Telecommuting

Managing the safety of workers in home office environments

By Michelle M. Robertson, Wayne S. Maynard and Jamie R. McDevitt

ADVANCES IN INFORMATION TECHNOLOGY are allowing select employees to work anywhere and at any time. The work location for some employees is changing from the traditional corporate office to a virtual work location, such as the home, hotel, airport, shared and satellite office, client office and the car. This trend toward alternative work styles and the distributed workforce is likely to continue. As these work styles and virtual workplaces continue to emerge, SH&E professionals will be called on to establish new processes for managing the safety and health of telecommuters. This article provides an overview of safety and health issues associated with telecommuting. First, a macroergonomics perspective and model is presented, then a work system design approach for telecommuting programs is described. Finally, a macroergonomics process for managing the safety and health of telecommuters, and guidelines to prevent and reduce disability associated with injuries that occur at an alternative worksite are presented.

Thanks to advances in information technology, where a person works these days is not as important as the work performed. The central work location is being replaced by the virtual work location, such as the home, hotel, airport, shared and satellite offices,

Michelle M. Robertson, Ph.D., CPE, *is a senior research associate at the Liberty Mutual Research Institute for Safety in Hopkinton, MA. Prior to joining Liberty Mutual she was a faculty member at the University of Southern California and was a senior researcher at Herman Miller Inc. Robertson holds a B.S. in Human Factors, an M.S. in Systems Management and a Ph.D. in Training from the University of Southern California. She currently serves on the Executive Council of the Human Factors and Ergonomics Society (HFES).*

Wayne S. Maynard, CSP, CPE, *is director, ergonomics and tribology, at the Liberty Mutual Research Institute for Safety. Maynard has more than 24 years' experience with Liberty Mutual and has held a variety of field, staff and line management positions within the loss prevention department. A professional member of ASSE's Greater Boston Chapter, he earned a B.A. in Zoology from the University of Maine at Orono. Maynard is the Alliance of American Insurers representative on ANSI's Z365 Committee on Control of Cumulative Trauma Disorders.*

Jamie R. McDevitt, M.S., *is a research associate at the Liberty Mutual Research Institute for Safety. She holds a B.S. in Computer Science from Central Washington University and an M.S. in Human Factors Psychology from the University of Idaho. Prior to joining the institute, McDevitt was an adjunct faculty member in computer science at Columbia Basin College and a graduate fellow at Pacific Northwest National Laboratory. She is a member of the HFES and a charter member of its New England Chapter.*

client office and even the car. This trend toward alternative work styles is likely to continue.

Millions of Americans now telecommute (defined as working for an employer at an alternative work location such as the home with an electronic link). According to the International Telework Assn. and Council, more than 23.6 million people reported working as telecommuters in 2000 (ITAC). Telecommuting offers benefits to employers and employees alike; these include increased productivity, reduced overhead and operating costs, and greater job satisfaction from flexible work schedules. Environmental benefits, such as reduced traffic and air pollution, affect the public at large.

While telecommuting programs offer an attractive alternative to traditional work locations, they present challenges to both employers and employees. These include how to best manage those who work at home, and how to implement and support required information technology. Other concerns include lack of social and group interaction; changes in job autonomy; absence of mentoring and career development; balancing work and personal conflicts; extended work hours and workload; and sound risk management that addresses safety and health issues. Designing effective communication strategies that allow managers and employees to define job responsibilities, set goals and job expectations, and regularly review work and performance are just some of the issues that organizations must address. Others include establishing policies and procedures regarding appropriate technology and equipment, and training employees to manage those technologies.

These challenges can have a negative impact on employee morale, and can lead to stress and musculoskeletal discomfort such as low back pain and upper extremity disorders. To help SH&E professionals address these issues, this article provides a macroergonomic or work system design approach for telecommuting programs. This approach helps explain the impact of organizational and psychosocial risk factors on telecommuter safety as well as on traditional workstation design. In addition, the article outlines a process for managing telecommuter safety and health, and presents guidelines to prevent and reduce disabilities associated with alternative-site work injuries.

