Uncertainty of cost components in assessments of working posture by different methods

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Background Assessments of cost-efficiency when collecting posture data in working life require accurate cost data. Some studies have assessed the costs of different measurement methods, but they have not addressed the uncertainty of estimated cost components, e.g. costs associated with purchasing equipment, or rating postures from video. Since uncertainty in cost components contributes to the uncertainty of the total cost estimate, information about uncertainties in cost components are important when selecting an optimal method in a given context.

Aim To assess uncertainty of estimated cost components when collecting and processing data on working postures using inclinometry, observation and self-report.

Method We used trunk and upper arm posture data from twenty-eight workers at a Swedish paper mill [1], collected using inclinometers, observations, and self-report. For each method, costs for data collection and processing were estimated using a model proposed by Trask et al. [2], addressing ten cost components, including costs for on-site data acquisition, data processing, and administration. Cost calculations required time-tracking of all tasks performed by researchers involved in the study, as well as documentation of costs for purchasing equipment and supplies. Uncertainties in costs were estimated by scenario analysis; i.e. we constructed an assumed best (lowest cost) and worst (highest cost) case for each cost component in all three methods.

Results On-site data acquisition for observations was the largest cost component of all, and showed the greatest uncertainty. This cost component was also large and highly uncertain for inclinometry. Costs of data processing and developing data analysis software were the most uncertain components for inclinometry, and the cost of data processing was notably uncertain for observation as well. For self-reported postures, cost components were smaller and less uncertain than for observation and inclinometry.

Discussion Onsite data acquisition and software development contributed most to the uncertainty of the total cost estimate for inclinometry and observation, respectively. Thus, they need to be particularly observed when budgeting a study. Observation can be less costly than inclinometry, or vice versa, depending on, e.g. whether experienced observers are readily available and whether inclinometers need to be purchased. These results highlight the importance of in-depth monetary cost analysis using systematic procedures before selecting a method for assessment of postures in occupational settings. Neglecting cost uncertainties may result in suboptimal decisions from an economic standpoint.