A vignette from occupational epidemiology: Stitching evidence from tattered fabric.

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Occupational epidemiology strives to determine whether working environment adversely affects health. Public expects it to deliver very specific recommendation about presence of health hazards and levels of exposure to there hazards at which no adverse effects can be expected. The latter expectation places considerable demand on accurate elucidation exposure-disease associations: its shape and exposure-response slope, especially at low exposures. I will highlight some challenges in historical (also known as "retrospective") cohort studies of occupational etiology that arise from missing data and uncertainty in levels of exposure. Group-based exposure assessment will be described: an approach that was adopted by epidemiologists and occupational hygienists to deal with measurement error. Methodological challenges will be introduced though simplistic hypothetical example and further illustrated by the international study of lung cancer risk due to inhalation of asphalt fumes during road paving. It will be apparent that great care must be taken to guard against drawing false conclusions, especially since replicating large cohort studies in occupational epidemiology is often impossible: unlike laboratory-based scientists, occupational epidemiologists get only one shot to the right answer. The optimal analytical strategy for the presented studies remains elusive and yet public demands answers, forcing epidemiologists to intuit sensible analytical approach without having the luxury of waiting for theoretically justified analytical framework to be developed/implemented.