

If You Rest, You Rust - Wearable Tracked Activity after Musculoskeletal Injury can Predict Incapacity for Work

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INTRODUCTION: Injury associated incapacity for work is a significant personal, as well as socioeconomic burden. To adequately identify patients at risk for a prolonged time of work early after a musculoskeletal injury is thus of high relevance. Aim of the current study was to construct a machine learning assisted model to predict the time of work based on the pre- and immediate post-injury patient activity as measured with wearable systems.

METHODS: Patients with a pre-existing wearable (smartphone and/or body-worn sensor), data availability of at least 7 days prior to their injury, and any musculoskeletal injury of the upper and lower extremity were included in this study. Patient age, sex, injured extremity, time off work, and activity data were recorded continuously both pre- and post-injury. Descriptive statistics were performed and a regression model constructed to predict patients work incapacity status based on their pre- and post-injury activity characteristics.

RESULTS:

To date, 38 patients were included and completed data collection in this proof-of-concept study. The average follow up with available wearable data was 85.4 days. Based on the activity data alone a predictive model determining the likelihood of being incapable to return to work by 6 weeks based on the amount of steps 7 days prior and up to 3 weeks post-injury was successfully created with an accuracy of over 70% (Fig. 1).

DISCUSSION AND CONCLUSION:

The introduced model is feasible to assess patients at risk for a prolonged incapacity to work based on readily available personal wearable activity data with sufficient accuracy. Additional patient data as part of an ongoing study already in active recruitment can now help adapt the model to more specifically focus on different fracture entities and patient groups. The model has the potential to identify patients requiring additional aftercare attention early on thus ultimately enabling an earlier return to work through focused intervention.

