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Regulatory actions to prevent work-related musculoskeletal disorders-the use of research-based exposure limits

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Regulatory actions to prevent work-related musculoskeletal disorders—the use of research-based exposure limits

In a speech given to promote the proposed United States ergonomics program in 1999, Charles Jeffress—former director of the Occupational Safety and Health Administration (OSHA)—announced a change in approaches to regulatory issues. “Setting standards is something we must do well. And we must do it differently in the future than we have in the past. It’s impossible to tailor standards to fit every conceivable hazard. Instead we must empower employers and employees to address problems within a practical framework. We must focus on performance rather than specification [p 3]” (1). With this clear emphasis on a performance or system approach instead of specification and exposure limits (occupational exposure limits or threshold limit values), the United States endorsed the kind of approach that has characterized work environment policies throughout Europe and the European Union (EU) in the last decade.

Influenced by the British Robens Report of 1972 (2), which called for less reliance on prescriptive regulatory requirements and greater reliance on codes of practice and the use of goal-oriented requirements, the EU regulation on occupational health issues was established in the framework directive adopted in 1989. This directive provides a general outline for risk identification and prevention that is further specified in several individual directives carrying special reference to work-related musculoskeletal disorders: the manual-handling directive, the directive on work with video display units, and the work-equipment directive. Built on a performance-based approach, these directives set up process and system requirements for companies and specify the employers' obligation to carry out a risk assessment of all occupational risks and to make provisions for adopting protective and preventive services.

Hand-in-hand with this reliance on system monitoring and dialogue, the emphasis on enforcement policies in Europe has gradually changed from control to dialogue, from inspection to outreach and assistance. This change does not mean that control and inspection are absent from European polices on occupational safety and health. The tendencies, however, are clear. In a 1997 EU survey on priorities and strategies in occupational safety and health policy (3), all member states agreed on the importance of inspection and enforcement, but most countries further argued that future legislation should focus more on setting targets, consolidating companies' own efforts, and introducing financial incentives.

The use of exposure limits has, however, not been removed from the agenda. Developmental trends in regulatory issues to prevent work-related musculoskeletal disorders are far more contradictory than outlined in these introductory remarks. In 2000, the State of Washington in the United States passed an ergonomics rule based almost entirely on exposure limits (4), and the International Labour Organization (ILO)—in a recent evaluation of its standards—expressed concern for the loss of protection that could result from replacing maximum weight limits with a performance-based approach (5). At the same time, technical standards on ergonomics and physical workloads, for example, CEN (Committee for European Standards) and ISO (International Organization for Standardization) standards, continue to present very specific exposure limits and equations to predict acceptable workloads.

Due to limited legal implications, the CEN and ISO standards have been “allowed” to present very specific and rather unsupported limits without much public debate. The main controversy appears

when the "active state" interferes and decides on specific regulation with respect to work-related musculoskeletal disorders. In this case, the conflict between labor and industry—or employers and employees—suddenly becomes evident. Trade unions, traditionally supporting specific limits backed up by enforcement policies, are confronted with employers who strongly oppose this kind of legislation. The Washington State ergonomics rule is thus facing heavy industrial opposition, and, in Europe, employers react promptly to demands for clear and specific directives: "if there is to be effective prevention of MSDs [musculoskeletal disorders] a flexible non-binding framework is required ... a rigid regulatory approach would not permit this [p 21]" (6). It is illustrative that, when the OSHA standard—following a public hearing that criticized the lack of exposure limits and specific compliance measures—stepped back from the performance approach advocated by Jeffress and introduced a specification approach that resembled that of the Washington State rule, political and industrial opposition grew rapidly, and the standard was repealed only a few months after it was passed.

When we look more specifically at arguments raised against exposure limits and a specification approach in the prevention of work-related musculoskeletal disorders, we find the following two aspects: (i) the efficiency of regulatory efforts are questioned and highly specific rules are seen as narrow, inflexible, and out of touch with rapid changes in workplace problems that seem better tackled with the implementation of a preventive culture rather than a prohibitive one and (ii) the scientific data for establishing occupational exposure limits are considered inadequate. The main objection against a formal rule in this respect is thus its inability "to make a scientific valid determination regarding the degree of risk from various levels of activity [p 3]" (7).

