RETURN TO WORK DECISIONS AND RE-INJURY PREDICTION: CAN WE IMPROVE ON OUR PRESENT METRICS THROUGH BIOMECHANICAL AND NEUROMUSCULAR INVESTIGATIONS?

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In the area of occupational health and safety, biomechanics research has been valuable to understand injury mechanisms, the development of standards and is now beginning to develop objective metrics that are predictive of injury and re-injury. While psychosocial factors need to be considered, there is ample evidence as to the importance of understanding biomechanical factors in many injuries, in particular those of a musculoskeletal nature. Disorders of the lower back continue to be the most prevalent musculoskeletal problem worldwide with a significant financial burden being related to direct and indirect costs. The focus of this presentation is to discuss whether objective metrics based on biomechanical and neuromuscular factors could improve assessment of recovery and potentially help predict low back re-injury.

The most costly low back disorders are those that are chronic, and research shows that chronic low back pain is often the result of repeat injuries. While 90% of low back injuries resolve themselves with respect to pain, up to 62% of all cases will re-injure within a year. This suggests that criteria for return to work (RTW) have poor predictive validity or that return to work is devoid of the risk for re-injury. RTW criteria are based on intrinsic and extrinsic factors to the worker. Intrinsic assessments (the focus of this presentation) are often based on self-reports of symptoms (pain) and functional disability, with objective assessments involving a myriad of functional capacity evaluations that have been used extensively since the early 1990s to determine readiness to RTW. The latter are time consuming and costly, with recent studies showing that the predictive value of these tests for recovery and re-injury is poor. Major limitations exist for self-reports as well, since pain is a complex phenomenon that is affected by variables that are not directly related to physiology or biomechanics, including psychological and sociological factors. Accurate self-report of “tolerance” or of function is difficult and even healthy individuals have been shown to not estimate lifting loads accurately. When pain is present (such as in a chronic low back disorder population) the ability to perform tasks, rating of pain and exhibits of pain behaviours are altered. This begs the question as whether we have accurate measures of recovery following an episodic low back injury or pain episode, and whether these outcome measures provide the information needed to make decisions on recovery and RTW. Current measures capture perceptions and outcomes but not biological changes associated with a low back injury/pain episode. While a task can be performed with minimal visible variability, it can be produced by an infinite combination of muscle activation patterns. Metrics that capture physiological changes might provide a more objective assessment of recovery and may be predictive of re-injury. Given the importance of the trunk musculature to spinal function, measures based on electromyography recordings offer an opportunity to link physiology and biomechanics during functional task performance. A number of studies have found differences in a myriad of features taken from electromyographic recordings between those with chronic low back injury/pain and controls; but would it not be more informative to examine low back pain before it becomes chronic? This would require examining those with a low back problem earlier in the injury process, to begin to understand recovery and thus determine predictive capabilities of those metrics related to re-injury. This area has been understudied and the present state of the literature will be presented. What is evident is that clinicians, case workers and even injured workers want more objective specific information.