



RISK ASSESSMENT OF SOFT TISSUE INJURIES FOR MANUAL AND MACHINE OPERATIVES

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1. INTRODUCTION

Daily work patterns and repetitive movements are a common feature of modern life. Poor postural habits are developed over a period of years and particular injuries can occur as a result of accidental trips and falls. The combination of such events and activities are likely to cause soft tissue problems and may lead to key site operatives being unable to work over extended periods of time. Employers can be faced with significant costs arising from sick leave or compensation for injuries and the dilemma of re-deployment of specialist staff to meet deadlines on existing contracts.

Standard risk assessments are normally based on taking control measures or avoiding actions to minimize risks to site operatives. This paper examines the particular hazards involved in common activities on a demolition site and considers the likely risks to specific muscle groups and associated soft tissues. Corrective actions include soft tissue treatment, stretching routines to loosen tight muscle groups resulting from the repetitive nature of the work and exercises to strengthen common areas of weakness.

2. MANUAL OPERATIVES

Daily activities on a demolition site are likely to involve a combination of lifting, twisting or moving materials with various tools. Typical examples and the associated risks to the muscular skeletal system are summarized in Table 1.

Lifting operations fall into two types, a one-handed lift of an object on one side only and a two handed lift of an item in front of the body. A one-handed lift is often undertaken in conjunction with another operative to reduce the weight per person, but it does not alter the basic body mechanics required to perform the movement.

During a one-handed lift, the basic weight of the item is taken directly by the lifting arm. To raise the weight, the abductor muscle group in the shoulder must also come into play.

Furthermore, to counter balance the weight, restraining muscles on the opposite side of the spine must contract and anchor the load into the opposite hip and leg. Due to the relative distances between the “arm-to-spine” and “back muscles-to-spine”, there is likely to be a load magnification of 4 to 5 times in the opposing muscle groups which stabilize the spine. In addition, the spine is likely to flex sideways like an “externally post-tensioned segmental column” and local increases in the compressive stress on the lumbar discs may lead to local deformation of the disc material. Lifting equal weights in both hands overcomes the potential risks created by sideways bending of the spine.

If a heavy weight is lifted with both arms in front of the body, flexure of the spine is essentially “front-to-back”. In this situation, the basic principles adopted by weight lifters should be applied to avoid overstressing the back muscles and damaging the lower spine.

Activities such as raking and brushing require twisting movements in the upper body, relative to the pelvis. Repetition of these movements will probably result in overuse of the oblique abdominal muscles and side stabilizers of the lumbar spine. The lumbar region is particularly vulnerable to any form of repetitive twisting action as this section of the upper body is torsionally weak compared to the shoulder-rib cage complex and the pelvic girdle. Regularly changing hands and alternative ways of producing a brushing or raking action should reduce the risk of repetitive strain injuries.

Any form of striking movement with heavy tools such as a pick-axe or sledge hammer places additional demands on the upper body. Not only can these movements induce repetitive strain injuries to the back extensor muscles, but the damage can go a lot further up the spine, with a particular risk of whiplash effects on the neck muscles. Long-term use of these tools may lead to displacement of the cervical spine and operatives “fainting” from a simple rotation or backward tilt of the head. Any history of whiplash injuries from falls or traffic accidents should be noted before assigning site operatives to such duties.

3. MACHINE OPERATIVES

Machine drivers spend the majority of their working day in a sitting position, using a combination of foot and hand controls. The common hazards and risks associated with these activities are summarized in Table 2.

Stress levels on the base of the spine can be far greater in a sitting position than in standing. Leaning forward or slouching for prolonged periods can lead to tightening in the neck and upper shoulder muscles, together with shortening across the front of the chest. Adopting an upright postural position, standing up and walking around at regular intervals can reduce the risks.

The sitting position also encourages shortening of the primary muscle groups across the front of the hip joint and the hamstrings at the rear of the upper leg. As a result, the opposing muscle groups, the gluteals over the rear of the hip joint and the quadriceps at the front of the upper leg become lengthened and weakened. This pattern of behaviour is likely to place the hip and knee joints at greater risk of deterioration in later life.

Continuous use of pedal controls can involve prolonged external rotation of the legs. A common problem for lorry drivers occurs with the right foot position on the accelerator pedal. The majority of drivers exhibit a characteristic walking pattern with weakened hip muscles and

splayed feet. Hence, the modern equivalent of the John Wayne swagger is the lorry driver swaying from side to side and walking with “10 past 11 feet”.

