CRE-MSD

Centre of Research Expertise
for the Prevention of
Musculoskeletal Disorders

WEBINAR

Exploring the Efficacy of Portable Lift-Assist Devices to Reduce Exposures Compared to a Manual Lift

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UNIVERSITY OF WATERLOO

RESEARCH MEETING PRACTICE TO PREVENT MUSCULOSKELETAL DISORDERS (MSD)

The Centre receives funding through a grant provided by the Ontario Ministry of Labour, Training and Skills Development.

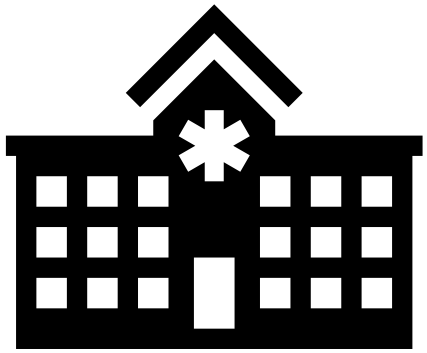
Background – The Problem

Image from: https://powerlifttraining.com/levigait-landing-page/

Image from: https://samsonstrap.com/

Background – Lift assist calls

- ✓Lift assist calls occur when Emergency Medical Services (EMS) are called to lift someone who has fallen or is stuck in an undesirable position (Cone et al., 2013)



Long Term Care

Community

Background – Lift assist calls

Image from: https://twitter.com/niagaraems/status/1363906028773904387

Background – Potential Solution

- ✓Emerging portable lift assist devices have the potential to decrease the number of manual lifts completed by paramedics
- ✓If portable lift assist devices decrease exposure associated with completing a lift, they could also be used in Long Term Care and other facilities

PROJECT OBJECTIVE

To evaluate the efficacy of the Elk and Raizer lift assist devices relative to a fore-aft lift for lifting a person from the floor to a stretcher, considering user perception and biomechanical exposure data.

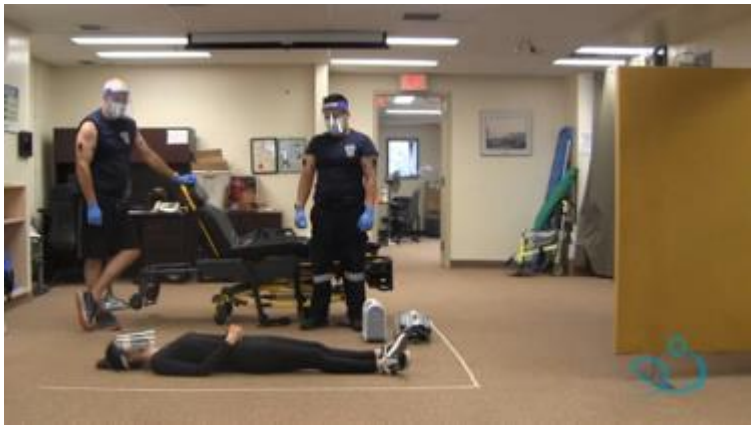
Methodology - Participants

- ✓21 participants were recruited from a paramedic service in Ontario
- ✓Scheduled in pairs to facilitate 2-person lifting procedures

Methodology – lift types

Fore-aft lift - manual

Elk – lift assist (6x speed)



Raizer – lift assist (4x speed)

Methodology – lift types

Fore-aft lift - manual

Methodology – lift types

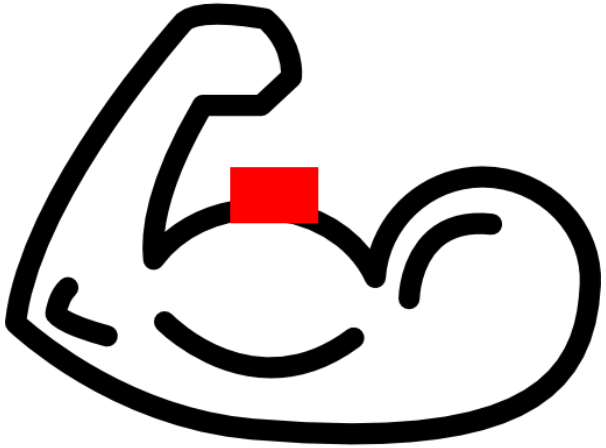
Elk – lift assist (6x speed)

Methodology – lift types

Raizer – lift assist (4x speed)

