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Fit for Duty

Laser therapy reduces musculoskeletal injury rates at a Canadian pulp mill

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Located near Castlegar in British Columbia, Canada, Zellstoff Celgar Ltd. (ZCL) is one of the largest and most modern single-line Kraft pulp mills in North America. ZCL's annual production capacity is 520,000 metric tonnes of Northern Bleached Softwood Kraft pulp, and 170,000 megawatt hours of green electricity exports to market. Total revenue in 2015 was over \$38 million.

The mill employs approximately 400 people; of that, 290 are maintenance and production workers. The 24-hour-per-day, seven-days-per-week production of pulp relies heavily on full staffing of the trades and labor personnel that maintain or operate the machines.

Together with the very high costs associated with worksite injuries, it's essential to reduce occupational injury rates. To keep workers healthy and at work, we implemented a unique on-site physiotherapy program to find out whether we could reduce musculoskeletal injuries by addressing incidents in their earliest stages.

This physical therapy program has been an important part of ZCL since 2005, and over time the clinic has increased its operating hours to meet the needs of the mill and the workers. Although the program had been very well received, musculoskeletal injuries remained a concern. Thus, in February 2015 therapy

laser was added to the program to determine whether it could provide a measurable impact on incidents of musculoskeletal injury.

Patient Population Profile

In this industrial setting, we treat a male-dominated population from 21 to 68 years old. Typically, younger patients present for movement dysfunctions related to being unfamiliar with their jobs, while older patients have more degenerative tissue conditions. We see both acute and chronic cases related to the work performed by pipe fitters, mill workers, painters, electricians, forklift drivers, pulp testers, control room workers and others.

These jobs all require repetitive movements; most would be categorized as moderate workloads by the National Institute for Occupational Safety and Health (NIOSH). Body movement is essential to many types of work in the mill, inclusive of squatting, crouching, trunk rotation with flexion and extension, reaching overhead, jarring, pushing, pulling, carrying, and grasping and pinching grips.

Our patients can be considered industrial athletes in that they're required to perform physical activities that include awkward postures and moderate loads on a daily basis, and their livelihood is dependent on performing these tasks throughout the day.

Thus, our clinic operates similar to a sports physiotherapy clinic, encountering sprains,

strains, degenerative arthritis-related pain and dysfunction, post-operative rehabilitation, muscle imbalances, overuse syndromes, tendinopathies, neuropathies and bursitis.

The Physiotherapy Program

The main focus of our physiotherapy program is injury prevention. There is a strong emphasis on employee education including retraining aberrant neuromuscular movement patterns and rebuilding any deficits in strength, power, and range of motion as required by the type of work performed.

If a soft-tissue injury does occur, our intent becomes one of pain and symptom resolution, keeping individuals at work and shortening treatment times. These challenges inspired us to consider laser therapy as a potential solution. A clinical trial using laser to treat lateral epicondylitis returned relevant applications in our patient population.

We currently perform 10-11 laser therapy treatments per day, with approximately 50% of our cases receiving laser therapy as an adjunct to their treatment program. We have not observed any contraindications to this modality.

Common Mill Worker Conditions

The most frequent clinical presentations among the mill's population are strains and sprains. Signs include joint effusion or

soft-tissue swelling, reduced range of motion, acute local tenderness and protective muscle spasm.

Following treatment with therapy laser, clinicians have noted significant objective changes in the above signs, as well as subjective reports of diminished pain as reported on a visual analog scale. We also found that when laser is used post-operatively for acute pain and inflammation, there is evidence of reduced pain and stiffness and — if indicated in the patient's post-op time frame — an ability to perform rehabilitation protocols with less difficulty and discomfort.

Although these are mostly anecdotal findings, our observations are consistent with reports in the literature that laser creates an optimal environment for rapid cellular regeneration, normalization and healing.

We also employ laser often for treating trigger point pain with excellent results. For example, after treating acute trapezius pain and restriction spasm with the laser, we have observed immediate reductions in tone and discomfort of this muscle, as well as significant improvements in mobility. This increased range of motion can help the practitioner move into other more aggressive treatment options faster. Patients too sensitized to tolerate intramuscular stimulation (IMS) often respond favorably to early treatment with therapy laser.

Another effective application lies in penetrating deep-tissue areas such as hip joint capsular ligamentous structures. Other modalities require excessively longer treatment times to accomplish the same therapeutic effect in deep tissues, making laser the treatment of choice for these difficult-to-reach areas.

One of the most impressive successes was a case of olecranon bursitis. This patient received six treatments at six watts for a total dosage of 1,000 Joules at each treatment. The visible change in a week was immediate and significant, and greater than we have observed using any other modality. On day one, the bursitis size was 6.2 centimeters by 5 centimeters. By day three the focal area had reduced to 3.5 centimeters by 4 centimeters, and finally on day six the bursal effusion was only 1.0 centimeters by 2.5 centimeters (See Figure 1).

Compliance and Investing in Results

Like all businesses, ZCL must work constantly to ensure that their operation is profitable. In

addition to changing markets, environments and technologies, these industries must comply with numerous and complex industrial safety requirements. To invest in new treatment modalities they must demonstrate cost-effectiveness.

In the following discussion, costs from injury include indirect expenses such as those associated with worker compensation, worker indemnity and overtime costs, as well as administrative costs of managing the case in addition to the direct costs of medical and lost time.

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The average direct cost per WCB claim for a compensable injury in this operation's peer class is \$10,000; indirect costs can be estimated to be equal to direct costs. Thus, total cost is approximately \$20,000 per compensable incident.

To determine return-on-investment for therapy laser, and whether the modality had an impact on our musculoskeletal injuries (MSI) per year, we compiled data from 2004 through 2015. Our data showed that prior to implementing therapy laser (2002-2014), we experienced an average of 35.17 MSI per year. During the year following the addition of laser to the physical therapy program, we only had 12 MSI, constituting a decrease of 65%. Thus,

during the first year of implementation, this program can be estimated to have saved nearly half a million dollars.

Preventing Lost Time

In providing a free access physical therapy clinic, ZCL is investing in their employees; the benefits go far beyond the simple treatment of an injury. Laser therapy, as reported by employees, delivers near-immediate pain relief.

Workers learn correct movement strategies and restore strength and function. They are taking positive action to reduce pain and improve their health. They feel supported and valued, which in turn leads to better morale, job satisfaction and work performance.

As in many other process-oriented industries, even small errors here can impact the entire production. Reducing pain and improving function helps improve job performance and ensure smooth production.

The mill is the livelihood of these workers, and there are serious consequences to them and their families if they cannot perform their jobs. The effects of occupational injury compound the importance of an effective early-intervention, worksite-based program. Therapy laser has significantly improved the effectiveness of physiotherapy in achieving our goal of lowering injury rates and improving worker health and function. ■

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