National Safety Council

Case Study

MSD Solutions Lab
an nsc program

Implementation of Wearable Sensor Technology with Haptic Feedback

What's the Risk?

Workers at warehouse sites are often at high risk of incurring low back and shoulder injuries due to manual material handling (MMH) job tasks. Employees in these job environments may repetitively pick items stored very low or reach for items that are overhead. Logistics employees at Schneider Electric are not immune to such risks and are at high risk of musculoskeletal disorders (MSDs) due to their MMH duties. These MMH tasks may be difficult to address with engineering controls due to the variability of reaches and tasks (e.g., location of items being picked, types and sizes of packages).

Goals of Wearable Technology Use at Schneider Electric

Schneider Electric recognizes that, due to the variation in MMH job tasks of their employees, engineering controls may not be feasible to implement in a standardized way. Therefore, other interventions to lessen the risk of MMH job tasks are necessary. After researching options, Schneider Electric chose to pilot a wearable sensor with haptic feedback to alert employees when engaging in risky postures or activities to mitigate MSD risks from MMH tasks.

Explanation of the Wearable Technology

The wearable technology is a chargeable, cell phone-sized sensor placed into a lightweight harness (x-pack) worn over the shoulders with the sensor in the middle of the employee's back. The sensor provides a slight vibration to alert employees if they are bending too far forward, bending too often, or twisting and tilting too quickly, which are considered high risk activities. Data from these activities are compiled and a safety score is calculated to measure risk. Participants can view their individual data and safety scores from the wearable sensors. An improved safety score equates to less risky behavior (e.g., decrease in forward bending and quick turns).

Implementation of Wearable Technology

To solve for these MSD risks, Schneider Electric worked with a wearable technology vendor through three-month pilots to target high risk job tasks at two selected sites (e.g., specific warehouse sites with known MMH risks). The initial implementation plan was to pilot at one site, but as interest at the first site decreased throughout the three-month pilot, a second site was selected. Twenty employees who performed MMH job tasks (e.g., picking, put-away, inventory analysis, loading/unloading, returns processing and quality auditing) were selected to participate in the pilot at the first site and 15 employees who performed similar MMH job tasks were selected at the second pilot site. The sample for each site comprised approximately 10% of their work force.

The vendor provided virtual 'train-the-trainer' training to three primary contacts overseeing the pilots: the site supervisor, site injury prevention specialist and site engineer. They were then responsible for conducting training for employees in the pilots. Employees were trained in use and output of the wearable sensor to understand the purpose, limitations, data generated from the device, and overall ability of the device. Participating employees were responsible for picking up the sensor from the docking station each day and returning it to the docking station at the end of the day, and were instructed to report any issues (e.g., with connectivity or fit).

Lessons Learned

For the first pilot site, organizational barriers hindered proper implementation and execution of the pilot. Employees at the first pilot site were not given an adequate amount of coaching, involvement by the primary contacts was minimal, and very little feedback about the pilot program and use of wearable technology was provided to the participants. For example, the technology allows for the tracking of interactions with employees, yet one pilot site only reported one interaction throughout the entire three-month process.

After learning from the first pilot experience, the second pilot site had more coaching sessions and trackable interactions in comparison to the first pilot. Frequent check-ins and follow-up with employees to review data led to a more engaged pilot group at the second pilot site. Collectively, this resulted in more robust impacts of the technology as employee engagement was higher. More involvement from the organization and site leaders (e.g., through coaching sessions, interaction documentation, general check-ins with employees about experience with the pilot process and data generated) in future pilots is imperative for successful implementation and execution.

Additionally, several challenges were realized throughout various phases of the pilot process:

- Implementing wearable technology may require IT approval, which could extend the approval and pilot timeline. Engaging IT early in technology implementation conversations may improve timelines.
- Despite training on the benefits of using the technology, sensor use dropped off quickly. This was perceived by leadership as resulting from a lack of requirement to use the sensors, a lack of consistent engagement from site leaders, and a lack of coaching. For example, of the 20 employees at the first

pilot site, only three to five were using the sensors consistently by the end of the pilot. The second pilot site was more successful with 15 employees wearing the sensors consistently through the entire pilot.

- The slight vibration from the wearable sensor resulted in employees slowing their pace of work or correcting their posture. Yet, there was a general response of indifference to the vibration from both pilot groups toward the end of the pilots.
- Pilot requirements (e.g., pilot duration or ability to change pilot sites) are important to consider before implementation. For example, some vendors require a minimum pilot length, often a year, which can be difficult to adhere to when benefits are not realized after a few months.

Impacts

While the pilots had some challenges, they still provided value to Schneider Electric. Several outcomes of the pilots were identified, as summarized below:

- A need for refresher training on proper lifting.
    - Employees participating in the pilot underwent training in proper lifting and the avoidance of quick twists, turns, and other fast movements. This exposed a need for additional training on MMH skills, as employees had forgotten recommendations from previous trainings on MMH.
- A new high-risk job task.
    - The safety scores calculated from the technology highlighted a previously unknown risk at a work station. After discovering the high risk, the work station was modified. This shows the ability of such technology to identify poorly designed job tasks.

Schneider Electric plans to continue use of the wearable sensors at four more sites going forward. For these sites, the sensors will be used for onboarding training for four to six weeks. Wearable sensors also may be utilized for short periods of ‘refresher training’ for established employees to help identify potential training deficits or work station design issues.

Schneider Electric

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