

Significance of cross-sectional surveys in occupational epidemiology

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MUR J-M, CAVELIER C. Significance of cross-sectional surveys in occupational epidemiology. *Scand j work environ health* 8 (1982): suppl 1, 24-25. This communication discusses the possibility of cross-sectional occupational surveys concealing real occupational risks. For example, occupational factors constitute only one of the etiologic determinants of multifactorial diseases. In addition the diversity of industrial processes leads to a dispersion of risks, and it is difficult to avoid sampling biases both for cases and for referents. The conclusion is drawn that only after several surveys, conducted by different groups and under different circumstances, have shown no risk for a certain occupational factor can such results be considered valid.

Key terms: epidemiologic research methods, work.

Industrial epidemiologic investigations on occupational risks are often cross-sectional since, from the technical point of view, they are easier and take less time than longitudinal ones. Yet several factors hinder the interpretation of data collected in cross-sectional surveys, and, even though a certain occupational agent is not shown to have a statistically significant effect on workers' health, one is not entitled to conclude that this agent is harmless. The following discussion presents some of the reasons for approaching negative cross-sectional survey results warily.

In industrial countries, where health standards are high, the problem of eradicating epidemic and endemic diseases has been superseded by concern about chronic health impairments such as degenerative diseases with multifactorial etiologies (6). These diseases appear as progressive transition from a state of good health to one characterized by health impairments that are difficult to detect in the early

phases. Therefore, the diagnostic criteria used in epidemiologic surveys must be well defined (7). In addition the methods available for detecting diseases must often be sensitive before a causal relationship can be established because the latency time between the first exposure to etiological factors and the diagnosis of the resulting illness can be long (1).

Not only are demands on the methods used to determine disease states great in cross-sectional studies, but the fact that several agents, both occupational and nonoccupational, can be involved and act either independently or synergistically in the development of the illness makes the determination of the occupational influences difficult (2). In fact nonoccupational factors sometimes produce more severe effects than occupational ones. For example, smoking is known as one of the major causes of chronic pulmonary diseases and lung cancer. On the other hand, industrial factors are not always at work only within the occupational setting. Atmospheric pollution from industrial plants is often a problem. For these reasons all known or presumed risks should be taken into account in a cross-sectional study, even if they are not directly related to the workers' jobs (8, 9).

As industrialization spreads, so do the occupational hazards involved. However,

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the severity of the hazards should, at the same time, be reduced by the development of industrial hygiene and the automation of industrial processes (4). Therefore, occupational conditions should be studied with respect to hazards associated with certain workplaces or technological processes. An epidemiologic investigation of such occupational hazards may be extensive (but the hazards studied heterogeneous) or focused on a particular factor (but the number of exposed workers small). To obtain larger samples, they can also be made multicentric.

As already stated, exposure to occupational hazards can alter with time. Technological advances and changes in workers' careers modify its nature and intensity. Because of these changes the evaluation of individual exposure becomes difficult (5, 9); it can be either a retrospective assessment which is necessarily imprecise because of the method used (eg, questionnaire) or an accurate determination based on measurements at the workplace. Objective and reliable methods for estimating cumulative exposure to certain occupational factors are still needed. One good example however is the methods used to determine exposure to ionizing radiation.

Large sampling biases may affect the validity of cross-sectional surveys. For example workers can temporarily or indefinitely leave their specific job because of illness, especially if the work involved is hazardous. Sometimes these workers are removed from hazardous jobs and placed in less dangerous ones; thus it may appear that the workers in the safer jobs have more serious health impairments than those working in hazardous places (3). Avoiding this bias requires that a large group of workers exposed to the investigated factor in the past be studied (historical longitudinal survey), and cross-sectional methods are not sufficient.

In a study on the effects of an occupational hazard on health, workers exposed to this hazard should be compared to a "reference group," ie, workers who are not exposed to this hazard and who are similar to the "exposed workers" with respect to other confounding factors, in particular

other occupational risks. Such a group is difficult to form (9), because occupational hazards are much too numerous and varied, even unknown, for ascertaining whether they are similar for the two groups. It may be more realistic to test the effect of an occupational hazard on health in a relative, rather than in an absolute manner, by comparing the workers exposed to this hazard to workers exposed to other hazards in the same plant. Thus, one can determine if the investigated risk is or is not more harmful than all other risks encountered in a plant.

In conclusion, several factors can conceal the effects of occupational factors on workers' health in cross-sectional surveys. Although some precautions may improve the sensitivity of these surveys, an occupational condition can be considered harmless only after several surveys, conducted by different staffs and under different circumstances, show that there is no evidence of risk.

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