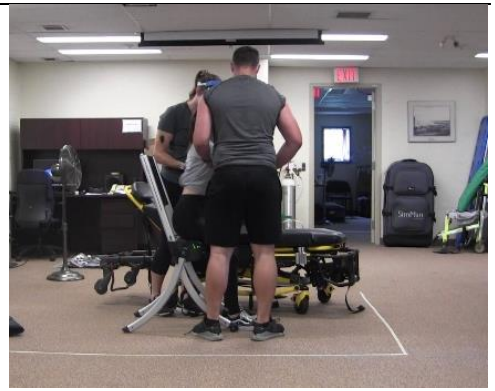
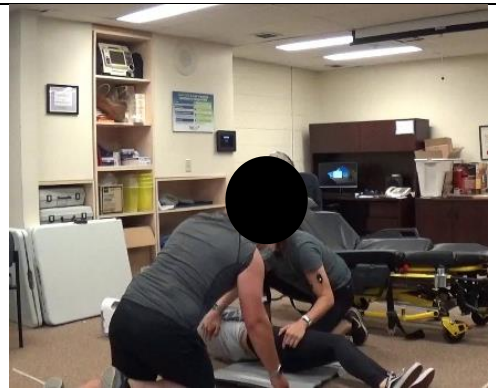
Methodology – Biomechanical outcome measures

Electromyography (EMG)

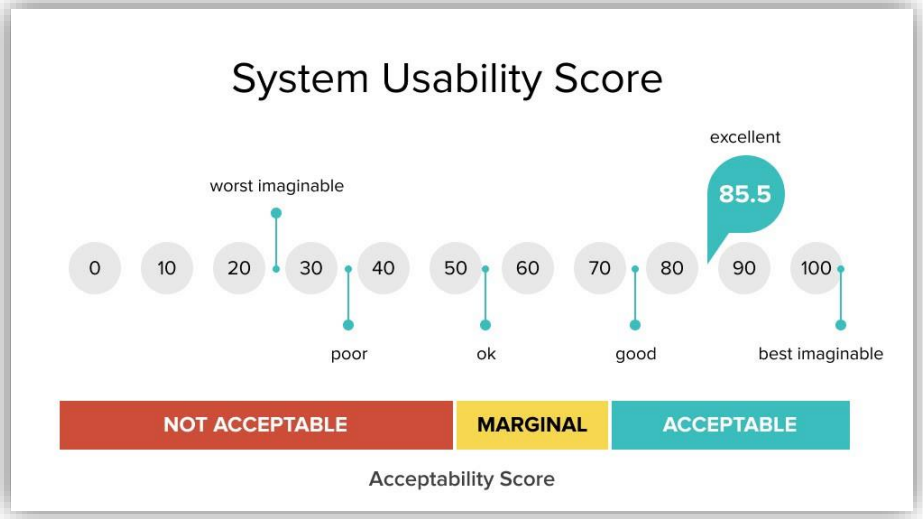


Rating of Perceived Exertion

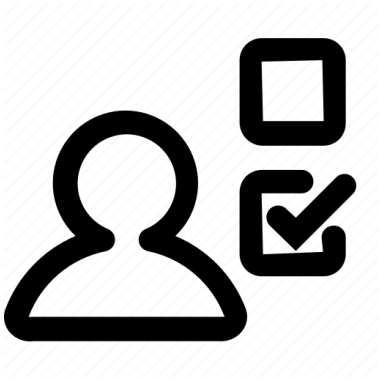
6	no exertion
7	very, very light
8	
9	very light
10	
11	fairly light
12	
13	somewhat hard
14	
15	hard
16	
17	very hard
18	
19	very, very hard
20	

	Task 1 (Device retrieval and set-up)	Task 2 (Device operation)	Task 3 (Patient transfer)
Raizer			
Elk			