The question of scientific validity is essential for all researchers involved in the study of work-related musculoskeletal disorders. The paucity of scientific data supporting threshold limit values seems evident in three large epidemiologic reviews from the National Institute for Occupational Safety and Health and the National Research Council in the United States, published between 1997 and 2001. The three studies are unanimous in their conclusion: there is a clear relationship between certain physical work factors and musculoskeletal disorders, but especially "when there are high levels of exposure [xiv]" (8). This last reservation serves to illustrate that the current scientific "state of the art" allows the identification of high risk and clearly hazardous jobs and—to a certain extent—jobs with minimal risk. In between, there is a "gray zone" of uncertainty, derived from the fact that the dose-response data required to determine threshold limit values are not available.

The lack of dose-response data can be explained by several underlying deficits in scientific data. First, most epidemiologic studies use gross categorical exposure measurements, and often exposures are dichotomized. While this approach is sufficient for etiologic causation, it is insufficient for threshold limit values or quantitative guidelines that require knowledge of the complete exposure(dose)-response curve (ie, exposure measurements on a continuous scale). Second, the exposure metric always carries an implicit assumption about dose (9), and as uncertainties with respect to exposure-dose relationships are the rule rather than the exception for work-related musculoskeletal disorders, the exposure metric chosen as a proxy for dose may be misleading. If the biological effect of different compositions of duration and intensity (eg, average, cumulative, or peak exposure) differs markedly, there is a clear risk of presenting a misleading impression of dose-response data (10).

It should, however, be noted that this scientific uncertainty mainly concerns dose-response relationships at moderate or low levels of exposure. Evidence-based information tells us that high levels of exposure to certain physical workplace factors increase the risk of work-related musculoskeletal disorders to a level that may be considered unacceptable. It could further be argued that government regulation in this case is essential to ensure a minimum level of worker protection. A policy relying exclusively on a performance approach without specific numeric limits may be implemented at the expense of the protection of the most-exposed and most-vulnerable part of the workforce.

The workers' protection aspect has been part of regulatory issues in the field of occupational safety and health since the early part of the 19th century. Is this outdated? Probably not. A challenge to the scientific community could be to discuss the research base for maximum permissible exposure limits and to seek a consensus for a limited number of generic workplace risk factors, which eventually could be implemented in national legislation.

If we then turn to the efficacy questions, some factors indicate that the introduction of ergonomic exposure limits will not oppose companies' self-regulation and voluntary initiatives as stated. On the contrary, Pedersen (11) showed that traditional control-and-command regulatory activities could be significantly and positively related to industrial self-regulation. At the same time, evidence of the efficiency of ergonomics programs is mainly circumstantial and based on individual case reports. Available data are mainly from large companies with a well-functioning health and safety system, internal expertise, and ample resources, and on a societal level the positive effects of performance-based regulation are difficult to demonstrate.

For small and medium-size enterprises, clear and specific exposure limits and specific compliance end points seem especially advantageous. This aspect is important, as such enterprises are crucial for the success of occupational health and safety policies; in the European union alone, more than 60% of the workforce is employed in small or medium-size enterprises.

The use of maximum permissible exposure limits for high-risk jobs in combination with a performance or system approach appears to be the most efficient and consistent with respect to regulatory actions. Gunningham & Johnstone (12), in their book *Regulating Workplace Safety—Systems and Sanctions*, reach a similar conclusion and argue that there is "a case for a two-track system of regulation, one involving traditional regulation and another involving a system based approach intended to encourage enterprises to go 'beyond compliance' with existing regulatory standards [p 15]".

A final question concerns the need for research with a view to establishing threshold limit values capable of distinguishing between safe and hazardous exposures (ie, based on the entire dose-response curve). I would suggest that this kind of research is strongly needed, but not for the purpose of regulation and the setting of specific exposure limits. It seems evident that, for the increasing number of jobs in the gray zone area with moderate or low levels of exposure (eg, computer workplaces), a system approach, focusing on safety management systems and participation and dialogue, appears to be best. The need for valid dose-response data in this context primarily concerns the quality of risk assessment and the establishment of tools and guidelines for companies. Jayjock et al (12) has convincingly argued that risk assessment in the absence of valid dose-response data is inflicted with a high degree of uncertainty. In this respect, efforts to promote research into the mechanism of disorders and the use of biomarkers in order to establish valid dose-response data for moderate and low levels of exposure become a must.

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