

Identifying musculoskeletal injury risk for application in injury prevention tool development for career firefighters

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KEY FINDINGS

- The Firefighting hose drag task is associated with high musculoskeletal injury risk.
- TEAM-Feedback may be an effective approach to inform firefighters on safer task performance and injury prevention strategies.
- Future directions should consider upscaling this approach through inclusion of a larger sample size.

Background

- Firefighters perform physically demanding work and experience higher rates of musculoskeletal (MSK) injuries than those in other occupations with a majority being sprains and strains¹.
- Developing applied approaches to measure MSK risk in firefighting can be used for the development of injury prevention strategies.
- This can be used for the development of evidence-based MSK prevention tools.

Objective

- To identify MSK injury risk in career firefighters.
- To develop evidence-based MSK injury prevention tools.
- To determine the utility of Technology-Enabled Analysis of Movement and Feedback (TEAM-Feedback) as an injury prevention

Methods

- Videos of 20 career firefighters performing a hose drag task were assessed for MSK injury risks using the Ovako Working Posture Analyzing System (OWAS).
- Descriptive statistics were calculated for OWAS scores of each phase of the task (standing, pick-up, stabilize, and carry) (Figure 2).
- TEAM-Feedback videos with corresponding OWAS evaluations were provided to firefighters using Dartfish (Figure 1).
- A sub-sample (n=5) were asked to complete a survey used to determine TEAM-Feedback utility scored on a 5-point Likert Scale (1=strongly disagree)



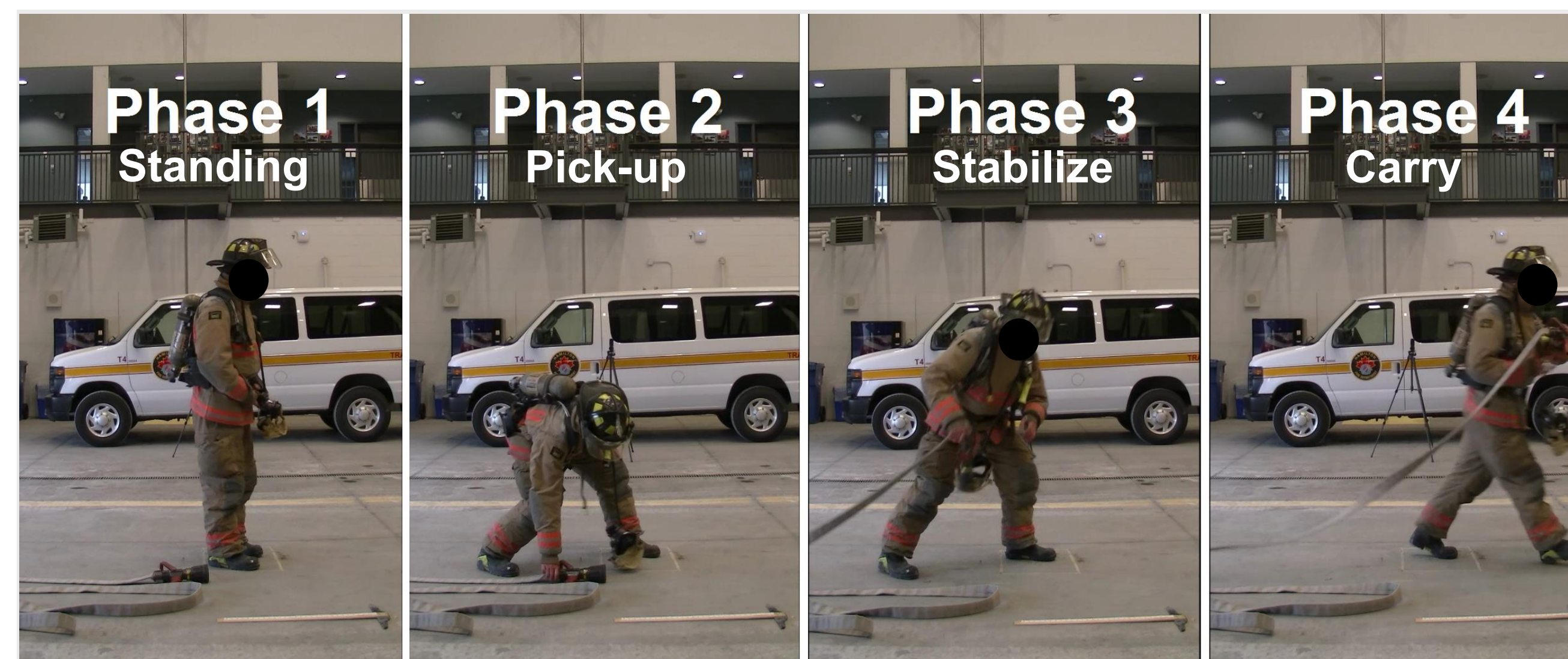
Trunk Flexion
Risk: Lower back injury
Recommendation: Squat down to pick up the hose lifting with the legs and reducing angle of flexion at the hips.

