

## CONTINUING EDUCATION - HEALTH TRACK

### Exposure to Physical Risk Factors for Musculoskeletal Health Outcomes During Common Agricultural Activities

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#### **Purpose/Objective:**

We are currently conducting a prospective epidemiological study to 1) examine seasonal trends of low back, neck/shoulder, and hand/arm musculoskeletal symptoms, 2) characterize exposures to physical risk factors for low back, neck/shoulder, and hand/arm musculoskeletal symptoms, and 3) estimate associations between physical risk factors and low back, neck/shoulder, and hand/arm musculoskeletal symptoms among a large sample of agricultural workers in nine Midwest states. The proposed oral presentation will address our approach to estimating physical risk factors, the data collection instruments used, and highlight important preliminary results.

#### **Methods/Efforts:**

Study participants include a cohort of 518 agricultural workers distributed throughout the Midwestern United States. Every six months, all participants complete a set of self-administered questionnaires that collect information about musculoskeletal health outcomes, the average number of weekly hours engaged in common agricultural activities, and other variables that may confound estimates of the association between the number of hours engaged in common agricultural activities and musculoskeletal health outcomes. For a subset of participants (~ 15%), our research team obtains on-farm measurements of exposure to physical risk factors during common agricultural activities using direct measurement technologies. For example, surface electromyography (EMG) is used to measure muscle activity, inertial measurement units are used to measure trunk and upper extremity postures, and accelerometers are used to measure vibration during use of self-powered vehicles.

#### **Results/Findings:**

At this time, we have conducted more than 50 visits to participants' farms to obtain measures of exposure to physical risk factors. Processing of muscle activity and posture measurements into biomechanically-meaningful summary measures is underway, and preliminary findings will be available at the time of the conference. Measurements of whole-body vibration have been obtained during use of 60 agricultural vehicles, including all-terrain vehicles, combines, and a variety of utility tractors. In general, the greatest magnitudes of whole-body vibration accelerations have been observed during ATV use and the lowest magnitudes of whole-body vibration accelerations have been observed during combine use. Preliminary estimates of exposure, which considers both the vibration acceleration and the duration of vehicle operation, suggest that operator exposures often exceed the recommended levels from consensus standards (e.g., ISO 2631-1).

#### **Application to Field Research:**

When completed, our research will result in a more complete understanding of associations between exposure to physical risk factors and musculoskeletal symptoms among agricultural workers. The use of direct measurement technologies will allow us to characterize the fundamental biomechanical aspects of exposure to physical risk factors during common agricultural activities. Such information is needed to provide an evidence base for the development of new intervention strategies to reduce the occurrence and severity of musculoskeletal outcomes among this large population of workers.

*\*Nathan Fethke is unable to attend; Mark Schall will be presenting in his place.*

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