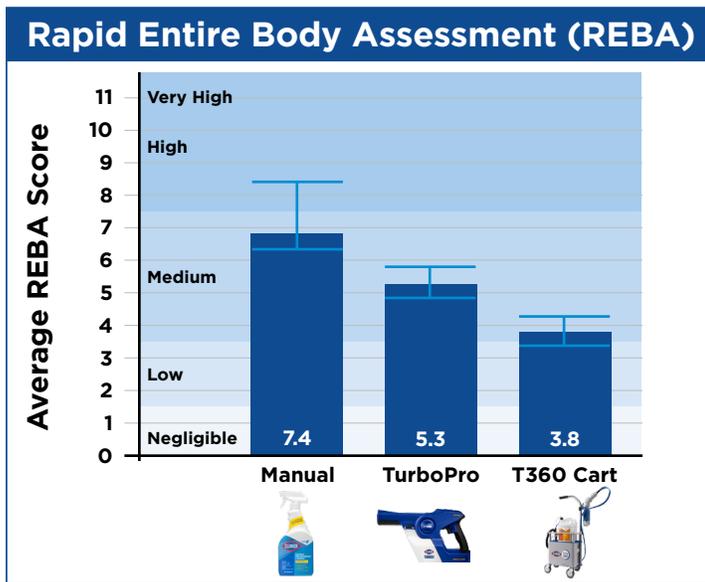
1. Village, J., Koehoorn, M., Hossain, S., & Ostry, A. (2009). Quantifying tasks, ergonomic exposures and injury rates among school custodial workers. *Ergonomics*, 52(6), 723-734.

Results

There was significantly lower ergonomics risk when using Clorox Total 360 and Clorox TurboPro over manual trigger spray.

On the REBA scale, using a manual trigger spray scored an average 7.4 points, placing it in a medium-high risk category for injury. On average, using the Clorox® Total 360® cart reduced REBA scores by 3.6 points ($p = 2.7 \times 10^{-5}$) and 2 points for Clorox® TurboPro™ ($p = 0.001$). These scores correspond to lower risk levels.

Reduction in Ergonomic Risk Level with Clorox® Total 360® and Clorox TurboPro



Ergonomics risk was reduced using devices for all custodians, including those who had never used electrostatic devices before.

Using electrostatic devices to disinfect high-touch surfaces reduced ergonomic risk factors for all study participants, even for first-time users. The reasons for this are due to the way devices are used compared to trigger sprays. With a trigger spray, the user must be closer to the surface to spray, use repetitive motions to squeeze the trigger, and move their wrists and arms away from their bodies more in order to cover the whole surface. This results in custodians bending at the waist more to lean over surfaces, using primarily

their dominant hand to do the repetitive trigger squeezing, and creating unnecessary movements in their arms and wrists, all of which can lead to musculoskeletal injuries.

With devices however, bending at the waist is less necessary, because the user can spray the surface from 2-4 feet away. The repetitive motion of squeezing a trigger is eliminated, because the device remains on with a single push. This also makes it easier for the user to alternate which hand they use, and the sweeping motion that is recommended to spray surfaces eliminates unnecessary movement at the wrists and shoulders. The key difference between the devices, which explains the difference in scores, is weight. The Clorox® TurboPro™ handheld is heavier in hand than the nozzle for the Clorox® Total 360®, making the Clorox® Total 360® overall the most ergonomic choice, especially for large areas or multiple rooms.



Discussion

This is the first study to assess ergonomics of electrostatic devices for disinfecting. Cleaning work is essential in every industry, and these workers are more likely than the average occupation to experience an injury that requires them to miss work.

Conclusion

The results of this real-world study showed that electrostatic devices may be used to reduce ergonomic risk factors for custodians, and additional training on ergonomics with devices may reduce these risk factors even further.



For more information, contact your Clorox sales representative.
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