



The Feet First project includes members of the B.C. Nurses Union — nurses are typically on their feet for long periods.

Study measures impact of prolonged standing on foot pain

By Gail Johnson

Researchers at Simon Fraser University aim to get to the bottom of where foot pain really comes from. In a new study funded by WorkSafeBC, the researchers have partnered with a custom orthotics company to create insoles that measure the weight-bearing behaviour of people at work.

Anyone who's ever experienced plantar fasciitis can attest to how debilitating the condition can be. It involves inflammation of a thick band of tissue called the plantar fascia, which connects the heel bone to the toes. A hallmark symptom is intense, stabbing pain along the bottom of the foot.

Prolonged standing at work is widely thought to be a risk factor for this kind of pedi-pain. Clear evidence to support a connection, however, hasn't been firmly

established. That's because there hasn't been an effective, objective tool to quantify how much time workers spend in weight-bearing postures.

New research supported by WorkSafeBC is filling that gap.

In a project called Feet First, researchers from Simon Fraser University (SFU) have collaborated with clinicians at Kintec, a Surrey-based footwear and custom orthotics company, to develop an innovative, "smart" insole system that can measure workers' weight-bearing behaviour. The thin insoles are embedded with activity sensors, allowing researchers to quantify activity type and duration.

"We know that foot pain occurs in jobs where people stand," says lead researcher Carolyn Sparrey, associate professor in SFU's School of Mechatronic Systems Engineering and principal investigator for the

International Collaboration on Repair Discoveries (ICORD). “We want to understand why people who stand at work have a higher proportion of foot pain, but no one has been able to quantify it or get statistically relevant data. We need to get a better understanding of how people load their feet and whether or not that influences their experiences of pain.”

The search for objective data

Currently, WorkSafeBC policy designates plantar fasciitis as an activity-related soft tissue disorder (ASTD). But as it’s not connected to any particular process or industry, work causation needs to be assessed on a case-by-case basis.

Most studies that propose a link between prolonged weight bearing and foot pain use self-reporting as a means of estimating weight-bearing exposure. Consequently, the accuracy and reliability of data have been questioned.

To get objective data about the association and incidence of prolonged weight bearing at work and plantar pain, the instrumented insoles directly measure time spent sitting, standing, and walking over a standard 12-hour workday. Workplace activities are differentiated by the novel insoles using a proprietary artificial intelligence algorithm.

Feet First study participants include members of the B.C. Nurses’ Union, who represent at-risk professions that typically involve prolonged weight bearing, and people who have more sedentary office jobs.

The workers wore the insoles for a week. In addition, they completed questionnaires and surveys about their foot pain and their activities, plus had a 30-minute calibration of the insoles to ensure accuracy.

The researchers, who include SFU students, are compiling data and expect to release findings soon.

“By far, the most common condition our clinicians see at Kintec is plantar fasciitis,” says co-investigator Michael Ryan, director of research and development at Kintec and an adjunct professor in SFU’s Department of Biomedical Physiology and Kinesiology.

“We often hear that it’s associated with standing for prolonged periods of time, but so far there hasn’t been sufficient evidence to suggest prolonged weight bearing places workers at a greater risk of developing foot pain. We’re excited to have developed a tool that can answer this question.”

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—Carolyn Sparrey, associate professor, Simon Fraser University School of Mechatronic Systems Engineering

The findings will lay groundwork for connecting postures and pain severity

What makes this research especially notable is its potential for far-reaching impact. If a relationship between prolonged weight bearing and plantar foot pain is identified, it will help determine the ideal postures to maintain at work to minimize the occurrence and severity of foot pain; workers could modify activities or change behaviours to mitigate their risk and exposure.

It will also lay the groundwork for a much larger study that would examine more deeply the specific impact of certain weight-bearing postures in the incidence and severity of plantar fasciitis.

The ultimate aim is to reduce foot pain in thousands of workers in at-risk industries, from construction to hospitality to retail.

Improving the health and well-being of workers

The study illustrates the kind of credible, research that WorkSafeBC supports, says Lori Guiton, director of WorkSafeBC’s Policy, Regulation and Research Division. The information can be translated to the real world by employers, workers, policy makers, health-care practitioners, and other experts.

“Carolyn’s study is a great example of scientific research that can be put to use in improving the health and well-being of workers,” says Guiton. “Plantar foot pain affects many people, and although it is quite common, how it develops isn’t well understood. Exploring whether there is a link between working

conditions and the onset of foot disorders will help us to better address it in the future.

“Our investment in research allows us to encourage the creation of new approaches to preventing and addressing workplace injury and illness, and respond to priorities in workers’ compensation,” she adds. “We’re excited to move forward in ways that meet the needs of our organization, as well as those of our partners and collaborators. We encourage anyone with an interest in research to connect with us through worksafebc.com.”

For more information

The WorkSafeBC Research Services department funds research projects that provide insights and solutions for issues faced by workers and employers. You can sign up to receive automatic email notifications when new funding opportunities are posted on worksafebc.com. Keyword search: research opportunities. ☺



Participants in the study wore instrumented insoles to measure various pressure points on their feet.



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