Methodology – Perception-based outcome measures

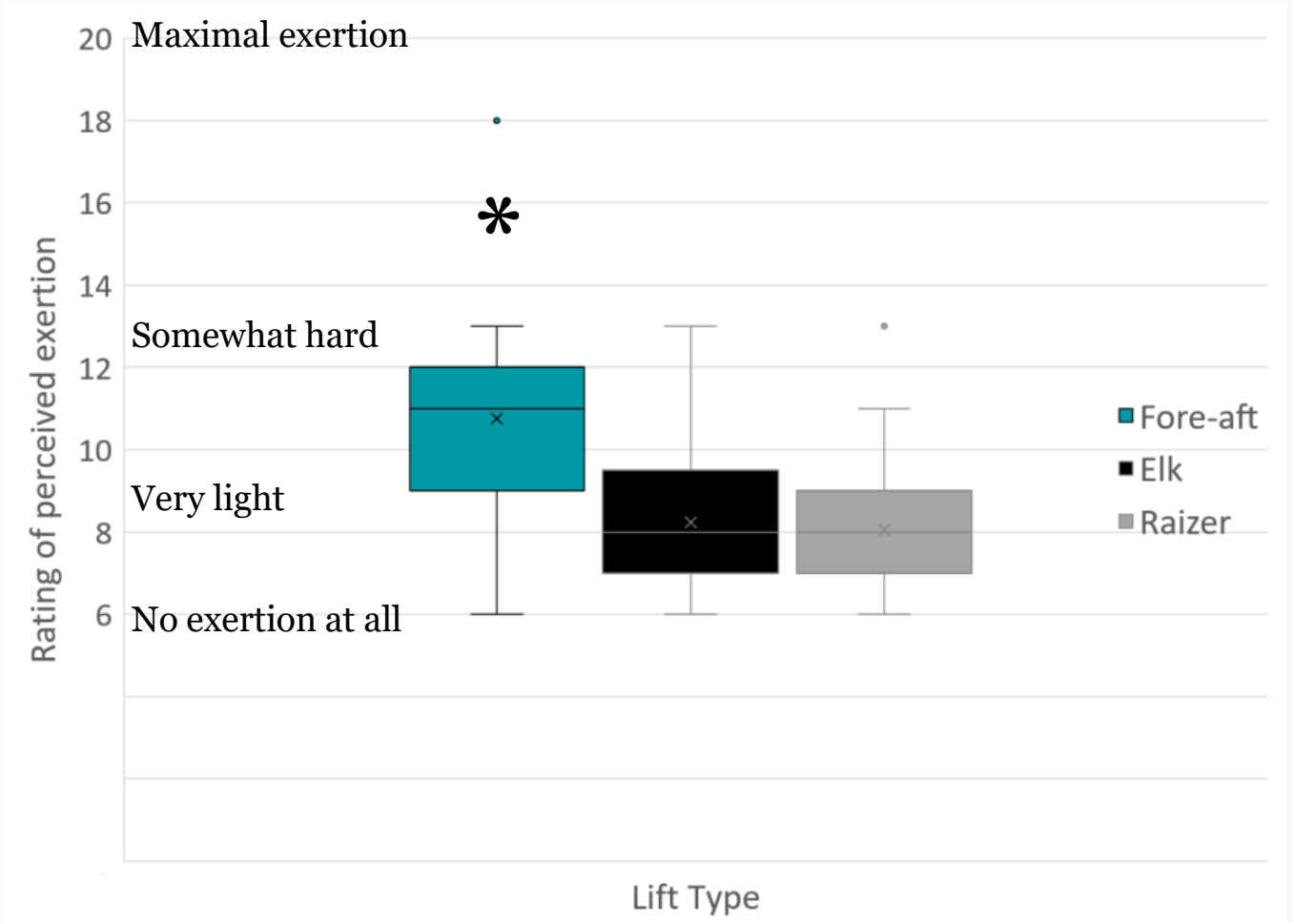


User preference

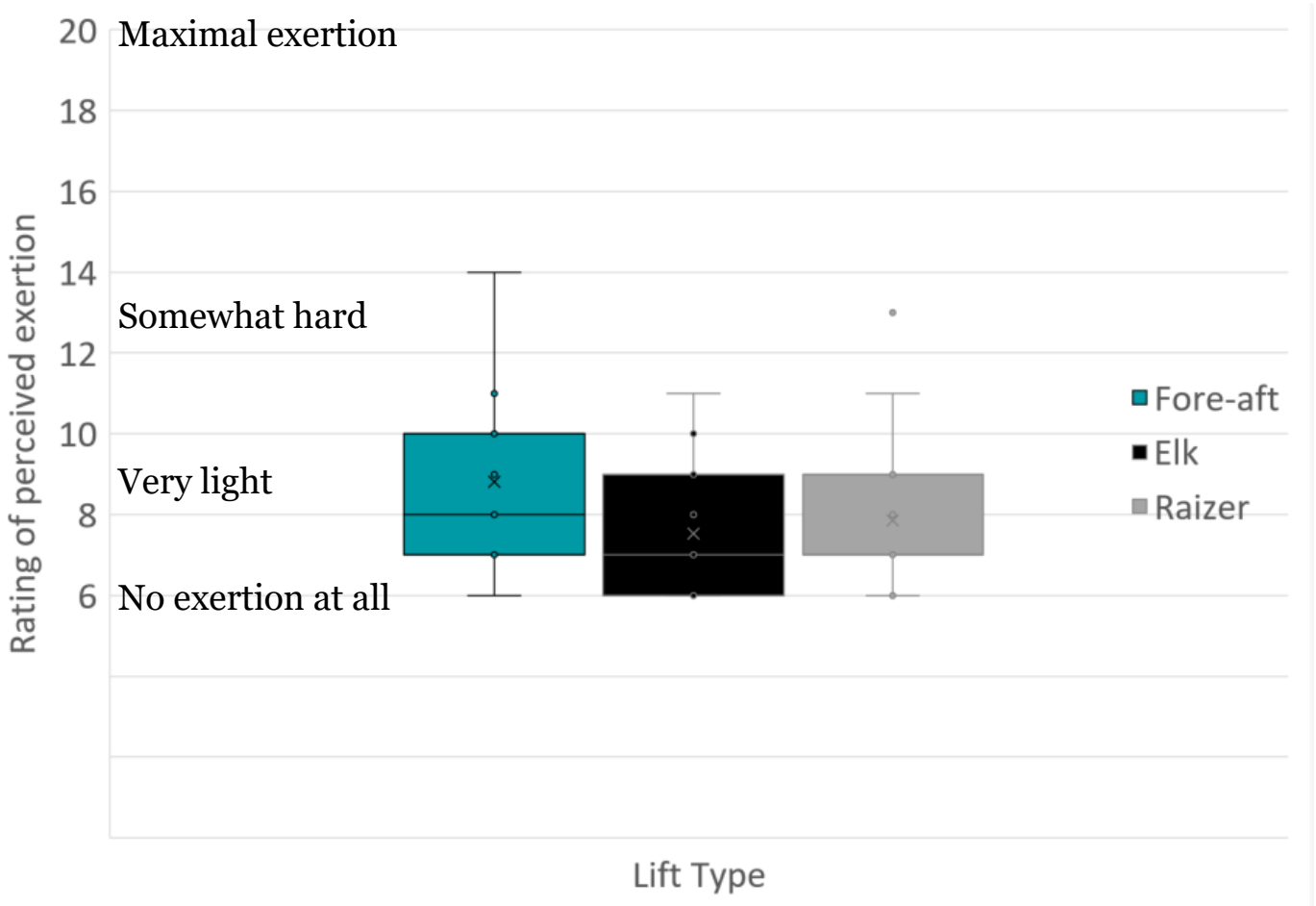


Exit interview

Results – RPE was significantly higher for the lead lifter during the fore-aft lift relative to using an assistive device



Results – RPE did not change for the assistant lifter across different lift types

