

VITALITYATLAS

YOUR SOURCE FOR WORKING HEALTH SOLUTIONS

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TOMORROW LAND: Wearable Devices in the Workplace

Wearable electronic devices designed to improve human health, safety and performance are finding their way into the workplace.

Emerging applications are expected to become relatively commonplace in the not-too-distant future. Many industry observers believe wearable technology such as postural aids and tracking devices have the potential to be game changers in workforce health management.

The following are some examples.

Risk Detectors

HCS, an international company, is creating a suite of wearable devices, artificial intelligence, building information modeling and cloud computing for high-risk industries including manufacturing, energy, warehousing and distribution, and construction.

In partnership with AIG, Microsoft, Autodesk and MSA, HCS conducted its first pilot project at New York's Jacob K. Javits Convention Center in 2015. This year the company is engaged in a second pilot project at Citi Field. The pilot projects are being used to identify incident indicators and demonstrate how technology can be applied to help reduce the frequency and severity of work-related injuries.

"With HCS's suite of tools, we leverage technology to keep people healthy and safe," said Peter E. Raymond, CEO of HCS. "We use technology to detect the exact moment someone loses their balance, trips and falls, or carries too much. It's not acceptable that we can push a button and have anything in the world delivered to our doorstep, but that people can still get hurt and even die needlessly when they go to work."

Exoskeletons

Wearable exoskeletons help reduce physical load work and have the potential to improve performance and decrease injury risk.

There are two basic types of wearable exoskeletons – passive and active. A passive exoskeleton uses springs, elastic cords and other resilient parts to provide either a restoring moment that unloads low back muscles or vertical force to arm and shoulder muscles when lifting tools or materials.

beat the WINTER BLAHS



- Keep your work and home environment bright. Open curtains and blinds during the day.
- Spend some time outdoors, even on cold or cloudy days.
- Follow a consistent exercise routine.
- Eat a healthy diet, including foods containing vitamin D – the sunshine vitamin.
- Limit alcohol consumption; it's a depressive substance.
- Keep your mind occupied: Take a class, plan a vacation, volunteer, try a new hobby.
- Listen to upbeat music.
- Stay warm and dress appropriately for cold weather.
- Maintain a consistent sleep schedule.

Exoskeletons (cont'd)

Active exoskeleton systems feature electronic motors and powered actuators on an external frame with joints that match those of the wearer.

Exoskeleton suits were originally designed for military applications, for example, to reduce fatigue among soldiers carrying heavy loads. They have been repurposed as restorative devices for victims of stroke, brain trauma and spinal cord injuries. In addition to enabling movement, exoskeleton benefits for patients with paralysis include improved bowel and bladder function, weight loss, better controlled blood-sugar levels and elevated mood.

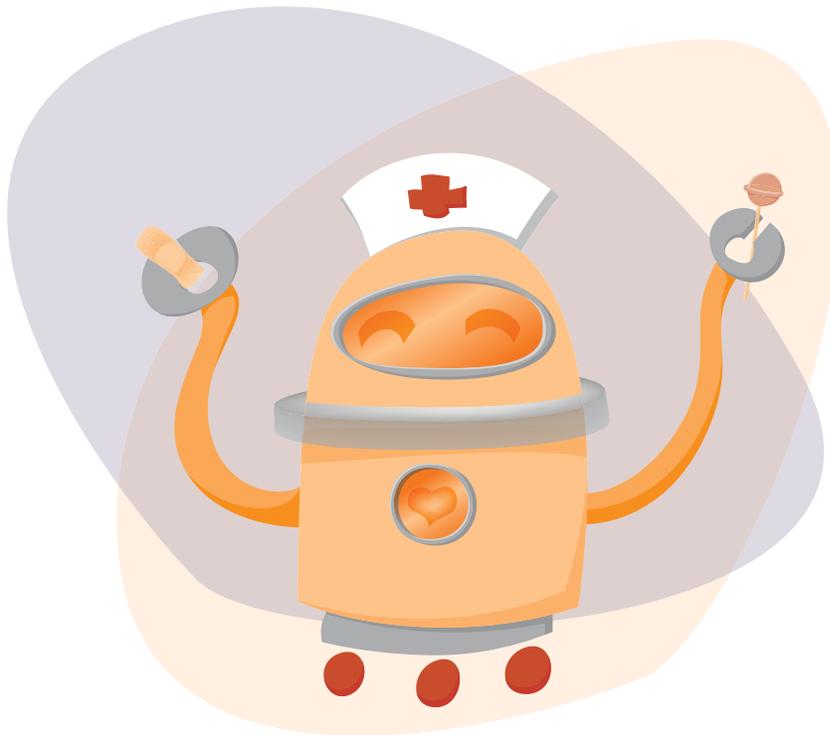
Researchers at the National Institute for Occupational Safety and Health (NIOSH) say wearable devices may be used in the workplace to supplement engineering solutions (1). Lifting and handling of heavy materials and supporting heavy tools contribute to the development of musculoskeletal disorders (MSDs), which reportedly account for about 30 percent of work-related lost-time cases in the U.S.