Shoulder & Elbow Flexion
Upper arm remains at shoulder level, reducing injury associated with reaching above shoulder height.
Elbow flexion maintains load placement closer to the body to avoid risk of injury

Figure 1: TEAM-Feedback Provided to Firefighters

Results

- The standing and carry phases were associated with a low MSK injury risk while the pick-up and stabilize phases were associated with a high MSK injury risk.
- The hose drag task is a moderately high risk task.



OWAS* Scores			
Median = 1; IQR = 1, 2.5	Median = 4; IQR = 0	Median = 4; IQR = 3, 5.8	Median = 1; IQR = 1, 3.8
Low Risk	High Risk	High Risk	Low Risk
Composite OWAS Score for Hose Drag Task			
Median = 2.6; IQR = 1, 3.8			

*Ovako Working Posture Analyzing System

Figure 2: Phases of the Hose Drag Task

- When identifying the utility of TEAM-Feedback, 60% of participants agreed they would apply TEAM-Feedback to their future work/health training; 40% agreed that TEAM-Feedback was helpful in teaching safe task performance strategies.

Q1 - I would apply TEAM-Feedback to my future work/health training.

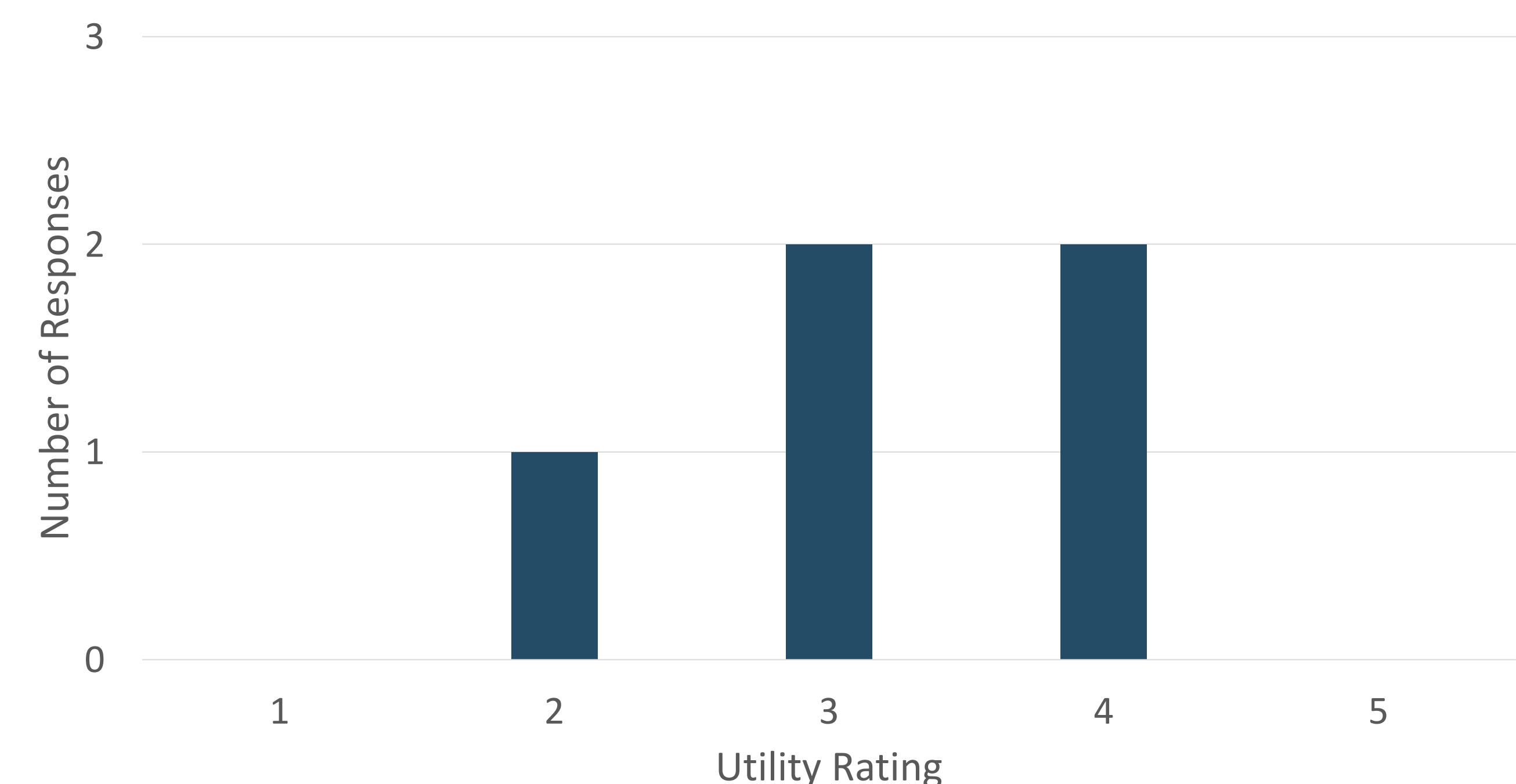


Figure 3: TEAM-Feedback Utility Survey Responses – Q1

Q2 – The TEAM-Feedback provided was helpful in teaching me how to do tasks more safely.