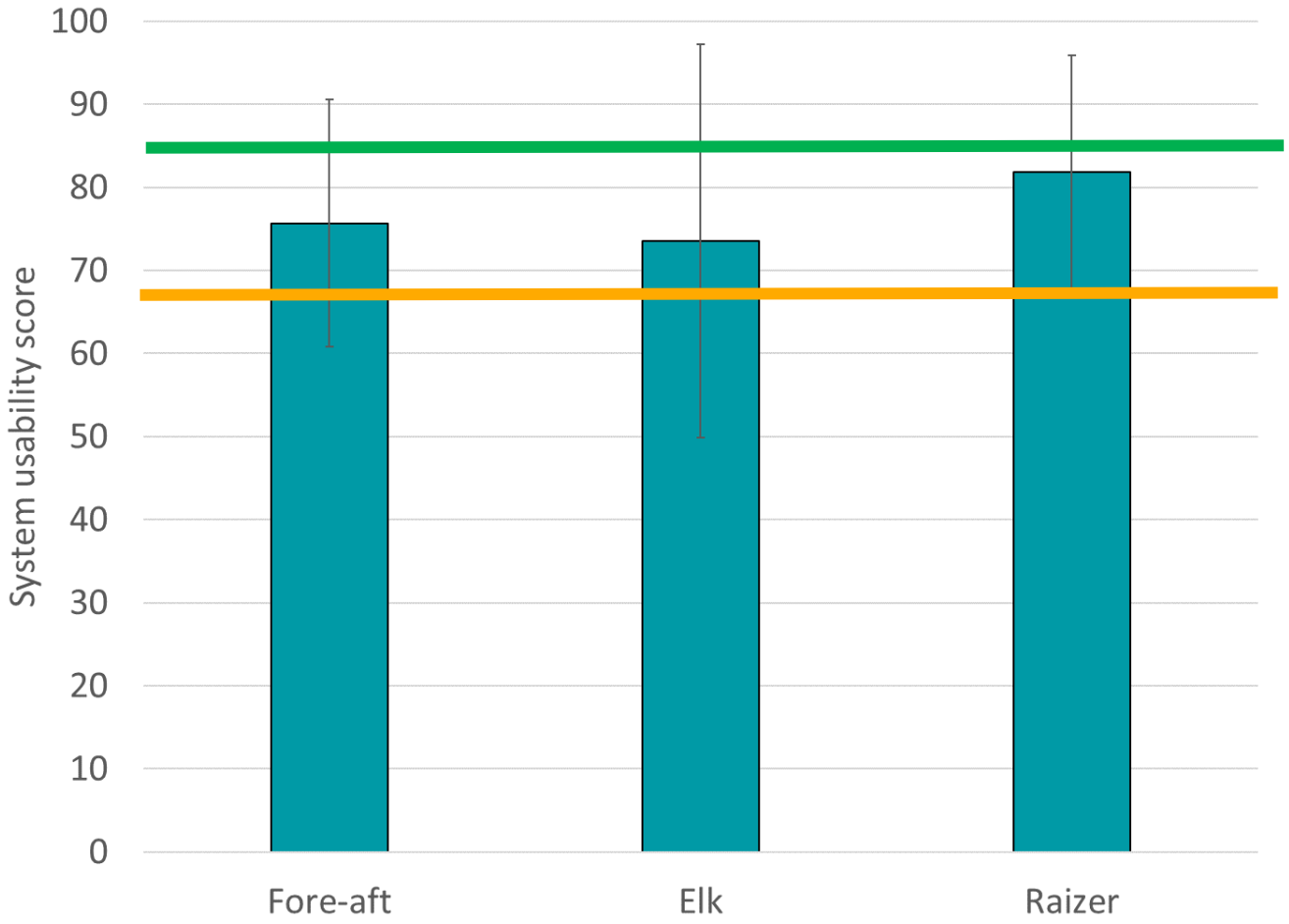


Results – EMG showed lift assist devices maintained or

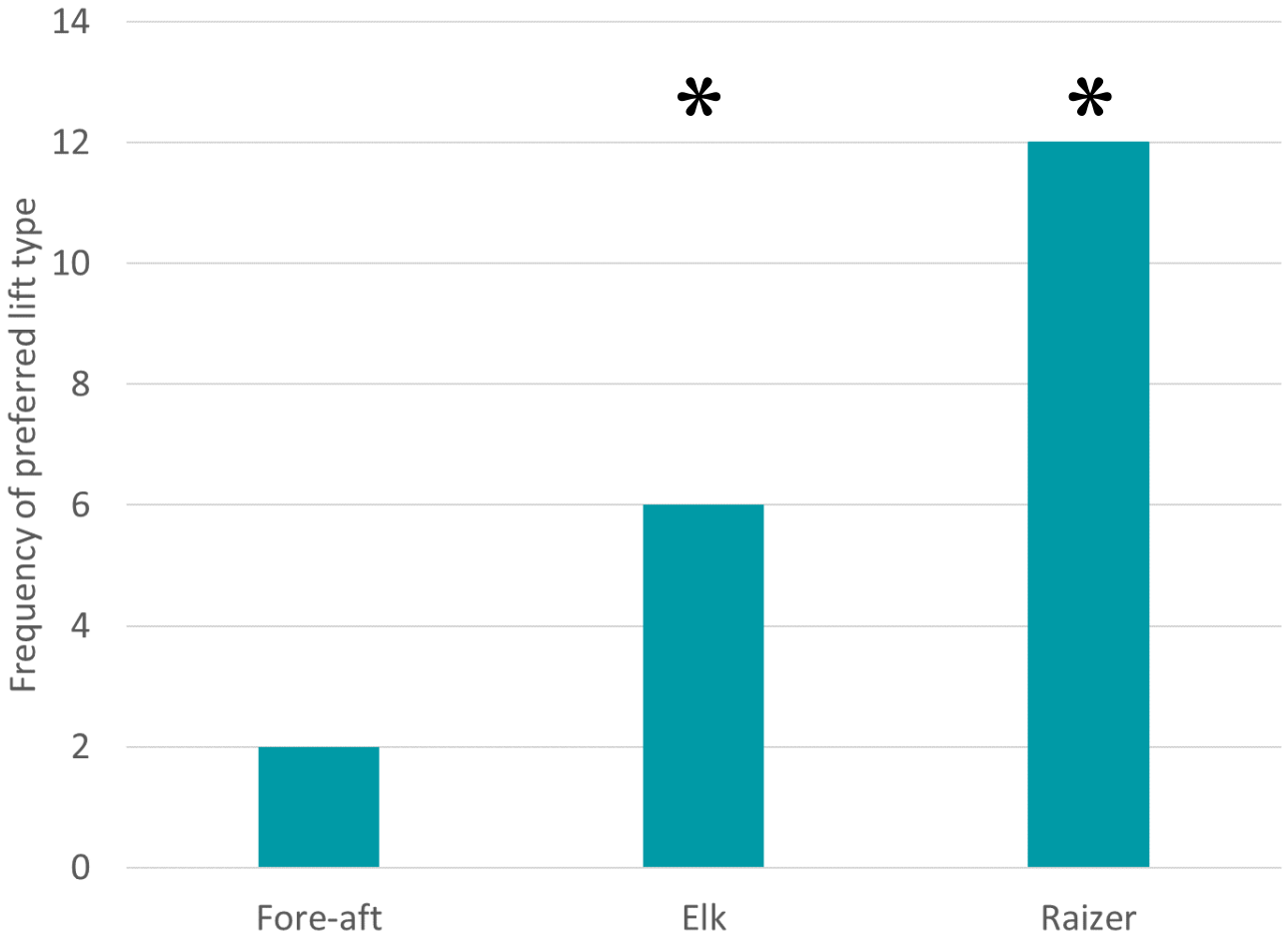
Assistant Lifter Muscle Activation

		Max Muscle Activation			Average Muscle Activation		
		Device setup	Device Operation	Transfer	Device setup	Device Operation	Transfer
