Why Injury Prevention Technology Used by Athletes is so Effective in the Workplace

By Scott Coleman | October 13, 2023

Physically demanding jobs, with the right safety parameters in place, can be healthy. In fact, most labor workers have above-average cardiovascular health. However, these workers also have much higher musculoskeletal injury rates.

The second leading cause of injury involving days away from work is overexertion and bodily reaction, representing 22% of all non-fatal injuries. Therefore, workers need to find a balance between doing enough physical work to benefit their cardiovascular health while avoiding overexertion and injury.

This begs the question: can we reduce the rate of injury and maintain the benefits of active work? If we look at the world of professional athletics, the answer is yes.

In elite sports, athletes are well-protected from injuries with on and off-the-field health optimized.

So, why are we lagging in preventing injury and promoting better health for the everyday, active workers?

Traditional Workplace Injury Prevention is Less Effective Than Sport Injury Prevention

Unfortunately, research has indicated that most workplace injury prevention programs are ineffective at reducing injury risks. Workplace injury prevention programs are not designed to engage and coach workers. This is because they consist of education-based teaching (classroom-style presentations) rather than behavior-based learning strategies and personalized, data-backed coaching.

Traditional workplace injury prevention solutions also tend to be very generalized and often fail to address the unique injury risks associated with each work task, different work sites, and individual workers. The most effective injury prevention training requires workers to be aware of when they are moving in a way that increases their risk and learn from their movements to be able to correct them.

Many injury prevention programs also fail to personalize alerts and coach each worker to optimize their movement for their specific job task. There are countless variables within the individual worker and the work environment that are critical for identifying risk but are all too often ignored.

The Sports-Science Advantage for Injury Prevention

The Accelerometer: Accelerating Injury Prevention Technology

Unlike the majority of workplace injury prevention (IP) solutions, sports technology is highly personalized. Elite athletes leverage wearable tech, consume their movement analytics, and receive alerts that lower injury risk and improve individual performance.

The high costs of elite-level athletes not being able to perform due to injury have driven the development of injury prevention technology. Among the research and innovation driven by elite athletics is the wearable accelerometer.

There is a high level of reliability and validity using accelerometers positioned on the person to collect movement data over long periods. This data accurately captures injury risk metrics—including fatigue thresholds, movement control, and athlete muscle soreness.

Bringing Sports Technology Into the Workplace

When we bring technologically advanced sports technology into the workplace, we can individualize at scale, in real time, over time for each worker.

Wearable technology increases the scope and removes the risk of reliability-based errors when identifying injury risks. In both sports and the workplace, it's impossible to assess injury risks for every individual over long periods by using the traditional approach of observation and opinion. Historically, in professional sports, a coach would spend time watching athletes with the Sports Physical Therapist or Doctor. They would manually assess an individual's

movements to identify injury risks. However, this manual procedure, involving one or more professionals, is not only costly, but subjective in nature.

The standard ergonomics approach to workplace injury risk assessment is also manual. This traditional approach focuses on the observation of workers performing tasks, and sometimes includes measuring range of motion and joint angles. Research has indicated only a moderate inter-rater reliability for observation and opinion-based work task safety assessments.

This means that two different safety professionals assessing the injury risks for the same worker could have different results. Wearable technology not only removes this risk of error but enables a worker's movements to be assessed over longer periods. This would not be possible with the traditional observation and opinion-based ergonomics assessment approach.

Wearables introduce objectivity by collecting data from all individuals over larger stretches of time and benchmarking injury risk with greater technical accuracy. They can measure the load on groups of workers throughout their week, establish benchmarks (relevant to their specific occupation and location), and then compare individual workers to these benchmarks to identify which workers are at risk for musculoskeletal injury. This aids in individualized risk insights, plus broader team-wide and company training.

Wearable technology removes human error and subjectivity and enables a worker's movements to be assessed over longer periods. Without the accelerometer and wearable tech, this level of individualized, ongoing observation and risk identification would not be possible.