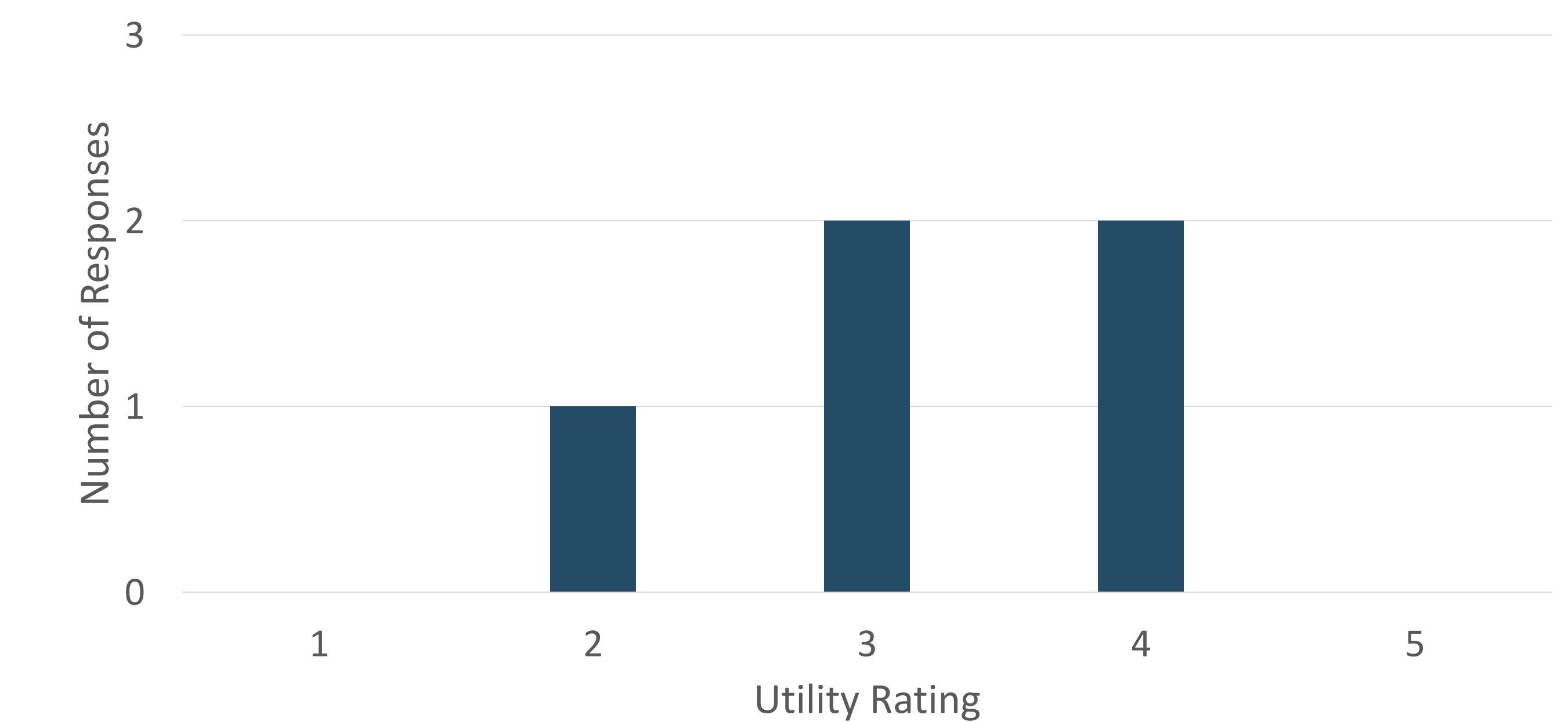


Figure 4: TEAM-Feedback Utility Survey Responses – Q2

Conclusion and Discussion

- Firefighters are at a high risk of incurring MSK injuries while performing a hose drag task.
- The pick-up and stabilize phases of the hose drag task place firefighters at highest risk of injury.
- TEAM-Feedback informed by MSK injury risk assessment appears to be a “user-friendly” and effective method for dissemination of postural feedback.

Future Directions

- Future research is required to validate TEAM-Feedback with kinetic loading parameters.
- Future initiatives are needed to determine how to make feedback more directly useful to firefighters.
- Upscaling this approach to include more firefighting tasks and additional contexts would improve applicability.

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