WinterGreen Research, Inc., projects growth for exoskeletons in the industrial market will match medical/rehabilitation demand by 2021 (2).

Holograms

A hologram is a three-dimensional image produced by a laser or other light source. This technology has widespread potential, including use as a workplace accident investigation, education and training tool (3).

For instance, software using hologram technology and *Lego*-inspired assembly to help manufacture some of the world's most complex machines reportedly is



in development. According to an article published in *Control Engineering*, an Australian division of Saab, the global defense and security company, has partnered with Microsoft to build a range of training, education and other complex 3-D holographic applications (4). Worn as goggles by users, Microsoft's HoloLens platform is the first fully untethered holographic computer.

World Nuclear News reports that a 3D model and holographic display system are being used in Russia to train workers on safe operations in nuclear power plants (5). The model can be animated to illustrate the power generation process, even depicting workers moving around inside buildings and revealing sections of the plant that are not accessible because of radiological exposure limits.

In health care, holograms and 3D virtual worlds may be a viable alternative to the cadavers that are typically used to train medical students (6). Meanwhile, holographic images can be accessed by physicians and other medical professionals to remotely perform physical assessments, make surgery less invasive and encourage multi-disciplinary collaboration.

Holograms are also emerging as a way to be seen without being physically present. An activist group demonstrated this capability last year when it projected video images of thousands of people outside Spain's parliament building while protesting a law that imposes fines for unauthorized assembly in front of hospitals, universities and government buildings.

Smart Skins and Caps

If you find carrying or wearing a device cumbersome, you may be a candidate for an electronic tattoo (7). A flexible electronic skin patch may be used to monitor your vital signs, detect your glucose level or measure your stress level. Electronic tattoos developed at Tel Aviv University in Israel reportedly can measure emotions by tracking muscle and nerve activity and collecting biometric data through a wireless signal.

Remote bio-monitoring using skin patches may also have applications in extreme, remote or enclosed working environments.

Wearable Technologies (WT), an international company specializing in WT innovations, recently reported on the SmartCap system, a monitoring tool developed for drivers, operators of heavy vehicles and others in safety-sensitive jobs (8).

The cap is fitted with a sensor that measures physiological signs of fatigue. The system uses a Bluetooth wireless connection to transmit data to an in-cap display and trigger visual and audio alarms if certain fatigue criteria are met.

Cyborgs

Cyborgs are organisms, such as people, with physiological processes enhanced or controlled by mechanical or electronic devices that are usually integrated with the nervous system. Cyborgs are another example of a developing military application that is likely to result in advances in bio-technology, medicine, business and industry.

The Defense Advanced Research Projects Agency (DARPA) reports it is working on an implantable neural interface that will facilitate "unprecedented signal resolution and data-transfer bandwidth between the

human brain and the digital world (9)." The intent is to use a small, biocompatible device to connect the electrochemical language used by neurons in the brain with the ones and zeros that constitute the language of information technology.

The program, called [*Neural Engineering System Design*](#) (NESD), is expected to dramatically enhance research capabilities in neurotechnology and provide a foundation for new therapies. Potential applications include devices that could compensate for deficits in sight or hearing by feeding digital auditory or visual information into the brain at a resolution and experiential quality far higher than is possible with current technology.

NESD is part of the National Institutes of Health's [*Brain Initiative*](#), which is supported by several federal agencies, technology firms, academic institutions and other contributors to the field of neuroscience.