Telecommuting Overview

An organization may establish a telecommuting program for various reasons. These may include reducing office space needs; attending to government regulations (e.g., clean air standards); enhancing employee retention; improving overall employee recruitment efforts; and increasing employee productivity (e.g., Hamilton; Piskurich). Workers view telecommuting as a way to gain more flexibility in their time management by balancing work and personal (home) responsibilities, thus reducing stress (Shamir and Salomon). The level of flextime depends on the type of job and task responsibilities. Some tasks, such as answering customer calls, require a more structured work schedule, while other tasks, such as writing software, require less structure and offer greater task variability. Other benefits of telecommuting include lower transportation costs, fewer distractions and less involvement in office politics.

Telecommuting is not for everyone, however, and not for an entire organizational workforce. Some of its advantages, such as fewer distractions, are viewed as disadvantages by others as they lead to less social contact with coworkers, more isolation and less career development (Hamilton; Piskurich; McCloskey and Igbaria). This double-edged sword can lead to many potential misconceptions by both employees and managers. For example, some employees regard work-at-home arrangements as a substitute for daycare services, and some managers believe that they will lose control of employees who telecommute. These misconceptions can be reduced and the disadvantages limited when a telecommuting program is systematically defined and planned.

Telecommuter Safety & Health

Telecommuter safety and health received national attention in November 1999 when OSHA published a letter of interpretation addressing a question from a Texas credit service company concerning its responsibilities to home-based employees. OSHA stated that "employers must take steps to redu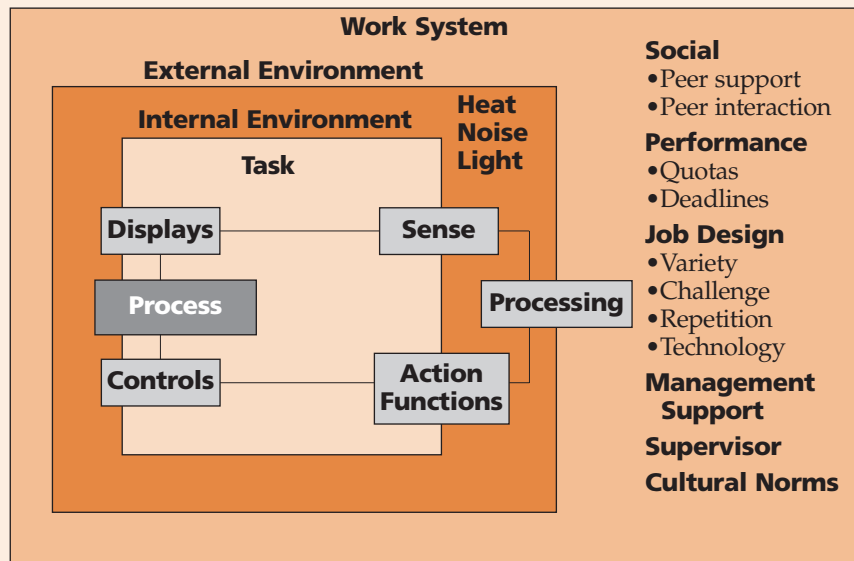ce or eliminate any work-related safety or health problems they become aware of through on-site visits or other means." The uproar that followed regarding invasion of privacy and compliance issues led the agency to rescind the letter just two months later.

Telecommuting presents unique challenges to safety and health—most of which have been anticipated for years. In 1984, in *The Office Environment: Automation's Impact on Tomorrow's Workplace,* Wilbert Galitz, estimated that 50 percent of the office workers of the future could be telecommuters. The chapter, "Toward the Year 2000," describes ergonomics/human factors, fatigue, social isolation and stress as critical concerns. This was an early hint of the challenges to come. Recent studies related to occupational safety and health indicate that although telecommuters report higher levels of job satisfaction, they have a lower level of awareness and knowledge concerning ergonomic and safety issues (Healy).