Elk	L_Bicep						
	R_Bicep			-	-	-	-
	L_ESPI		-	-	-	-	
	R_ESPI			-			
Raizer	L_Bicep				-		-
	R_Bicep		-	-			
	L_ESPI		-	-			
	R_ESPI			-			

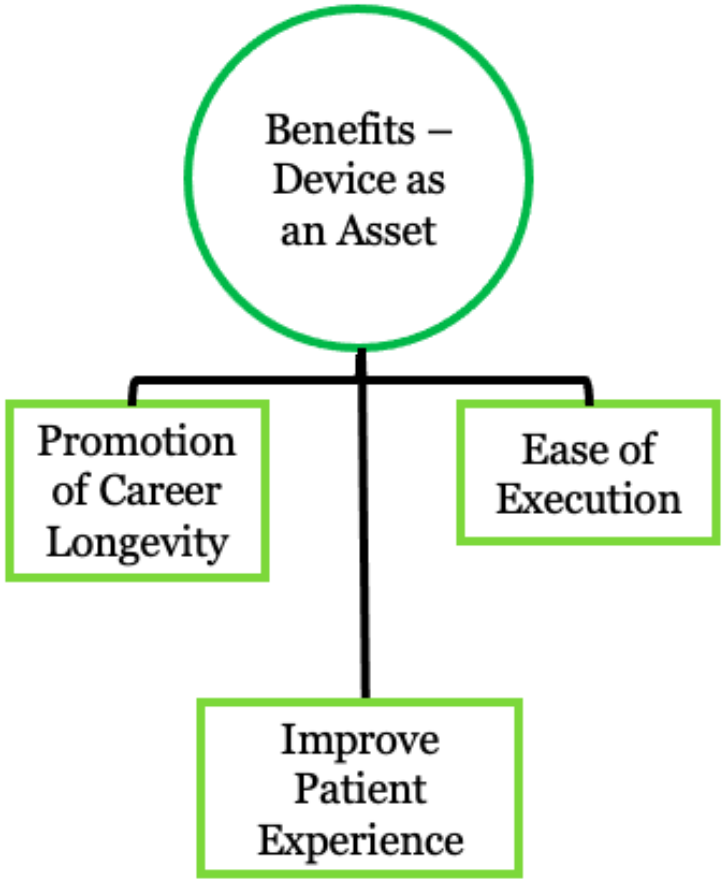
Results – no significant difference in perceived usability