In another recent development, Google announced it has patented technology to inject a computerized lens directly into the eye, a concept that takes Google Glass, its "augmented reality device," and other wearable vision-related devices to a whole new level. The "cyborg lens" would replace glasses and contacts and could even contain a camera or microscope capabilities. Smart contact lenses that would be placed on the eye are another concept in development (10). In the future, people with diabetes may be able to wear contact lenses equipped with tiny sensors that detect glucose levels in their tears (11).

Devices that can be worn in the ears, such as heart-rate monitoring headphones, are also considered a promising market by some industry pioneers. ■

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Craving Sweets? Could Be a Genetic Predisposition

By Peter P. Greaney, M.D.

If your jeans are feeling too tight, the other kind genes may be partly responsible.

Genetic mapping has spawned research on the connection between genes and diet. New findings suggest your genetic makeup may influence cravings and the way your body processes certain foods.

In the same household, two people may eat the same food and follow a similar exercise regimen but have different health outcomes.

A gene that stimulates a desire to eat sweets may be more pronounced in one person than another. If your ancestors experienced famine, your body may be predisposed to store fat. In the Framingham Heart Study of two generations in the town of Framingham, MA, a variant gene was found to make certain people with a high-fat diet more susceptible to weight gain.

Your metabolism, or the way your body stores and burns calories, also plays a role, but not necessarily in the way you might think. A slow metabolism is not directly correlated with weight gain; basal metabolic rate accounts for about 70 percent of calories burned. While body size and composition, gender and age influence your metabolism, physical activity largely determines how many calories you will burn on a daily basis.

In addition to diet and sedentary lifestyles, other controllable factors such as smoking and stress (which can be managed) have strong links to the leading causes of death in the U.S. Meanwhile, attempting to limit

your intake of any one nutrient (such as carbohydrates, fat, cholesterol or omega-3 fats) or taking vitamins and nutritional supplements is not proven to protect you from disease.

What Can You Do?

Consumers are justifiably confused about their dietary choices. There is a perennial flow of scientific studies, fad diets, opinion pieces and articles about nutrition, pesticides (organic vs. not organic), food access, cost and quality.

Using common sense when food shopping or eating out is a good place to start if you want to be healthy. Walking or biking rather than driving to the store or restaurant will also help.

For further enlightenment, I refer to The China Study, subtitled “the most comprehensive study of nutrition ever conducted.” The authors’ findings are based on 8,000 statistically significant associations between lifestyle, diet and disease variables.

The key message of The China Study is that a whole-foods, plant-based diet can increase longevity and prevent chronic diseases and cancer. The authors say “there are virtually no nutrients in animal-based foods that are not better provided by plants.”

This doesn’t mean you have to be a vegetarian. The American Institute for Cancer Research’s recommendations outline a diet consisting mainly of vegetables, fruits, whole grains and legumes, but also including limited amounts of fish, poultry, dairy and

Food for Thought

Researchers followed the eating habits and health behaviors of 126,233 men and women for 32 years. They found:

- Replacing 5 percent of daily calories from saturated fats (mainly animal fat) with foods high in polyunsaturated fats, such as the omega-3 and omega-6 fatty acids in fish and walnuts, was associated with a 27 percent reduction in total mortality and reduced death from cardiovascular disease, cancer and neurodegenerative disease.
- The switch from saturated fat to monounsaturated fat, such as olive oil and avocados, was associated with a 13 percent reduction in total mortality and a 29 percent reduction in death from neurodegenerative diseases.

Source: JAMA Internal Medicine, Association of Specific Dietary Fats With Total and Cause-Specific Mortality, August 2016.

occasionally lean red meat. Equally as important, recommendations include avoiding processed foods and sugary drinks, and limiting alcohol consumption.

Eating mostly fresh and non-processed foods, staying well-hydrated, getting enough sleep, managing your stress, not smoking and engaging in at least 30 minutes of moderate physical activity (if possible, on a daily basis) will contribute to keeping you fit and healthy. ■

Peter P. Greaney, M.D., is President, CEO and Medical Director of WorkCare, Inc.

Clinical Conversations

Adolescents may be at increased risk of exposure to a variety of toxic substances in the workplace. Working in inadequately ventilated areas or without protective equipment may be contributing factors.