Little reliable data on claims frequency and severity is currently available regarding telecommuters. Such data is important for developing strategic and tactical plans that target telecommuter safety and health and disability management. In addition, hazard data for individual work-at-home environments is lacking—and good quality injury and hazard surveillance information is essential to ensure telecommuter safety. The same is true for ergonomics. Addressing ergonomic issues and related musculoskeletal discomforts for the employee working in a nontraditional office requires approaches similar to those used in traditional corporate office SH&E management.

Figure 1

Micro & Macroergonomics: A Work System Design Model

Work System

External Environment

Internal Environment

Task

Displays — Sense

Process

Controls — Action Functions

Processing

Heat Noise Light

Social
- Peer support
- Peer interaction

Performance
- Quotas
- Deadlines

Job Design
- Variety
- Challenge
- Repetition
- Technology

Management Support

Supervisor

Cultural Norms

Source: Based on Leamon; Sanders and McCormick; Hendrick and Kleiner; Robertson, et al.

Figure 2

Macroergonomic Work System Design Perspective of Telecommuting

Organizational Level

Organizational Design: Structure & Processes
- Supportive infrastructure
- Senior management commitment
- Policies
  - HR; technology
- Financial resources
- Communication programs

Personnel Subsystem
- Information systems training
  - computer support; online help

Technological Subsystem
- Information systems (IS)
  - computers; communications
  - technology support; online help

Effectiveness Outcomes
- Productivity
- Customer satisfaction
- Employee satisfaction
  - turnover; absenteeism
- Balance score card
- Economic value added

Group Level

Personnel Subsystem: Psychosocial Factors & Professionalism
- Teamwork synergy
  - social norms
  - team training
- Job design
  - high workload
  - time pressures
  - electronic performance monitoring
- Distributed team
  - satellite centers
- Managerial support
  - mentoring
  - technology facilitator
  - communicator

Technological Subsystem
- Groupware
  - computer supported cooperative work
    - *Lotus Notes*
- Teleconferencing
- Videoconferencing

Effectiveness Outcomes
- Group effectiveness
- Group collaboration
- Teamwork
- Performance

Individual Level

Physical Environment Subsystem
- Computer/workstation design
  - training; ergonomic knowledge
  - lighting; acoustics
  - HVAC

Technological Subsystem
- Communication lines/cables
- Electrical service

Psychosocial Factors
- Balanced work/personal
- Flexible time
- Social isolation
- Personal stress
- Longer work days
- 24-hour accessibility
- Recognition and feedback
- Attitudes; supportive relationships
  - responsibility
  - self-help support; appropriate personal work style
- Decision making
- Social isolation

Effectiveness Outcomes
- Health and well-being
- Job satisfaction
- Workplace satisfaction
- Workplace comfort
- Reduced stress
- Performance

External Environment
- Culture
- Politics
- Market
- Global competition
- Migration of capital

Macroergonomics　　　　　**Microergonomics**

Work System Design

A work system can be described by the organization of work, task requirements, environmental considerations, norms and culture, equipment and technology (Figure 1). Such an approach provides a systemic view of the emerging trend of telecommuting and changing work styles and workplaces. A systems approach is concerned with the design of the overall work system involving the technological and personnel subsystems, the external environment and their interrelationships (Hendrick and Kleiner). It is a top-down, sociotechnical, human-centered design approach that focuses on the human-organization-technology interface. A sociotechnical system (STS) approach focuses on two major components of the work system: people and

technology and the relationship between the two. The technological subsystem refers to the tools, work rules, information and machines, while the personnel subsystem consists of the human element, and the skills, knowledge and abilities of individuals and groups. The STS approach also identifies the external environment change drivers, such as the global market, politics and cultural influences, that interact with the organization.

