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From Our Readers

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From Our Readers

To the Editor:

In the article entitled "Observational Analysis of the Hand and Wrist: A Pilot Study" [Appl. Occup. Environ. Hyg. 6(11):927–937; 1991], Stetson *et al.* present what they consider to be the disadvantages of relying on video records when conducting an ergonomic job analysis. The authors describe, as an alternative, a direct-observation method for recording and analyzing hand exertions and wrist postures at the worksite.

In nearly 40 ergonomic hazard investigations, we have found videotape an invaluable tool for documenting biomechanical stressors in the workplace. Specifically, we believe that the authors' statements about the use of videotape are extreme and may be misleading to readers unfamiliar with ergonomic job analysis methods.

Videotape provides a "permanent" record of work activities and conditions and is equivalent in many ways to the "raw" data that is collected in other studies or experiments. Although procedures for recording work activities on videotape vary depending on the purpose of the study, the complexity of the jobs, the number of workers involved, etc., videotaping generally requires no more time than other data collection activities in the field. We feel that the authors do themselves a great disservice by relying on the analyst to observe and analyze all relevant information during the site visit. Recording work activities on videotape allows analysts to review the data after the site visit and to solicit opinions and advice from other analysts. The data can be reanalyzed, if necessary, to resolve problems or discrepancies. It would be unfortunate for an analyst to recognize a need for additional job analysis and have only processed observational data to consult. Videotape also offers the advantage of slow-motion or real-time playback, which is often useful for accurately measuring task durations or detecting subtle hand movements or exertions. As the authors point out, frame-by-frame analysis is time-consuming. However, in most cases, it is possible to identify major biomechanical stressors while analyzing video in real time. Video records serve as a "baseline" in studies where the plan is to implement and evaluate job interventions. Finally, videotape is a valuable visual aid for training and demonstration purposes.

We disagree with the authors' statement that a camera cannot adequately capture the complete range of hand and wrist postures used by workers during their job tasks. Since the advent of the battery-powered "handycam" or "palmcorder," the video camera has become an extremely light and portable instrument. Just as analysts can move around to get clearer views of hand and wrist postures during direct analysis, camera positions and angles can be changed to best capture work activities.

Although not stated explicitly, the authors hint at a problem that can arise when work activities are videotaped by inexperienced technicians who are not involved in the subsequent analysis. We agree; for the best results, the analyst should either do the videotaping personally or direct the videotaping activity. Many of the problems alluded to by the authors stem from handing out cameras to inexperienced technicians and telling them "to videotape some jobs." The analyst needs to be involved in data collection activities at the job site to ask questions, make measurements, and take notes. Because of unexpected events, the analyst will often need to devise a "custom" videotaping strategy based on changes in worksite conditions and the activities of interest.

In summary, we believe that recording work activities on videotape is a necessary supplement to other data collection activities in ergonomic hazard investigations. When collected and analyzed judiciously, videotaping provides an indispensable tool for the identification of ergonomic hazards and the formulation of appropriate control methods.

Katharyn A. Grant, Ph.D.
Daniel J. Habes, M.S.E.
Psychophysiology and Biomechanics Section
Applied Psychology and Ergonomics Branch
Division of Biomedical and Behavioral Science
National Institute for Occupational Safety and Health
Cincinnati, Ohio

Authors' Response

We regret that Dr. Grant and Mr. Habes have interpreted certain comments in our paper as a condemnation of using videotape in the performance of ergonomic analyses. This was certainly not our intent, nor was it a major point of the paper. The method described in "Observational Analysis of the Hand and Wrist: A Pilot Study" [1] was developed as an alternative approach to videotape analysis for specific situations where it is necessary to quickly measure exposure to ergonomic risk factors for the hand and wrist on a large number of jobs.

We agree with Dr. Grant and Mr. Habes that videotapes are a very useful, and often essential, tool when performing ergonomic analyses where the primary purpose is to diagnose the causes of ergonomic stresses so that appropriate intervention measures (i.e., workplace changes) can be developed and implemented.[2] We also agree that videotapes can be an important training tool, both for teaching people how to recognize ergonomic stresses and for demonstrating the effectiveness of ergonomic interventions by showing "before" and "after" examples of successfully modified jobs.

However, there are situations where

large numbers of jobs need to be evaluated in a consistent manner. For example, in our research, we attempted to follow over 600 workers for a several-year period. Videotaping each worker on each job he/she held was not feasible and the observational analysis method was developed to meet, in part, the need for a rapid, reliable method of documenting the presence of ergonomic risk factors for cumulative trauma disorders of the hand and wrist.

Situations where videotape may not be necessary include the following:

- Initial screening of jobs in a large plant where the primary objective is to identify and prioritize problem jobs. While we endorse videotaping those jobs found to have significant exposures to ergonomic stresses, we question the efficiency of videotaping all jobs as the first step. Instead, some type of observational screening system is needed to select jobs that require follow-up evaluation.
- Epidemiological research or surveillance programs where the objective is to track worker exposure to ergonomic risk factors on a large number of jobs over time. Because the primary objective is to assess the level, rather than diagnose the causes, of ergonomic stresses, job-site observational techniques can provide the necessary exposure indices in less time and at a lower cost than video-based methods.

While not always practical, we agree that the ability to simultaneously videotape and perform on-site job analysis could be an asset in these situations. Videotapes provide a permanent record and allow a check for consistency between on-site and videotape analysis. The advantage of a reliable, direct observational analysis method is that it can be performed either at the job site or during observation of videotapes.

In closing, we believe that there is no single best method for performing ergonomic job analyses. The job analyst must evaluate the specific needs of a given situation and develop an appropriate strategy for collecting the required information.

Diana S. Stetson, Ph.D.
William Monroe Keyserling, Ph.D.
Juli Ann Leonard, M.S.
The University of Michigan
Ann Arbor, Michigan

Barbara A. Silverstein, Ph.D.
Washington Department of Labor & Industries
Olympia, Washington

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To the Editor:

The article by Rosenthal and Abdollahzadeh on "Assessment of Extremely Low Frequency (ELF) Electric and Magnetic Fields in Microelectronics Fabrication Rooms" [Appl. Occup. Environ. Hyg. 6(9):777–784; 1991] was interesting. However, they need to note that we don't know yet what constitutes dose. Average or cumulative field strengths may not be the relevant or the only relevant factor.[1,2] This fact needs to be made clear in the occupational exposure literature. Laboratory experiments show that several factors, especially time dependence of fields and harmonics, may be extremely important in determining biological response.[3–5] As occupational hygienists become aware of the problem of potential health risks from fields and start measurements, it would be helpful to measure the field environment in a more complete way so that we will have useful data when we understand what the relevant dose metric is.

Indira Nair
Jun Zhang
Department of Engineering and Public Policy
Carnegie Mellon University
Pittsburgh, Pennsylvania

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Authors' Response

We wholeheartedly agree with the comments of Nair and Zhang. As stated in our paper: "Because mechanisms of ELF-induced health effects have not been identified, the most appropriate parameter for characterizing exposure is not known." Given this situation, a possible approach is to gather exposure data using microprocessor-based personal dosimeters, which are now available. These dosimeters can store field data many times per minute; thus, the data can be used to assess exposures with various averaging times simultaneously, including "peak" exposures. Harmonics can be detected with the use of electronic filters such as the one used in our study.

Frank Rosenthal, Ph.D.
Sassan Abdollahzadeh, Ph.D.
School of Health Sciences
Purdue University
West Lafayette, Indiana