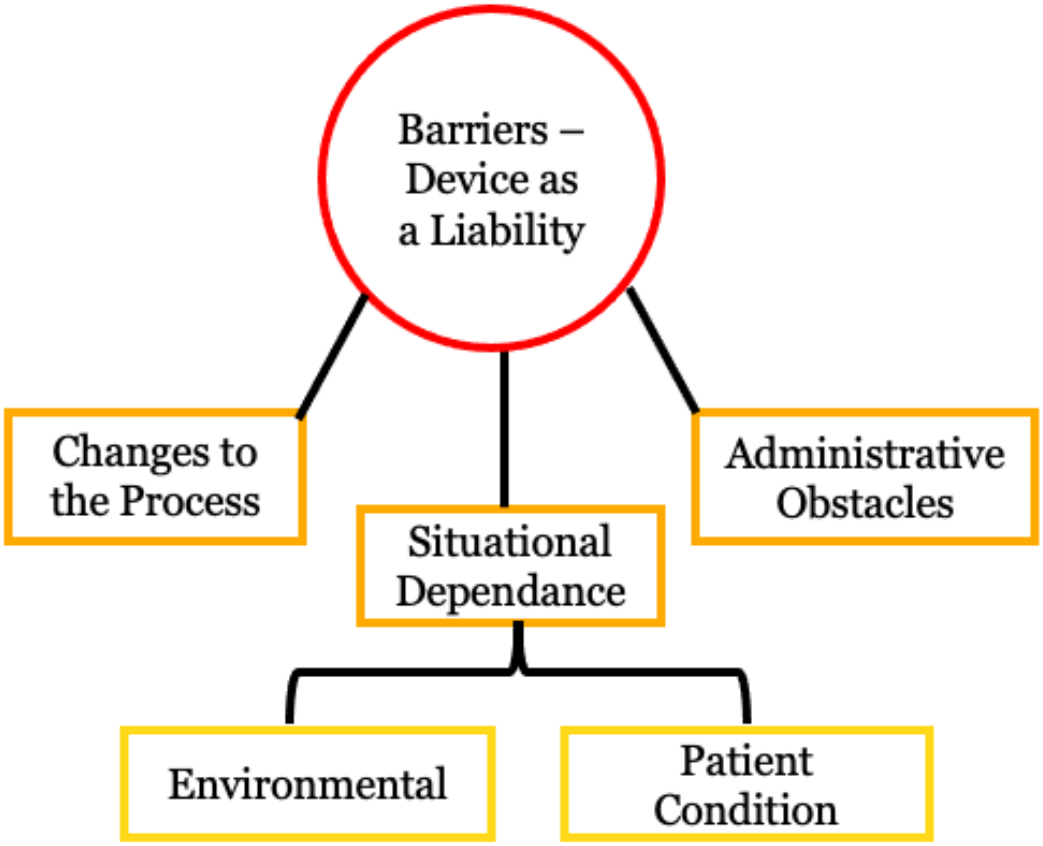


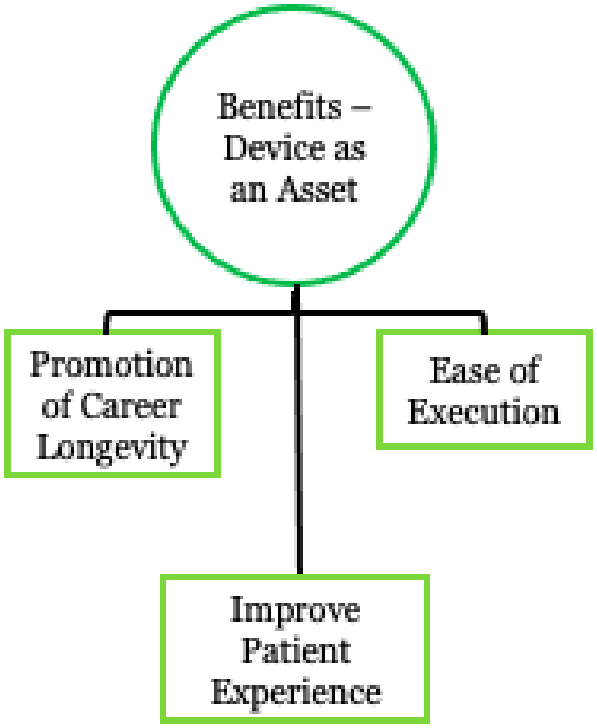
Results – Participants preferred a lift assist rather than performing a fore-aft lift



Results – Interview feedback







Theme: Benefits – Device as an Asset

Sub-Theme: Promotion of Career Longevity

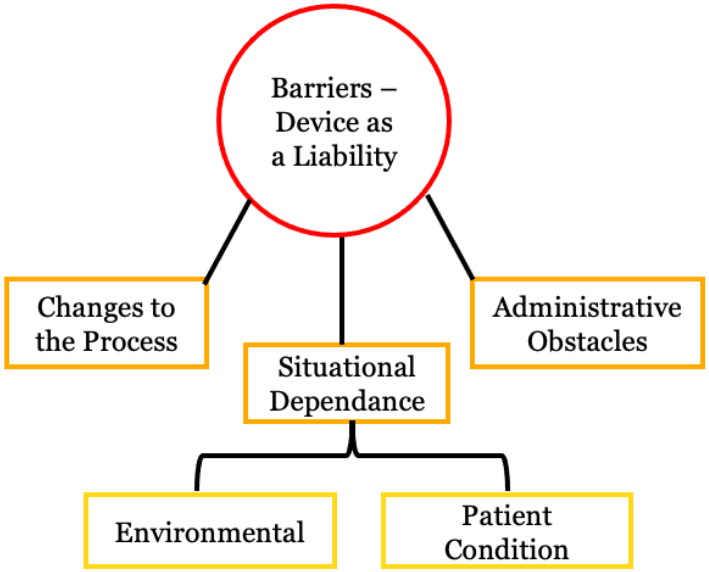
- Decrease in physical exertion
- Decrease in risk of injury
- Decrease in mental stress/anxiety