Organizational design and structure is another subsystem interfacing with the other work systems. This human-centered design systematically considers the worker's professional and psychosocial characteristics in designing the work system, then carries this effort through the ergonomic design of specific jobs and related hardware and software interfaces. Integral to this process is joint design of the technical and personnel subsystems, using a human-centered approach in allocating functions and tasks.

Participatory ergonomics is a primary methodology of work system design; this process involves employees at all organizational levels in the design process. Using systems analysis models and design processes, individual, group and organizational ergonomic factors can be identified throughout the work system design process (e.g., Robertson, et al). Designing work systems that have congruent subsystems and alignment and that consider the sociotechnical characteristics of the organization can lead to substantial benefits such as increased productivity, safety and health.

To conceptualize these work system design issues as related to telecommuting, a model was developed that structures these issues into three levels—organizational, group and individual (Figure 2). Within each level, the sociotechnical elements (technological and personnel subsystem) and the physical work environment factors are identified, as are potential outcomes that could be used to measure the success of the

telecommuting program. The bottom of the model presents a continuum of ergonomic issues—ranging from macroergonomic factors (such as organizational design) to group issues, to individual ergonomic physical design and psychosocial factors. These factors were derived from the literature and exemplary industry case studies (Aborg, et al; Kochan, et al; McCloskey and Igbaria; Shamir and Salomon).

The Safety & Health Management Process

Implementation of a managed safety process is critical for optimizing the working environment of telecommuters; reducing the risk of claims and injury costs; and increasing profits. Key stakeholders inside and outside the organization are essential to program success. Figure 3 illustrates a process that addresses prevention (pre-injury) and return to work (post-injury). Key individuals who need to be involved include human resources, leadership personnel, SH&E professionals, engineering and maintenance, healthcare provider, rehab provider and workers' compensation (WC) insurer. The worker is envisioned in the middle. Communication between the worker and all other parties is essential for instilling safe behavior on the job and enabling return to work after an injury occurs.

Of the many elements in the safety management process, surveillance, or worksite analysis, is essential. It is difficult to manage safety without detailed injury and hazard information obtained through surveillance efforts. National Safety Council recently released a working draft of the proposed voluntary ergonomic standard, ANSI Z365, Management of Work-Related Musculoskeletal Disorders (WMSDs). This draft standard describes a process for managing WMSDs of the neck and upper extremities in order to reduce their occurrence and severity. In the draft, surveillance is a key element and a trigger for interventions. It is defined as "the ongoing, systematic collection, analysis and interpretation of health and exposure information in the process of describing and monitoring WMSDs and evaluating the effectiveness of the program" (NSC). In other words, surveillance can indicate what problems exist and where, how to fix them and whether solutions are working. This is a key element of prevention-based, SH&E programs.

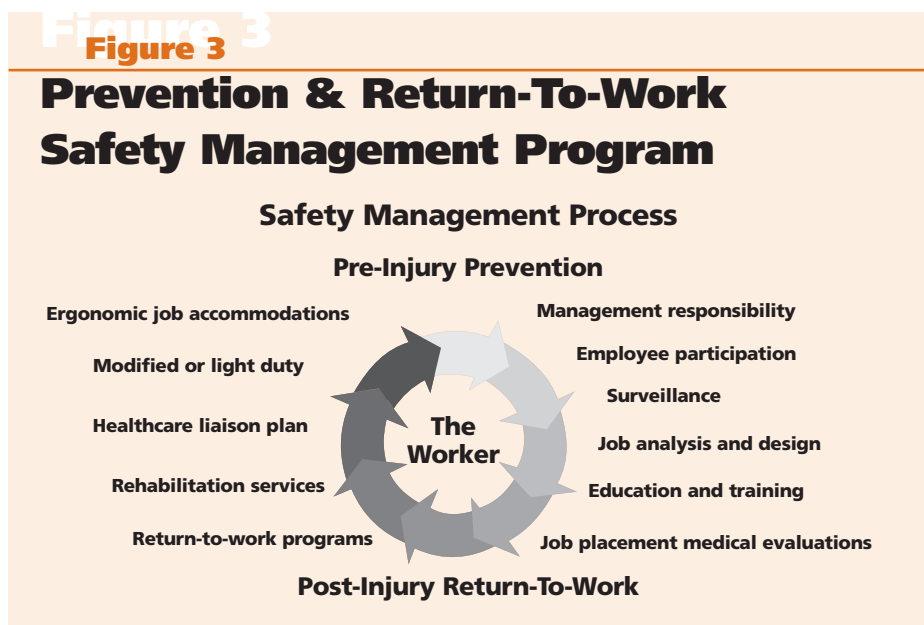Effectively managing telecommuter safety requires accurate, complete in-

