



Case study

Prime Series® Big Wheel stretcher

shows improved steering and pushing power over Fifth Wheel stretcher

Background

Occupational injuries are more frequently experienced by healthcare workers compared to many other professions, with a reported incidence of 465 per 10,000 in the United States.¹ Specifically, these individuals suffer from lower back pain at a disproportionate rate. Moving hospital stretchers is considered one of the most physically demanding tasks undertaken by healthcare workers.²

The Prime Big Wheel® stretcher was designed to help decrease the physical strain required to maneuver hospital stretchers. With added convenience features for healthcare workers, such as electric lift and four-sided brake/steer pedal, as well as patient-accessible comfort controls, the Big Wheel stretcher technology provides an efficient, highly customizable option that benefits both hospital staff and patients.

Methods

In 2017, Stryker performed steer force and rolling resistance tests using three Big Wheel (BW) stretchers (model 1115) and three Fifth Wheel (5W) stretchers (model 1105). Testing was conducted on hospital-grade laminate floors with the stretcher at high height and litter in flat orientation. The primary outcome measure was the pound of force (lbf) necessary to steer or push the stretcher. The following variable testing configurations were utilized:

- **Patient weight distribution**
 - No weight
 - 700 lbs safe working load (SWL)
- **Caster orientation (rolling resistance only) when pushing from head end**
 - Casters 90°, all casters pointing the same direction
 - Casters trailing

Each stretcher underwent three trials in each testing configuration. Contact your Stryker sales representative for more information.

Objectives

Measure the difference in start-up rolling resistance forces and steer forces between Stryker's Prime Series® Fifth Wheel and Big Wheel stretchers.

Results

Steering force ⁴	Rolling resistance, unloaded ⁴	Rolling resistance, loaded (SWL) ⁴
The BW stretcher required 4.99 lbf and 15.81 lbf to steer while empty and at SWL, respectively. Comparatively, the 5W stretcher required 123% greater force to steer while empty (11.14 lbf) and 135% greater force when loaded (37.19 lbf).	With casters trailing, the BW stretcher required 8.79 lbf to push, while it required 10.41 lbf to steer with casters at 90°. The 5W stretcher required 17% more effort (10.37 lbf) to steer with casters trailing and 46% more effort (15.19 lbf) to steer with casters at 90°.	With casters trailing, the BW stretcher required 27.22 lbf to push, while it required 35.11 lbf to steer with casters at 90°. The 5W stretcher required 34% more effort (36.56 lbf) to steer with casters trailing and 45% more effort (51.03 lbf) to steer with casters at 90°.

Conclusion

Steering force testing indicated that:

- The BW stretcher was 55-57% easier to steer (loaded and empty, respectively) compared to the 5W.

Rolling resistance testing indicated that:

- The BW stretcher was up to 31% easier to push, both when loaded (up to 700 lbs) and unloaded.

These results are of particular importance in a clinical setting as approximately 59% of all nursing injuries result from overexertion, and experts generally agree that nursing-related injuries frequently result from years of routine daily activity.³ The Big Wheel stretcher's comparative ease of use may help to reduce physical strain for hospital staff and aid in the prevention of nursing-related injury.

References

1. Bureau of Labor Statistics. 2007. Nonfatal occupational injuries and illnesses required days away from work. US Department of Labor.
2. Daniell N, Merrett S, Paul G. Effectiveness of powered hospital bed movers for reducing physiological strain and back muscle activation Applied Ergonomics. 2014 Jul 1;45(4):849-56.
3. Compensation and working conditions, "Dangerous Jobs," Summer 1997.
4. Data on file

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