In a study, researchers reviewed 2,430 occupational exposures for 13-to-19-year-old workers reported to Texas poison centers from 2000-2015.

They found:

- The most frequently reported major substance categories were chemicals and household cleaning products, followed by hydrocarbons and industrial cleaners.
- The most common exposure routes were inhalation (28 percent), dermal (27 percent), ingestion (26 percent) and ocular (24 percent).
- Half of the cases were managed onsite.
- 23 percent of cases had serious outcomes.
- Males accounted for 66 percent of cases; 27 percent were 18 years old and 37 percent were 19 years old.

Citation: [Adolescent workplace exposures reported to Texas poison centers](#); T Ziqubu-Page and MB Forrester; Int J Adolesc Med Health, Oct. 12, 2016.

Workplace Fatigue Contributors

Sleep loss and poor working conditions contribute to fatigue that can impair mental and physical work performance and create the potential for serious errors and injuries.

In an effort to help employers better control contributing factors, Matthew Hallowell, Ph.D., and colleagues at the University of Colorado at Boulder, analyzed previous research to develop a “comprehensive systems model” of causes and consequences of occupational fatigue – defined as “a decreased ability to perform

activities at the desired level due to lassitude or exhaustion of mental and/or physical strength.”

They found sleep deprivation and factors in the work environment such as noise, vibration and temperature are major fatigue drivers that can interact with other issues such as increased work load and long work hours. The most significant consequences of fatigue were short-term degradation in cognitive (thinking) and physical functioning. Illnesses, human error and injuries occurred to a lesser extent.

Citation: Causes and consequences of occupational fatigue: meta-analysis and systems model; Techera, et al.; J Occup Environ Med;58(10), 2016.

Genetic Explanation for Multiple Symptoms

Scientists have identified a genetic explanation for a syndrome characterized by multiple symptoms including dizziness and lightheadedness, skin flushing and itching, gastrointestinal complaints, chronic pain, and bone and joint problems.

Some people who experience these diverse symptoms, which can impair performance and lead to work absence, have elevated levels of tryptase, a protein in the blood often associated with allergic reactions, according to a study led by investigators at the National Institutes of Health. Other studies indicate that 4 to 6 percent of the general public has high tryptase levels.

Family members with similar complaints “have gone for years without a medical diagnosis, and

many had been told that some of their symptoms were ‘all in your head.’ These results not only provide a genetic explanation for the combination of symptoms that these patients experience, but also point the way to a potential solution,” said Joshua Milner, M.D., chief of the Genetics and Pathogenesis of Allergy Section, Laboratory of Allergic Diseases, and senior author of the study.

Citation: [Elevated basal serum tryptase identifies a multisystem disorder associated with increased TPSAB1 copy number](#); JJ Lyons et al.; Nature Genetics, Oct. 17, 2016.

Policy Promotes Decline in Opioid Prescribing

Monthly opioid prescription rates declined after an insurer implemented a comprehensive utilization policy that includes treatment plans, risk assessment, patient-provider agreements, single-pharmacy dispensing rules, prior authorizations, quantity limits and a ban on mail orders, according to a study in Massachusetts.

The average monthly prescribing rate for all opioids decreased 14.7 percent, from 34 per 1,000 prescriptions before implementation to 29 per 1,000 after policy implementation.

The policy was adopted July 1, 2012, by Blue Cross Blue Shield of Massachusetts, the largest insurer in the state, in response to data showing that many insured members were receiving new opioid prescriptions lasting for 30 or more days. The Centers for Disease Control and Prevention’s 2016 Guideline for Prescribing Opioids for Chronic Pain recommends avoiding opioids as a first-line therapy for chronic pain and limiting quantities when initiating opioids for acute pain.

Citation: [Declines in Opioid Prescribing After a Private Insurer Policy Change](#) – Massachusetts, 2011-2015; M Garcia, et al.; Morbidity and Mortality Weekly Report, 65(41), Oct. 21, 2016.

OSHA Updates Recommended Practices for Workplace Health and Safety Programs

The Occupational Safety and Health Administration (OSHA) has released a set of [Recommended Practices for Safety and Health Programs](#) to replace its 1989 guidelines and reflect changes and trends in U.S. workplaces.