Video Analysis for a Three-Dimensional World

Video analysis and motion capture are widely used for sports injury risk assessment and prevention, but there is a common fatal flaw. Single-camera video analysis is very rarely used due to the risk of parallax error. Parallax error refers to when the eye of the observer (or camera) is not in line with the measurement instrument and what is being measured. This can occur when measurements are only taken from a single, two-dimensional plane of movement.

This is highly inaccurate when an athlete (or worker) is always moving in three dimensions. While there has been an increase in the use of video technology in the workplace to assess injury risks over the past few years, the only way to accurately measure the movements of athletes and workers to assess injury risk is through either multi-camera video analysis or wearable technology.

Sports injury prevention programs combine data from wearable technology with video as an effective training tool to demonstrate high or low-load movements on the body. This process can be transferred to the workplace. By leveraging wearables and capturing movement data with video movement, better training and observation can take place for specific job tasks. This allows for individualized feedback to guide the worker's movements.

Using Sports Injury Prevention Methods to Prevent Workplace Injuries

For any injury prevention program to be successful, it must address the needs of the two main stakeholders: the target group (athletes or workers) and the people delivering the program (the sports medicine team or safety professionals). Implementing a sports-inspired injury prevention program in the workplace must engage workers and safety professionals in several key ways.

For workers, a successful, sport-based injury prevention program should:

- **Treat workers like industrial athletes**. Many workers involved in physically demanding roles love sports, and most people are aware that professional athletes get high-quality care. Promoting the injury prevention program to workers as an opportunity to use the same type of injury prevention technology as their sporting heroes shows that their employer is treating them like athletes, valuing their health and well-being.

- **Give positive feedback**. Providing feedback to workers using language like the "risks" or "hazards" associated with their work tasks has a negative impact, as no one wants to feel like they are doing hazardous or risky tasks. However, providing them with feedback using the same data, technology, and terminology (load) as used with elite athletes makes them aware when they are moving in a way that has a high load on their body without the fear of injury.

- **Engage workers in real time**. The most effective way to reduce overexertion injuries for workers is to provide them with feedback at the most relevant time–when they are performing their work tasks. Using wearable technology that provides alerts to notify workers when they are performing "high load" movements helps them understand what movements they need to change to avoid injuries.

- **Provide strategic, bite-sized training**. Training content should also be delivered in a timely way in appropriate amounts. Small training modules delivered using video and images periodically throughout the year are much more effective than a one-hour classroom-style presentation.

And for the Safety Professional:

- **Keep data collection simple.** Safety professionals are often the busiest people at the worksite, so the injury prevention program needs to be easy to use and time efficient. The safety professional can use a simple process, placing sensors on a worker while they are performing their tasks and collecting video using their smartphone. The data from the sensors and video are automatically combined in a simple platform to demonstrate which components of tasks can be modified or performed with a different technique to reduce injury risks.

- **Make data easy to review**. Analyzing the data from wearable technology can be overwhelming. Teams of sports scientists are required to process and analyze the wearable technology data in professional sports. However, safety professionals do not have that luxury, so the workplace injury prevention data needs to be displayed in an

easy-to-use format, enabling them to see where the risks are and what they need to prioritize their time on.

Conclusion

Traditional workplace injury prevention programs have proven to be ineffective at reducing the risk of musculoskeletal injuries. Using elite-sport-inspired tech to protect industrial athletes is an exciting and effective way to lower injury risk.

Bardavon has developed an Injury Prevention Suite that integrates effective sport-based prevention methods and technology. This program is easily implemented to engage workers and provide safety professionals with valid and accurate data.

Leveraging technology designed for elite athletes, our everyday, active workers can keep healthy—on and off the clock.

Meet the Author

Founder of Preventure, **Scott Coleman**, has become an industry leader in workplace injury prevention through his innovative and comprehensive wearable technology approach. This approach evolved from the combination of over 20 years of experience working with elite athletes as a coach, physiotherapist, and biomechanist, with the skills developed working in private practice treating injured workers. Over the past five years, Scott has been partnering with large organizations, workers' compensation insurance brokers, and safety consultants to reduce the costs associated with workplace injury using wearable technology and data analytics. For Bardavon, Scott is the VP of injury prevention as the company commits to getting ahead of workplace injuries.

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