Figure 3

Prevention & Return-To-Work Safety Management Program

Safety Management Process

Pre-Injury Prevention

Ergonomic job accommodations

Modified or light duty

Healthcare liaison plan

Rehabilitation services

Return-to-work programs

Management responsibility

Employee participation

Surveillance

Job analysis and design

Education and training

Job placement medical evaluations

The Worker

Post-Injury Return-To-Work

Table 1

Safety Program Evaluation

1) Do you offer guidelines for setting up a home office, including equipment and ergonomic accessories, and provide general recommendations?

2) Do you have self-assessment checklists for ergonomics, video display terminals and home hazards? If so, are these checklists administered online or by hard copy?

3) What do you do with checklists after you receive them? What kind of follow-up exists to determine whether hazards are corrected?

4) How is checklist data collected, analyzed and used for improving safety at off-site environments?

5) Do you have a policy of what ergonomic accessories and office furniture is paid for by the company?

6) Do you offer training programs for work-at-home workers that include ergonomics hazards, symptom recognition and reporting? If so, are the training programs administered via an intranet, hard copy or other means?

7) Do you assess whether training is completed and learning has taken place?

8) Is there a procedure for reporting computer and systems problems that impact the work-at-home employee? Are these problems promptly resolved? Do you know that for sure?

9) How do work-at-home employees report symptoms and general health concerns they feel are work related? Do they feel they can do so without reprisal or job action? Is confidentiality of reports maintained?

10) Does your WC insurer offer site coding in its claims databases for identifying injuries that occur to at-home or off-site workers? Do you use this data to determine safety and risk management priorities for off-site workers?

11) Do you have a return-to-work strategy for disabled workers who work at home or off site? Are workers able to receive quality healthcare? How do you know?

12) Do work-at-home employees communicate regularly with their managers and peers, and are they kept current on company happenings?

3) **Job surveys.** These tools include checklists and surveys dealing with hazards. Employers may not know what hazards exist in the home environment unless the worker volunteers that information. Although some companies use checklists, whether an employer should inspect the home is a topic of debate because it raises privacy issues. OSHA says it will not do this and some companies have policies that prohibit employees from visiting other employees at home for this purpose. Most companies rely on self-assessments of at-home workplaces.

Research has shown that working at home can lead to long work hours, insufficient breaks, isolation, difficulties with computer technology, working at nonergonomically designed workstations and more (Aborg, et al; Kochan, et al). These practices can lead to stress-related health issues, particularly for those who have difficulty coping with stress. Increased alcohol or coffee consumption and tobacco use can compound the problem.

What to Do?

The questions in Table 1 can be used to assess whether a given SH&E program effectively addresses work-at-home employees. If an answer is "no" or "I don't know," the item should be targeted for improvement. In addition to having an effective safety program, work-at-home employees must receive guidelines for selecting office space and furnishings, using equipment, creating a comfortable work environment and achieving a good ergonomic fit. The Telecommuting Program Management Guide (pg. 35) provides an overview of 10 critical issues that should be addressed when implementing a telecommuting program.

jury data and hazard information. To gather such data, three surveillance approaches are recommended:

1) **Employee reports.** Prompt reporting of hazards, injuries or symptoms is important for treatment and prevention. However, some telecommuters are reluctant to do so, fearing that it may cause the telecommuting agreement to be canceled. Rather than report a work-related injury, some may visit a personal physician and rely on health insurance to pay the bill.

