A.L.M.E. Assistive Lifting Machine for Elders: Engineering a Solution to Fall-Recovery-Related Injuries in Seniors and Caregivers

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Falls are the leading cause of injury in the United States amongst those aged 65 or older as every second an older person falls. When a fallen individual is left on the floor for a prolonged period of time, they are at risk of further injury. Additionally, caregivers are at a risk of injury from lifting fallen seniors. Currently, there are no devices designed to lift a fallen individual from flat on the ground, so we set out to create one. The device consisted of a frame, ramp, and hydraulic system. The hydraulic system consisted of a 2500 PSI hydraulic cylinder and two hand-operated 350cc hydraulic fluid reservoirs. This allows the user to simply move the hand pump back and forth to raise the ramp, thus lifting the fallen person off of the ground. We tested the maneuverability of the device, the height the ramp could get off of the ground, and the time to reach 100 pumps of the hand pump, all as weight increased. As weight increased for the three tests, the maneuverability decreased, but the cart was still able to complete a simple obstacle course; the ramp height decreased but still cleared the floor; and the hand pump didn’t become more challenging to use. Finally, we calculated the maximum weight the device could lift before breaking to be 250 lbs. This device represents an effective, user-friendly, and inexpensive solution to safely lifting up fallen seniors with the potential to reduce injuries to both seniors and their caregivers.

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