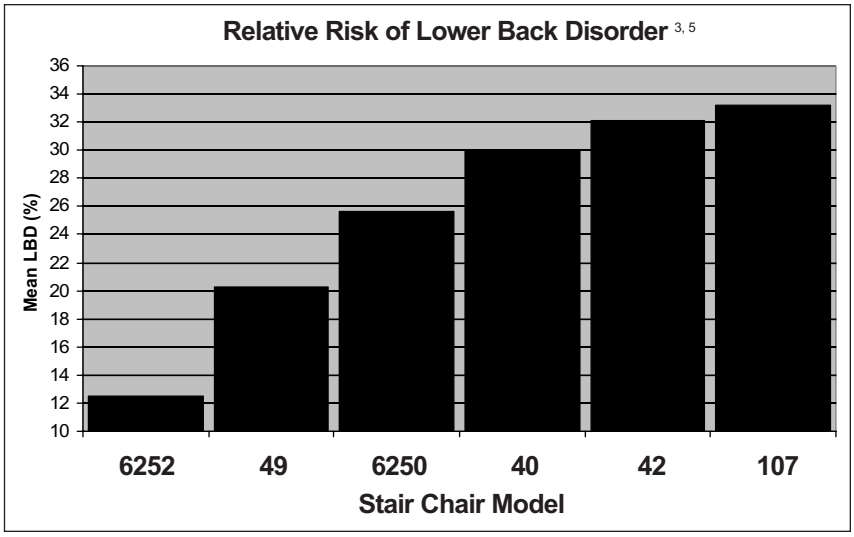
Ergonomic Analysis Shows Stair-PRO Helps Alleviate Risk of Operator Injury

Situation

Firefighters and emergency medical services (EMS) personnel must perform a wide array of potentially hazardous emergency rescue procedures that often include the use of specially designed rescue and/or transport equipment. One common procedure involves manually transporting a patient down flights of stairs using a stair chair.

Unfortunately, the physical strain of maneuvering patients in this environment contributes to a high number of back injuries being reported in the EMS industry.[1] Researchers have identified awkward body postures when handling patients as one of the main contributors.[2]



Rationale

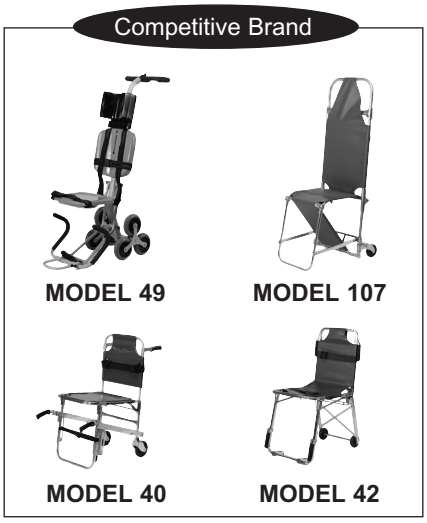
Stryker EMS recognized the opportunity to provide a product that could reduce the risk of injury to medics and patients during stairway transport. Capitalizing on its technical experience with the innovative RUGGED series of ambulance cots, Stryker EMS applied advanced engineering practices along with biomechanical science to develop the Stair-PRO stair chair models.

Methodology

Independent ergonomic experts studied paramedics transporting a 160 pound patient down one flight of stairs and around a 90-degree landing using six different types of stair chairs. The simulated task included the initial lift, the descent of the staircase and the negotiation of a landing.

Four video cameras captured the postural measurements of each subject, while a Lumbar Motion Monitor digitally measured the three-dimensional trunk position and motion of the lumbar and thoracic sections of the spine.

Biomechanical analyses using these objective measures quantified the risk of lower back disorder (LBD) for each of the six stair chair models.



Results

The Stair-PRO model 6252 was found to reduce the relative risk of lower back disorder significantly as compared to all other models tested. *(see chart)*

The study also determined that the probability of LBD is least in "leader forward" position, and worst in "leader backward" position when carrying a patient down the stairs using models other than 6252.[3, 4]

Conclusion

Patient transport in stairways is a common task that has a high reported back injury rate. The design of stair chairs can significantly influence operator and patient safety. This testing substantiates Stair-PRO's ability to help reduce the risk of back injury.

[1] *"Evaluation of the Injury Profile of Personnel in a Busy Urban EMS System," Hogya, P.T., Ellis, L., Journal of Emergency Medicine (vol 8, pages 308-311, 1990).*
[2] *"Shoulder Posture and Localized Muscle Fatigue and Discomfort," Wiker, S.F., Ergonomics (vol 32, pages 211-237, 1989).*
[3] *"Comparison of Commercial Stair Chairs Using Data Envelopment Analysis," Human Performance Institute, Dept of Industrial and Manufacturing Engineering, Western Michigan University (March 2002).*
[4] *"Postural Analysis of Paramedics Using Stair Chairs," Human Performance Institute, Dept of Industrial and Manufacturing Engineering, Western Michigan University (March 2002).*
[5] *"Biomechanical Analyses of Paramedics Using Stair Chairs," Human Performance Institute, Dept of Industrial and Manufacturing Engineering, Western Michigan University (March 2002).*

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