Many machine drivers operate both foot and hand controls on a continuous basis. Consequently, gripping control handles will involve over use of the wrist flexors and may lead to long term aching in both wrists and finger joints.

4. CONTROL MEASURES

The most important first step in providing effective control measures is for employers to make their staff aware of the potential hazards and risks involved in any form of repetitive activity. This basic principle follows from the CDM Regulations, which also require employees to take responsibility for their own welfare and safety. Hence, employees also have a duty to take steps and measures to reduce the long-term risks to their own bodies.

The best safeguards can take the form of education through training courses designed to demonstrate the need to vary activities and posture as much as possible. It is also important that inherent muscle imbalance, weakness or soft tissue injuries should be identified or assessed for each employee on an annual basis. Simple checks of this nature would take no more than an hour per person but they would form a valuable health check and could prevent significant problems developing over several years.

Employees can be taught to become aware of the possible significance of aches and pains in their back, shoulders and limbs. Once potential problems are identified, they can be given appropriate treatment for tight, over-used muscle groups and exercises for weakened under-used muscles. At least one major haulage company now allows time and pays for employees to receive deep-tissue massage and exercises to reduce time lost by drivers suffering with postural related injuries.

5. CONCLUSIONS

Risk assessments for standard physical and machine related activities on demolition projects should consider the potential long-term risks associated with the continuous repetitive nature of daily work patterns. Site operatives should be trained to recognise potential risks and assessed on a regular basis to determine whether muscular and joint problems are increasing or if they can be controlled by a combination of soft tissue treatment, stretching and strengthening exercises.

The costs of periodic treatments and postural checks on Employees are insignificant compared to the personal suffering and losses that can accrue from sick pay and compensation for permanent disabilities. The overall benefits to Employers should be a reduction in lost time, improved health and efficiency of the demolition work force in the long term.

Table 1 Particular Risk Assessment of Soft Tissue Injuries for Manual Operatives

Activity	Hazard	Risk	Probability	Severity	Control Measures
One hand lift	Counter balance forces on spine of up to 4-5 times greater than load.	Overstress in side flexor muscles from spine to opposing hip.	Very High	High	Pick up loads in both arms to balance the spine sideways. Stretching and strengthening exercises for arm, shoulder and back stabiliser muscles. Reduce weight of lift. Use two man lift.
		Overstress in shoulder abductor muscles on lifting arm.	High	Medium	
		Overstress in wrist flexors on lifting arm	High	Medium	
Two hand lift	Additional load on lumbar spine.	Excessive compressive stresses on lumbar discs. Overstress in back extensor muscles.	High High	Very High High	Reduce weight of lift. Stretching exercises for tight back muscles. Strengthening exercises for abdominal muscles and core stability. Training in safe lifting techniques.
Raking and sweeping	Twisting forces on upper body.	Overstress in oblique abdominal muscles and stabilising muscles of the spine and pelvis.	Very High	High	Change hands and direction of movement on regular basis to reduce repetitive strain of over-used muscle groups. Build up abdominal muscles, core stability and gluteal muscles. Stretching exercises for tight back and hip muscles.
Pick axe and sledge hammer	Dynamic forces on upper body.	Whiplash effects on neck muscles.	Very High	Very High	Avoid activity if history of neck injuries.
		Repetitive strain injuries in elbows, shoulders and back.	Very High	High	Stretching and strengthening exercises for neck, arm and back muscles.

Table 2 Particular Risk Assessment of Soft Tissue Injuries for Machine Operators

Activity	Hazard	Risk	Probability	Severity	Control Measures
Sitting	Loading on lumbar spine. Shortened hamstrings and hip flexors.	Overstress in lumbar discs and back muscles. Sciatic pains, cramp in hamstrings and knee pains.	Very High Very High	High Medium	Adopt good postural position. Avoid slouching back or leaning forward for long periods. Stand up, move around at regular intervals. Build up core stabilising muscles. Stretching exercises for shortened muscle groups.
Pedal Controls	Shortened hip rotators.	Restricted range of movement in hips. External rotation of upper leg, leading to knee and foot pain.	Very High Very High	Very High High	Avoid prolonged outward rotation of feet on pedals. Adopt regular stretching exercises for hip rotators. Training exercises for foot and knee positions in walking, standing and sitting.
Hand Controls	Shortened wrist flexors.	Stiffness in fingers and pains in wrist and elbows.	High	High	Vary hand and arm positions. Stretching exercises for wrist and arm muscles.

