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COST BENEFIT STUDIES THAT SUPPORT TACKLING MUSCULOSKELETAL DISORDERS

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ABSTRACT

Twenty nine case studies are presented that demonstrate ergonomics interventions carried out in organisations to reduce the risks of musculoskeletal disorders (MSDs). Of these twenty one are presented which quantify the costs of the intervention and the benefits that have been gained. The case studies illustrate ways in which investment in reducing musculoskeletal risks has resulted in financial benefits to the company through cost savings, or increased productivity and quality of output.

The case studies have been drawn from a range of industries. The ergonomic interventions took a variety of forms, from addressing the design of the task, the equipment, workstation and environment, to the organisational context in which the work was done. The studies that have been produced varied in complexity and magnitude, containing within their scope simple and inexpensive fixes to aspects of a job, and major projects involving several personnel and quite significant capital outlay.

Benefits were clear to see when the company had already started to incur costs due to sub-optimal task design or workplace organisation. Where benefits were difficult to quantify, testimonials were used to describe the benefits.

It is hoped that making the business case for ergonomic interventions will promote the benefits of a proactive approach to managing MSD risks.

EXECUTIVE SUMMARY

Twenty one case studies are presented that show the cost benefit analysis of ergonomic interventions to reduce the risks of musculoskeletal disorders (MSDs). An important tool in persuading UK businesses to adopt good practice in tackling MSDs

is to demonstrate that ergonomics interventions at the workplace can prevent MSDs and benefit businesses financially.

In UK business, competing in a market-driven global economy, business owners, shareholders, managers and their advisers need to be persuaded that business investment is sound, that it will provide a good return on investment, and, increasingly, that it will form an integral part of their goal to meet good practice in social responsibility. It is against this background that interventions to improve health and safety must be considered.

The cost of MSDs to UK business and society is well known. The Health and Safety Executive (HSE) estimate that in 1995/96 MSDs cost British society £5.7 billion, with 1.0 million people currently affected each year, resulting in 11.6 million lost working days (2004/05)¹. MSDs most commonly affect the lower back (almost half of those who suffer an MSD), the upper limbs or neck (just over a third of those who suffer an MSD), with fewer people experiencing problems in their lower limbs (almost a fifth).

The case studies that have been produced varied in complexity and magnitude, containing within their scope simple and inexpensive fixes to aspects of a job, and major projects involving several personnel and quite significant capital outlay.

The case studies presented here have been drawn from a range of industries. In many instances the design or organisational ideas will be readily transferable to other industries and situations. The ergonomic principles that led to changes to a packing line in a food processing factory, for example, are likely to apply to a manual assembly line for other goods. The ergonomic interventions took a variety of forms, from addressing the design of the task, the equipment, workstation and environment, to the organisational context in which the work was done.

Benefits were established by calculating the investment required to bring the intervention about and comparing that cost with the quantifiable benefits of the improved work system. It was important therefore to be able to compare the difference in conditions before the intervention and afterwards. The research team therefore considered changes to sickness absence levels attributed to MSDs, productivity rates, staff turnover, and other variables which might apply such as reduced waste of materials and higher quality output. Different factors were applicable to different case studies, and not all companies were able to provide comprehensive data on all potential costs or benefits. Where necessary, assumptions were made about certain costs using the HSE Ready Reckoner cost calculators, published on the HSE's websites. Where estimates have been made, they are identified as such in the cost benefit analysis calculations. A Chartered Accountant supported the research team by interpreting financial data where necessary and ensuring that calculations were in accordance with good accounting practice.

In situations where companies had used their risk assessment procedure proactively to avoid health problems before they occurred, 'before' and 'after' data on MSDs could not be used: the potential risks had been avoided before they had begun to emerge. Estimating savings from avoidance of potential MSDs was difficult in these cases because any figure put forward would be based on assumption only. Musculoskeletal injuries are complex and do not follow a linear dose-response relationship. Benefits were clear to see when the company had already started to

¹ www.hse.gov.uk/msd

incur costs due to sub-optimal task design or workplace organisation. Where benefits were difficult to quantify, testimonials (that is, informed statements and comments made by workers, managers or health and safety staff) were used to describe the benefits.

By way of example two case studies are summarised.

Case study: Controlling handling risks for offshore equipment

The first case study is from the oil and gas industry. Radioactive sources are used to investigate the density of rock formations. The radioactive material is stored in source containers of various sizes weighing from 10 to 75kg. Onshore these containers were handled manually into an overpack which was used for transporting the containers offshore. A back injury had occurred when an operator was loading the heavier of the containers; this resulted in six months sickness absence. Another similar incident resulted in 10 days lost revenue from sickness absence.

It was not possible to make the source containers lighter or to change the dimensions of the overpack which would have improved the postures that could be adopted. Instead, a jib crane was fitted permanently to the top of the overpack which would take the weight of the containers. In addition, a trolley was fitted to the interior of the overpack which would allow containers to be handled without the operator having to reach into the storage space.

One overpack was modified at an initial cost of £2,500 and the system was tested in the operational environment. After it was found to be successful a further 14 overpacks were modified at an additional cost of £10,000. As a result of this intervention it has been found that the cost of injuries has been avoided and the job is reported to be less fatiguing. The total direct intervention costs were £14,875, the net intervention benefit was £178,671, and the payback period was 3 months.

Case study: Better workstations to reduce risks to shoulder and neck

The second study relates to the manufacture of medical devices. Attaching ultra-fine sutures, used in ophthalmic surgery to needles, by a foot operated pneumatic machine was a highly skilled job. The location of the microscope eyepieces meant that very awkward, and at times extreme neck postures had to be adopted and held to position the needle correctly in the needle clamp. There was no job rotation from this task. Shoulder and neck discomfort was reported by 40% of the workers carrying out this task.

It was identified that the high ergonomic risk could be avoided if the ultra-fine attaching job was only performed for four hours per shift. However, four-hour maximum task time significantly reduced the productivity levels which cost the Company both lost revenue and profit. Therefore modifications were made to the workstation to improve the posture. Although this reduced the musculoskeletal risks the Company remained concerned about the residual risk.

As a result the workstation height was raised and a camera and small monitor were installed that allowed the operator to check the location of the needle without adopting awkward neck postures. Staff who had not been experienced in the task could now perform it with less training than had been required before. An ergonomic assessment was undertaken of the revised workstation which showed that operators could work safely for an additional two hours a day without being at significant risk of musculoskeletal pain or injury.

The cost of the modification to the workstations and for purchasing the cameras was £9350, the net intervention benefit was £18,900, and the payback period was 12 months.

To our knowledge this is the first time that an attempt has been made to gather a significant number of case studies that demonstrate quantifiable benefit to organisations from tackling MSDs. Despite certain difficulties that were faced, most notably being able to isolate the required information from the organisations, the required deliverables have largely been met.

The case studies can be used to provide ideas for ergonomic interventions and to support a business case for the investment of time and money which may be necessary to realise them. The organisations that have carried out this analysis have found the exercise to be very worthwhile and it is hoped that the case studies will have a wider implication by indicating the ways in which MSDs cost money and quantify how their elimination can save money. The list of issues to consider which have been used in the cost calculations can be used by organisations wishing to balance the costs and benefits of investing in ergonomic interventions.