2) **Review of existing records.** Records such as WC claims reports and OSHA logs provide valuable information. However, injury reporting fears can affect WC data quality. In addition, WC insurer claims databases may not accurately code injuries that occur off site, so detailed claims reports may not be available. This results in the lack of quality data regarding trends and loss issues involving off-site workers. Claims cost data can point to healthcare quality and return-to-work issues, which impact the length and cost of off-site worker disability.

Achieving a Good Ergonomic Fit

Once furniture and equipment have been installed, employees must know how to correctly adjust their workstations. The health benefits of an adjustable workstation are a function of the employee's ability to make a good ergonomic fit. BSR/HFES 100 identifies four reference postures that represent the range of observed postures in workers (HFES). Figure 4, a flowchart of ergonomic recommendations for setting up a workstation, provides examples of these postures (in the center).

Conclusion

Establishing an effective telecommuting program and managing these workers' safety and health requires a work systems approach. This type of "holistic" strategy allows SH&E professionals to manage this work style more effectively, realizing

Telecommuting Program Management Guide

1) Is this the right position?

Determine which positions might be appropriate for work-from-home assignments. Positions selected may reflect:

•work that requires face-to-face customer contact;

•independent thinking (e.g., research, writing, programming);

•work that is generally processed electronically;

•daily interaction with peers and supervisors not critical to effective product delivery.

Work-at-home assignments tend to work well for positions that require long periods of concentration and few unplanned face-to-face meetings with coworkers. Identify specific tasks to be performed and answer the question, "How will I know if the task is done well?" If the position is not appropriate for work at home, performance could deteriorate, and frustration and stress levels could increase.

2) Is the employee suited for alternate worksite assignment?

Research has shown that in most successful work-at-home assignments, employees have a sound relationship with their manager built on trust, respect and mutual understanding of expectations. Prior to extending an offer for such an assignment to the employee, carefully consider the skills and work behaviors of a successful candidate in that position, including:

•effective decision-making abilities;

•clear and concise written and verbal communication;

•demonstrated time-management and organizational skills;

•self-directed and motivated;

•flexible approach to problem solving;

•fully trained/proficient in the position;

•computer literate and competent in the use of other standard office equipment required (e.g., fax, e-mail);

•history of solid job performance;

•ability to handle workload and potentially stressful situations.

3) Is the work space sufficient?

Discuss with the worker the home workspace environment and determine whether it is sufficient in terms of personal safety, efficiency and physical comfort. A visit to the home is usually not necessary and either a phone call or a discussion when the employee is in the employer's office is sufficient to perform this assessment. Guidelines for work-at-home environments include:

•Ideally, the location should be in a dedicated space that is private, quiet and secure.

•The space should be large enough to accommodate the work activity, equipment and furniture requirements. Typically, workspace size should be equivalent to the employee's current workstation; however, the area should not be smaller than 6 ft. x 6 ft.

•HVAC and utilities should be evaluated for employee health and safety, property protection and compliance with environmental standards.

•Based on the above, determine whether improvements to the premises and equipment (e.g., doors, locks, alarm systems) are necessary.

4) Consider what office furniture the employee needs.

After reviewing the inventory of required equipment, and reference and related materials, consider the following as a minimum configuration:

•work surface for computer, printer and optional fax machine (approximately 26 inches high and at least 24 inches deep);

•chair;

•file cabinet(s).

In acquiring furniture, the following alternatives should be considered (listed in order of preference):

•use of existing personal furniture;

•use of excess office furniture (this could be the employee's current desk);

•purchase of furniture (expenses may be reimbursed or provided in the form of a stipend).

5) Evaluate the telephone equipment and service options.