Sub-Theme: Ease of Execution

- Easy to use
- Easy set-up
- Minimal affect from time regarding usage
- Easy to clean

Sub-Theme: Improve Patient Experience

- Lift with device is gentle for patients and provides support
- Can be used on patients of different characteristics



Theme: Barriers– Device as a Liability

Sub-Theme: Changes to the Process
- Different exertion
- Learning curve

Sub-Theme: Administrative Obstacles
- Liability concerns
- Money and maintenance
- Device distribution and accessibility

Sub-Theme: Situational Dependance
- Use of a device versus a manual technique is dependent on the situation

Sub-Sub Theme: Environmental
- Space
- Floor

Sub-Sub Theme: Patient Condition
- Emergence level
- Chronic injury vs acute injury

Discussion

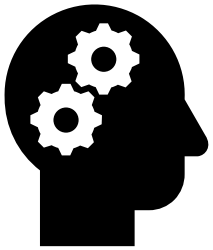
- ✓Overall, biomechanical exposure decreased with use of a lift assist device
  - ✓Expect to see further decreases with a heavier patient
- ✓Many barriers revealed in exit interviews can be addressed with strong administrative controls

Changes to Process

Environm and Pati Conditio

Administrative Obstacles

Discussion

✓ 

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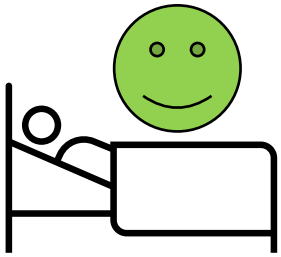
✓ 

Devices were perceived to be easy to learn and use, decrease injuries, increase career longevity, and increase patient experience, **which is important for adoptability**

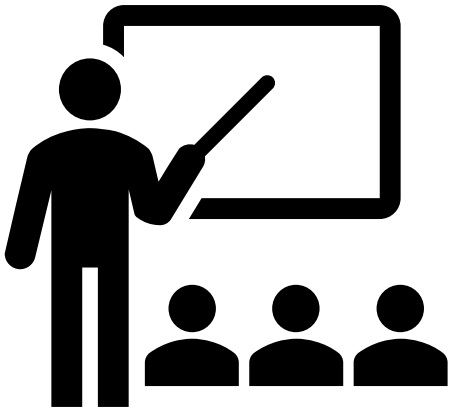
(Noble and Sweeney, 2017, Conrad et al., 2007, Ruiter & Liaschenko, 2011)

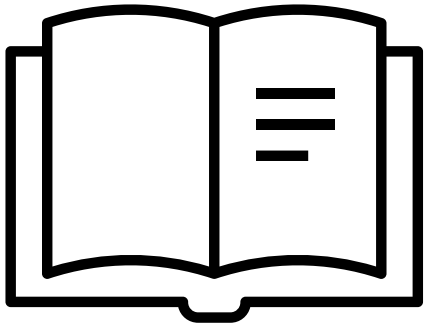
Key take away points

- ✓Paramedics perceive lifts to be less demanding when using a lift assist device
- ✓Devices were perceived to increase patient comfort and experience
- ✓Paramedics prefer access to lift assist devices
  - ➢Raizer preferred by more, but may want access to both devices if feasible / possible

Key take away points

- ✓Training and when-to-use guidance are important to support adoption
- ✓Change management process may be important to help paramedics move away from "*tried and true*" fore-aft lift method





Next Steps

- ✓Submitting our paper to a peer-reviewed journal for publication
- ✓Different populations (i.e. LTC staff), intervention study, cost-benefit-analysis could be considered
- ✓Future work planned evaluating other products aimed at decreasing injuries during patient handling tasks

Acknowledgements

OCCUPATIONAL BIOMECHANICS & ERGONOMICS LAB

EMS Niagara

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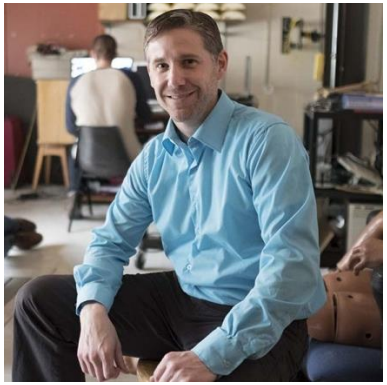


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