



Body Stressing Injury Risk Assessment Using Wearable Technology and Data Analysis

The warehouse and distribution center industry has the highest rate of body stressing injuries, with 29% of the total number of body stressing injuries that occurred in the U.S. in 2019*. The industry also has the highest rate of slip, trip and fall injuries, with 35% of total slip, trip and fall injuries in 2019. The median recovery time for injured warehouse and distribution center workers is 11 weeks, having a significant impact on productivity and increasing costs.

Bardavon conducted a trial program to assess how the wearable technology, smartphone app, and data analytics platform could assist in assessing and reducing avoidable body stressing injury risks.

Background

Decades of research have indicated that the most effective injury prevention methods are found in elite sport. These methods involve the measurement of an athlete's movements using wearable technology and analysis of the data collected to identify injury risk and guide action to reduce risk. This technology (validated by leading universities) is now available to companies through the Bardavon platform.

Key Outcomes

43

Reports recorded across
12 different workers in
5 different locations

46%

Potential risk reduction
for high load tasks

* 2020 data available. 2020 data skewed due to Covid.

Trial Overview

The employer faced the following challenges in reducing the risk of body stressing injuries:

- Workers are required to perform physical work tasks which are unavoidable
- Previous injury risk assessments have not used data analysis to identify opportunities to reduce risks for specific tasks and individual workers
- Decreasing physical capacity of an aging workforce
- High cost of injury prevention programs with variable outcome and difficulty demonstrating ROI



Trial Objectives

Use wearable technology and data analysis to understand the physical demands on various workers, and identify opportunities to reduce injury risks.

Method

Measure the movements of a selected group over a five week period using Work Task Assessments and Movement Coaching.



Task Assessments

A safety professional places the sensors on a worker and records data and video through the smartphone app as the worker is performing the work tasks. This enables;

- The direct comparison between different methods of performing the task to identify the safest way
- An accurate assessment of a worker's ability for pre-employment screening or return to work following injury

Movement Coach

The worker wears the sensors to measure their movements throughout a shift. The smartphone app provides alerts when the worker moves in a way that increases their injury risk. This enables;

- Workers to modify the way they perform tasks to reduce risk
- Employers to understand which workers are moving safely, which have a high injury risk and which may be fatiguing faster than others

Safety Team and Worker Engagement

The most important components of a workplace injury prevention program are the safety team and worker engagement. The safety team onboarding process involved a 30 minute online training session, whilst the worker engagement process involved sports themed posters around the worksite and a short instructional video.

Task Injury Risk Reduction

A total of 13 work tasks were assessed. When data and video is collected from workers performing the task, it enables an accurate assessment of the load on the body. This highlights any opportunity to reduce the injury risk through task modification or changes in operating procedures.



The top chart demonstrates the repetitive load on the worker's back when they lean and twist to pick items in the different caged sections. By removing the cages and changing the position of the items there was a reduction in the load by 46% (as indicated by the bottom chart).

Worker Risk Reduction

When the different worker's movements were measured for a full shift in each of the different zones of the distribution center, it enabled the physical demands (driving, walking, bending, reaching and carrying) of each zone to be assessed and ranked.

The chart below demonstrates which zones have the highest demands, which was then used to plan the rotations between zones for the workers to avoid overload, and enabled workers returning from injury to avoid the zones which may overload their injured area. E.g. A worker returning from a back injury would avoid security and bulk as those zones require the most bending.

	Most Prevalent				Least Prevalent
Driving	High Cube (44%)	Main Floor (38%)	Bulk (25%)	Confection (21%)	Security (14%)
Walking	Confection (33%)	Bulk (24%)	Main Floor (24%)	High Cube (23%)	Security (16%)
Bending	Security (28%)	Bulk (23%)	Confection (22%)	Main Floor (15%)	High Cube (10%)
Reaching	Bulk (14%)	Security (9%)	High Cube (9%)	Confection (7%)	Main floor (6%)
Carrying	Security (34%)	Confec (18%)	Main Floor (17%)	Bulk (15%)	High Cube (14%)

"This is the future of injury prevention."

–Robyn P., Aon People Risk

Overall Results

Key Outcome	Opportunity
The load on the worker's body is different when they perform tasks with different equipment and techniques.	Identify the equipment and techniques that reduce the load on the worker's body and take action to train the workers to reduce their injury risks.
Some of the physical demands of the work tasks are unavoidable.	Educate and coach the workers on the health benefits of physical work when it's performed in the safest way with low load.
Different tasks, locations and individual workers may have different load.	Develop a risk profile across tasks, locations and individual workers and take action to reduce the load. Use AI to automatically provide workers with high load individualized training content.