The program features a user-friendly format, a greater emphasis on continuous improvement and advice for multi-employer workplaces. Supporting tools and resources are included.

The voluntary, non-regulated programs are based on seven adaptable business processes. The agency says these processes have been successfully implemented in industries including manufacturing, construction, health care, technology, retail, services, higher education and government.

The core elements are:

- Management leadership
- Worker participation
- Hazard identification and assessment
- Hazard prevention and control
- Education and training
- Program evaluation and improvement
- Communication and coordination for host employers, contractors and staffing agencies

Getting Started

To help the uninitiated, OSHA has published 10 Easy Things to Get Your Program Started:

1. Always set safety and health as the top priority. Tell your

workers that making sure they finish the day and go home safely is the way you do business. Assure them that you will work with them to find and fix any hazards that could injure them or make them sick.

2. Lead by example. Practice safe behaviors yourself and make safety part of your daily conversations with workers.
3. Implement a reporting system. Develop and communicate a simple procedure for workers to report any injuries, illnesses, incidents (including near misses/ close calls), hazards, or safety and health concerns without fear of retaliation. Include an option for anonymous reporting.
4. Train workers on how to identify and control hazards in the workplace using, for example, OSHA's [Hazard Identification Training Tool](#).
5. Conduct inspections. Inspect the workplace with workers and ask them to identify any activity, piece of equipment or material that concerns them. Use checklists, such as those included in OSHA's [Small Business Handbook](#), to help identify problems.
6. Collect hazard control ideas. Ask workers for suggestions. Provide time during work hours for employees to research solutions.

7. Implement hazard controls. Assign workers the task of choosing, implementing and evaluating the solutions they propose.
8. Address emergencies. Identify foreseeable emergency scenarios and develop instructions on what to do in each case. Meet to discuss these procedures and post them in a visible location in the workplace.
9. Seek input on workplace changes. Before making significant changes to the workplace, work organization, equipment or materials, consult with workers to identify potential safety or health issues.
10. Make improvements. Set aside a regular time to discuss safety and health issues, with the goal of identifying ways to improve the program.

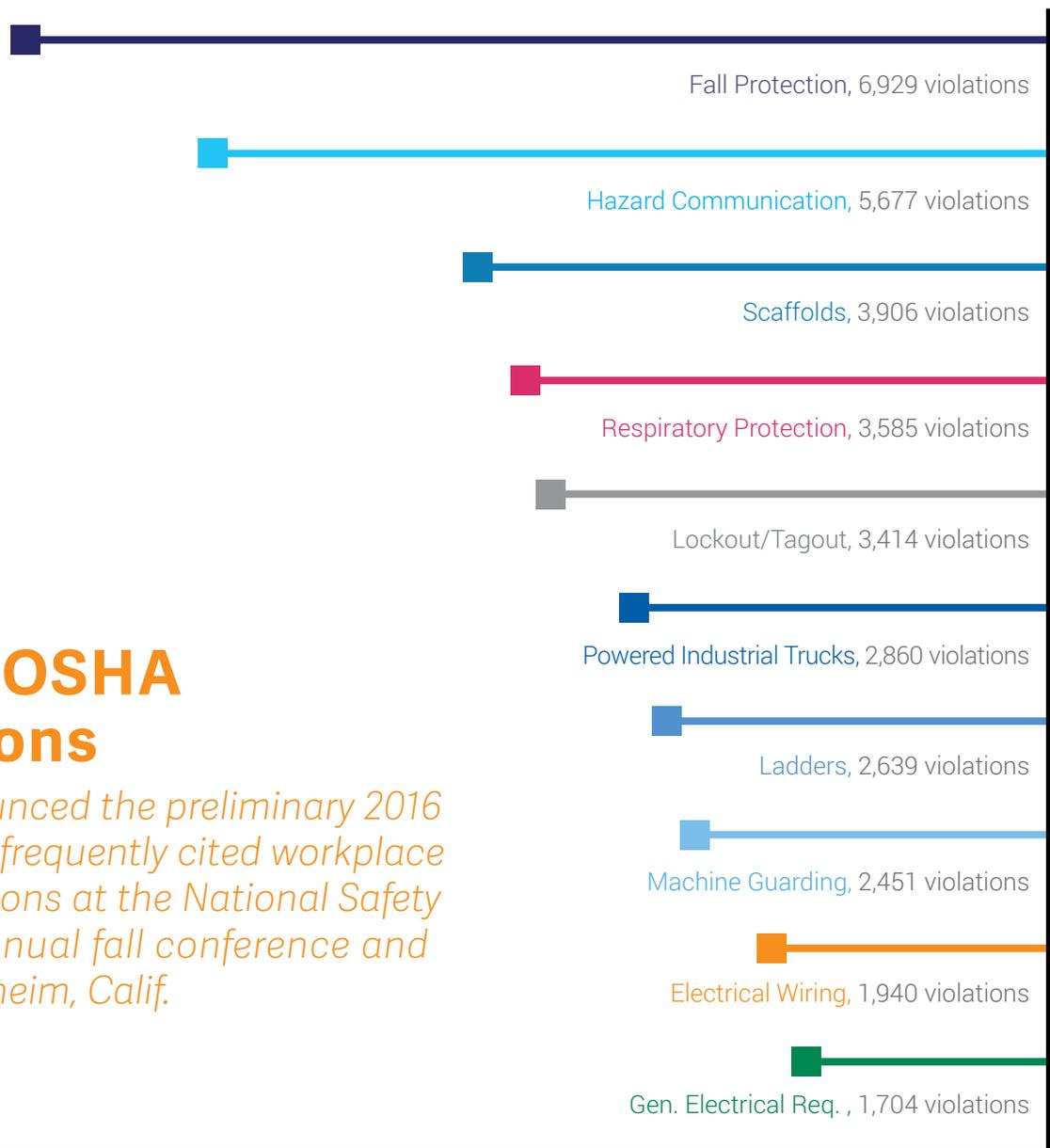
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OSHA Delays Anti-Retaliation Provision Enforcement