When selecting appropriate telephone service, consider both the frequency of calls and desired capability. For employees requiring only occasional telephone use, the following capability is often sufficient:

•standard analog phone line (employees may use a current residential line);

•one-line telephone set;

•modem.

When more-frequent telephone use and/or advanced capabilities are required, any number of the following options may be considered:

•modem;

•fax machine;

•two-line telephone set;

•call forwarding;

•call waiting;

•conferencing;

•voice mail or answering machine;

•additional analog line;

•corporate calling card.

6) Identify employee's computer equipment needs.

Establish a computing environment including hardware, software and printer capability that is uniform for the employee, regardless of location, work performed or mobility needs. For example, computing needs may be achieved with the use of a laptop computer; however, for more stationary work-at-home participants, a desktop personal computer may be the best option. If a laptop computer is used, the lack of a full-size monitor may create eye discomfort during periods of extended use. Therefore, for those whose work will require substantial visual interaction with the screen, docking systems, attachable full-size terminals, as well as a detached keyboard may be desirable.

Research has shown that stress level is increased when technology provided in work-at-home environments is not responsive to the needs of the employee.

7) Ensure the employee's new office meets ergonomic standards.

Ergonomic site assessments, worker training, adjustable workstation furniture and set up are required injury prevention controls. An ergonomic assessment should be performed at each worksite. A checklist can be used for this purpose either online or hard copy and placed in the employee's personnel file. A visit by the employer to the home work environment is not always necessary, but always follow up to ensure that any deficiencies noted in checklists are corrected.

8) Review property and liability insurance needs.

Consider insurance and liability implications for work-at-home assignments. Consult with your risk management department regarding property and liability insurance requirements for work-at-home employees.

9) Keep communication lines open.

Culture and values are typically learned through day-to-day interactions with coworkers and managers. Information is shared through informal channels (e.g., during breaks, between meetings, at lunch, during gatherings outside the office). When employees work from home, these informal channels are less accessible. Be aware of the need for more-frequent telephone conversations, as well as face-to-face meetings:

•hold biweekly teleconference meetings between coworkers from surrounding locations. These meetings can include a discussion of recent organizational changes, status of group projects and upcoming corporate-sponsored events;

•encourage participants and traditional worksite employees to continue sharing information and problem-solving ideas;

•schedule informal monthly performance discussions to review progress toward objectives.

10) Report accidents.

All accidents must be reported and investigated immediately. Employees must be aware of the importance of prompt and accurate reporting. Managers should identify a member of the local office safety committee to coordinate all reporting activity for employees engaged in work-at-home assignments.

Workers' compensation: Employees are covered for job-related illnesses and injuries. All accidents must be reported and investigated.

Accidents of others: Consult with your risk management department on reporting and investigating injuries of others.

Figure 4

Office Ergonomics Guidelines
Tips to maximize comfort when computing

Chair
- Make sure your chair allows **clearance behind your knees** when seated against the backrest.
- **Use the chair's backrest** to provide full support to your lower back.

Lighting
To **reduce glare and shadows** on your work surface:
- **Adjust window shades or decrease overhead lighting.**
- **Adjust the monitor screen** or add an anti-glare filter.
- **Add a task light** to properly illuminate paper references.

Document Holder
Use an adjustable document holder to:
- Place reference materials as **close to the computer screen** as possible.
- Keep materials at the **same height and distance** as your computer screen.

References: www.libertymutual.com; www.mmm.com; www.pc.ibm.com/ww/Healthy computing; www.hermanmiller.com; www.compaq.com/comfortguide/index.html.

Posture
Maintain proper body posture by:
- Sitting with your hips and knees at a **90-degree or greater angle.**
- Keep your **feet flat** on the floor or on a footrest.
- Keep **arms relaxed** at your sides, ideally with elbows at 70 to 135 degrees.

