

CPH News and Views

A semi-monthly column on emerging topics related to healthy workplaces

Issue #58: Lobstermen participate in ergonomics research on breaking down traps to reduce risk factors for musculoskeletal disorders

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Lobstermen are exposed to multiple ergonomic risk factors during their normal operations on the water. One recent study documented that they have a substantial burden of suffering due to musculoskeletal disorders. A high rate of various acute injuries at multiple body locations was observed, as well as a high prevalence of chronic pain, also at multiple body locations (Fulmer & Buchholz 2002; Fulmer et al 2016, 2017).

Lobstering is a male-dominated industry, featuring thousands of de-centralized, independent, autonomous operators. They engage in all aspects of their work through a “do-it-yourself” approach on non-standardized boats manned by crews of 1 to 3 people. Logically, an effective reduction of risk for pain and injury on one boat might not have the same effect on all boats. Each lobsterman will want to personally optimize any potential ergonomic improvement. Lobstermen’s autonomy, however, makes the industry a natural setting for participatory ergonomics and for spreading improvements through better design.

The typical lobster boat is equipped with low-tech hauling equipment, deployed in a rigorous but simple routine. The essential repetition of hauling hundreds of traps is integral to the work itself and cannot be eliminated. The standard work cycle is to pull in a trap from the water with mechanical assistance, then manually place it onto the boat where it can be opened, rebaited, and cleared of its contents. This entails forceful exertions that often require awkward trunk and arm postures. Researchers and lobstermen alike have identified this activity, known as “breaking down a trap,” as a priority for ergonomic intervention. Breaking down the traps starts with the lobsterman bending to retrieve the trapline in the water and feed it through a block hanging overboard, then lift it using a hydraulically-powered hauler installed on board.

This task creates trunk and shoulder flexion (see photo), so it has become the focus for intervention. Through our participatory research process, the lobstermen generated some intriguing ideas to reduce the biomechanical risks in this task. Some ideas have been implemented, and some still need to be tested. One idea was to use a robotic arm. Further evaluation of this idea predicted that there would be some safety and reliability concerns. To develop an alternative



approach, we assessed existing equipment and mechanical demands of the work that could be re-engineered to reduce the need for extreme postures. A less robotic approach would introduce adjustability to the existing block height, so that it could be close to the lobsterman's hips when feeding the trapline through the block, but many inches higher when a trap nears the block. This would allow the lobsterman to reach and pull in the trap while remaining in a neutral trunk posture.

In Canada, experiments have been conducted to eliminate the block altogether. The lobsterman instead hauls a trap up across a modified section of the hull and washboard, where the trapline automatically pulls the trap to the processing location on the boat's washboard (Coulombe et al, 2018). In this scenario, the hauling is done at the stern of the boat, whereas in the US, hauling is done at the wheelhouse.

These examples demonstrate that practical safety innovations for lobstermen are feasible and that participatory ergonomics can be an effective means of compiling lobstermen's own knowledge to prevent injuries. Because there are so many independent lobster boat operators, it takes a great deal of effort to disseminate innovations so that more operators can benefit. For lobstermen to make improvements to their own operations, they must be aware of potential ergonomic alternatives, what others have done, how they did it, and what support might be available to help them introduce the idea on their own boat. Research support is needed to develop dissemination resources that fit the natural forms of lobstering culture, so that new ideas can ultimately translate to a reduction in the rate of injuries.

References

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