OSHA has delayed enforcement of anti-retaliation provisions in its [injury and illness tracking rule](#) until Dec. 1, 2016. The U.S. District Court for the Northern District of Texas requested the delay to allow time to consider a motion challenging the new provisions. The anti-retaliation provisions were originally scheduled to go into effect Aug. 10, 2016. Under the rule, employers are required to inform workers of their right to report work-related injuries and illnesses without fear of retaliation.

Top-10 OSHA Violations

OSHA announced the preliminary 2016 top-10 most frequently cited workplace safety violations at the National Safety Council's annual fall conference and expo in Anaheim, Calif.



How to Avoid **Holiday Grinch Syndrome**

The holiday season can make a Grinch out of even the most easy-going employees. The following are some ideas to promote a more inclusive and healthful work environment for everyone, regardless of their cultural background or religious beliefs.

Decorations

Non-denominational decorating may be allowed – even competitive – but it should not be mandatory.

Food

Invite employees who wish to participate to share foods that represent their cultural heritage. Make sure perishable foods are refrigerated before serving.

Music

Some people prefer to work with a headset on while listening to music while other need quiet in order to concentrate. If holiday music must be played, keep it at a low level.

Parties

If staff avoid office get-togethers or complain about the content and outcome of previous holiday events, invite them to serve on a planning committee to help take celebrations in a new or off-season direction.

Giving Back

Promoting charitable giving or volunteerism to support a diverse cross-section of community non-profit organizations is a popular anti-Grinch tactic. Examples include visiting nursing homes or shelters, and collecting and donating toys, clothes or food.



Becoming One with **your desktop?**

Try These Simple Solutions

1. Your computer monitor should be at eye level and the keyboard positioned so your hands, wrists and forearms are parallel with the floor.
2. To compensate for craning your neck toward the screen, do chin retractions to better align your neck and spine.
3. Adjust your chair and sit up straight with feet firmly planted on the floor or a footrest.
4. Reduce glare, adjust monitor clarity and take frequent eye breaks.
5. Stand up, stretch and walk around. If possible, get a cordless phone headset.

Executive Editor

William E. Nixon

Chief Financial Officer, WorkCare

Editor-in-Chief

Karen O'Hara

Director, Marketing and Communications, WorkCare

Graphic Design

Michelle Ball

Lead Graphic Designer, WorkCare

Please send your questions, comments and editorial contributions to karen.ohara@workcare.com

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800.455.6155

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