several risk factors combined. The need for wider interventions in the workplace will depend on the absolute elevation of risk associated with each occupational hazard, for individual workers and the workforce as a whole, and on the extent to which the excess risk might be reduced by controls. Again, the most relevant statistics (individual attributable risk and population attributable risk) are distinct from the etiologic fraction.

A more appropriate application of etiologic fraction is in the assessment of claims for compensation. Here, the critical question is whether the individual case can be attributed to a particular hazardous exposure according to specified criteria (eg, on the balance of probabilities). The statistic has been used in the United Kingdom, for example, in deciding whether diseases should be classed as occupational for social security purposes, and, if so, in which groups of workers. However, compensation for low-back pain is problematic because the diagnosis depends largely on the reporting of symptoms, which makes it difficult to distinguish genuine from fraudulent claims.

Perhaps the main value of the model developed by Lötters et al (2) will relate to patients with low-back pain to which the occupational contribution is likely to be relatively small. In such cases, the estimate of work-relatedness might help a clinician to convince the employer that there is no need to restrict the worker's occupational activities unnecessarily and that, if a further episode of low-back pain occurred for this worker, there would be adequate defense against any legal claim for compensation. This possibility would, however, depend on being able to convince a court that the model was sufficiently trustworthy.

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Where to with meta-analysis?—first, do no harm

by Barbara Silverstein, PhD [1]

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As resources to conduct large multicenter prospective studies of musculoskeletal disorders become more limited, it is critical that we make maximum use of the data we already have to focus our prevention efforts. It is, in this context, that the meta-analysis used in the "Model for the Work-relatedness of Low-back Pain" (1) must be viewed. This particular paper has strong implications for clinicians in judging work-relatedness in cases of nonspecific low-back pain.

The authors conducted a systematic review of the literature on low-back pain, physical load, and psychosocial factors and performed a type II meta-analysis (from published studies rather than individual data) using a random effects model to calculate the pooled prevalence for nonspecific low-back pain and a pooled odds ratio for each risk factor using logistic regression. The stated objective of this analysis was to develop a decision-making model for clinicians to determine the work-relatedness of low-back pain.

The authors used cross-sectional and population cohort studies of *nonspecific* low-back pain. They eliminated studies that did not have sufficient exposure based

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on published guidelines and thereby increased the probability of seeing a work-related effect. It is unfortunate that they did not find more studies of prolapsed disc and sciatica because risk estimates for more specific conditions tend to be greater. The use of primarily cross-sectional studies allows for more inclusion in pooling, but it may weaken the argument for using the model to estimate the work-relatedness of specific cases because of the lack of directionality. The necessary elimination of some retrospective studies (2, 3) because of their different designs (case-referent) and means of determining a "case" also reduces the risk estimates. The authors excluded one of these studies (2) because physical examination and injury reporting determined the outcome measure rather than a symptom survey. This is unfortunate. In assessing the implication of multiple exposures more adequately, the use of "correction factors" based on the studies that did have adjustment is a reasonable compromise. The same approach should be performed to assess a possible gender effect as well.

In the model development, the authors assume that knowledge of latency, previous exposures, or traumatic injury is not important. While the authors hope that the model will be used for prevention purposes, it is more likely to be used by clinicians for worker's compensation purposes that predominantly operate under the "more likely than not" rule (eg, more than 50% likely). Under this scenario, the model suggests that those over 45 years of age must be exposed to all four risk factors and all three high-exposure risk factors for their low-back pain to be considered "more likely than not" work-related. There is no way for the clinician to take the frequency and duration (days or years of exposure) into account with this model, except for whole-body vibration.

The authors are to be congratulated on their efforts in taking on such a difficult and necessary task. It is incumbent upon all of us to provide meta-analysts with more rigorous studies that take into account a variety of potential risk factors. Meta-analysts must consider better ways to incorporate studies with very different designs, particularly those with more rigorous outcome measures. Otherwise, the result is likely a model that underestimates work-relatedness for clinical decision-making and intervention. And this outcome may result in inadvertently increasing the work-related risk for injured workers.

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