Effects of Glovebox Gloves on Grip and Key Pinch Strength and Contact Forces for Simulated Manual Operations with Three Commonly Used Hand Tools

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Running head: Glovebox gloves effects (maximum 30 characters)
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This study examined the effects of glovebox gloves for eleven females on maximum grip and key pinch strength and on contact forces generated from simulated tasks of a roller, a pair of tweezers, and a crescent wrench. The independent variables were gloves fabricated of butyl, CSM/hypalon, and neoprene materials, two glove thicknesses, and layers of gloves worn including single, double, and triple gloving. CSM/Hypalon and butyl gloves produced greater grip strength than the neoprene gloves. CSM/Hypalon gloves also lowered contact forces for roller and wrench tasks. Single gloving and thin gloves better hand strength performances, however, triple layers lowered contact forces for all tasks. Based on the evaluating results, selection and design recommendations of gloves for three hand tools were provided to minimize the effects on hand strength and optimize protection of the palmar hand in glovebox environments.

Practitioner Summary: To improve safety and health in the glovebox environments where gloves usage is a necessity, this study provides recommendations for selection and design of glovebox gloves for three hand tools including a roller, a pair of tweezers, and a crescent wrench based on the results discovered in the experiments.

Keywords: glovebox glove; grip strength; key pinch strength; contact force; hand tool.