Healthy Computing Habits
- **Use a softer touch** when keying; relax your grip on the mouse.
- Avoid working too long **in the same position.**
- Frequently **change body posture.**
- Take frequent breaks. **Stretch periodically.**
- Give your **eyes a visual break.**

Monitor
- **Place monitor directly in front of you** about an arm's length away.
- Position the top of the monitor screen **at or below eye level.**

Keyboard/Input Devices
- Adjust the keyboard or chair height to **keep forearms, wrists and hands in a straight line.**
- Place mouse and other input devices **near to and at the same height** as your keyboard.
- Keep **elbows close to your body.**

Work Area
- **Allow ample clearance to move your knees and legs** under the keyboard and desk.
- **Avoid contact stress** with the edge of the desk and keyboard.

Accessories
- **Use ergonomic accessories** to support body posture (e.g., lumbar support, armrests, monitor blocks, external keyboard).
- Use a **headset if you regularly talk** on the phone for extended periods. Use a lowered voice.

©2002 Liberty Mutual Research Institute for Safety.

---

the benefits that senior management expects while minimizing the negative effects. As telecommuting and mobile computing trends continue to grow, SH&E professionals must proactively manage safety and ergonomics issues in order to maintain employee well-being and maximize performance. ∎

References

Aborg, C., et al. "Telework: A Longitudinal Study on Effects on Work Environment and Well Being." *Proceedings of the 26th International Congress on Occupational Health.* Singapore, 2000. 382.

Galitz, W.O. *The Office Environment: Automation's Impact on Tomorrow's Workplace.* American Management Society Foundation, 1984.

Hamilton, C.A. "Telecommuting." *Personnel Journal.* 66(1987): 90-101.

Healy, M.L. "Telecommuting: Occupational Health Considerations for Employee Health and Safety." *AAOHN Journal.* 48(2000): 305-314.

Hendrick, H.W. and B.M. Kleiner. *Macroergonomics: An Introduction to Work System Design.* Santa Monica, CA: Human Factors and Ergonomics Society, 2001.

Human Factors and Ergonomics Society (HFES). BSR/HFES 100, Human Factors Engineering of Computer Workstations. Santa Monica, CA: HFES, 2002.

International Telework Assn. and Council (ITAC). "New U.S. Teleworkers Grow by Nearly Three Million." Press Release. Wakefield, MA: ITAC, Oct. 3, 2000.

Kochan, F., et al. "Telework as a New Challenge to Occupational Health in the Information Society." *Proceedings of the 26th International Congress on Occupational Health.* Singapore, 2000. 382.

Leamon, T.B. "The Organization of Industrial Ergonomics—A Human:Machine Model." *Applied Ergonomics.* 11(1980): 223-226.

Liberty Mutual Research Institute for Safety. "Ergo Guide: Office Ergonomics Guideline." Boston: Liberty Mutual, 2002.

McCloskey, D.W. and M. Igbaria. "A Review of the Empirical Research on Telecommuting and Directions for Future Research." *The Virtual Workplace.* Hershey, PA: Idea Group Publishing, 1998. 338-358.

National Safety Council (NSC). ANSI Z365, Management of Work-Related Musculoskeletal Disorders. Final Draft. Itasca, IL: NSC, 2002.

Piskurich, G.M. "Making Telecommuting Work." *Training & Development.* 50(1996): 20-27.

Robertson, M.M., et al. "Macroergonomics Methods: Assessing Work System Processes." In *Macroergonomics,* H.W. Hendrick and B.M. Kleiner, eds. Mahwah, NJ: Erlbaum, 2002. 67-69.

Sanders, M.S. and E.J. McCormick. *Human Factors in Engineering and Design.* New York: McGraw-Hill Inc., 1993.

Shamir, B. and I. Salomon. "Work-At-Home and the Quality of Working Life." *Academy of Management Review.* 10(1985): 455-464.

Your Feedback
Did you find this article interesting and useful? Circle the corresponding number on the reader service card.

RSC#	Feedback
26	Yes
27	Somewhat
28	No