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Use of Contact Lenses in an Industrial Environment

More than 34 million Americans wear some type of contact lenses and many of these individuals are employed as part of the industrial workforce. On occasion, contact lens wearers have been disqualified from industrial employment. As the health professional most familiar with the hazards encountered in the industrial setting, the occupational and environmental medicine physician must be able to address employee and employer concerns regarding the proper use of contact lenses in this setting. This guideline of the American College of Occupational and Environmental Medicine (ACOEM) addresses the use of contact lenses and personal protective equipment by the industrial worker under the guidelines of the Occupational Safety and Health Administration (OSHA). It is also intended to inform the occupational and environmental physician of specific standards regarding the use of contact lenses as authorized by OSHA.^{2,3}

OSHA Regulations

Regardless of the reason for wearing them, contact lenses do not fulfill the personal protective equipment requirements for ocular safety when worn by individuals performing eye hazardous tasks. OSHA, in the Code of Federal Regulations,⁴ requires individuals who wear contact lenses in the workplace to combine them with appropriate industrial safety eyewear.

OSHA has codified the voluntary ANSI Z87.1⁵ consensus standard, which makes compliance mandatory. The OSHA rule states, "The required industrial-safety eyewear for the specific hazard identified in ANSI Z87.1 must be worn over the contact lenses." Therefore, individuals who wear contact lenses are required to combine them with appropriate industrial safety eyewear (ANSI Z87.1) since contact lenses do not provide ocular protection from hazards such as particles, chemicals, and radiant energy. For example, personnel must wear eye and face safety equipment to protect themselves from chemical vapors/eye irritants, optical radiation-glare, optical injurious radiation, and biologic hazards. Many harmful agents are transmitted by contact with the eye in the form of an aerosol droplet or splash. In an effort to protect the medical personnel, OSHA published the Occupational Exposure to Bloodborne Pathogens, Standard 29 CFR 1910.1030.⁶ It states in the regulation that personal protective equipment (PPE) must be used to prevent blood or other infectious fluids from passing through to or contacting the employees' work or street clothes, undergarments, skin, eyes, mouth or other mucous membranes.

Zelnick et al., showed that when a respirator was worn even without spectacles, there was a loss of visual field, which varied depending on the type of full-face respirator.⁷ Since the frames of glasses have been shown to be an obstruction of the full field of vision, the combined use of a respirator plus glasses compounds the loss of visual field. The use of "intra mask corrections" (lenses suspended inside mask) and lenses built into a facepiece as a substitute for spectacles, leads to poor visual ergonomics. Individuals who wear soft contact lenses may present with symptoms of "dry eyes" due to dehydration of the contact lenses especially if there is a low blink rate. For those whose tear flow is not adequate, sometimes using artificial tears and increasing the blink rate are necessary to minimize these symptoms. This may be worse in air fed respirators, but the problem is minimal in return for better visual function, work proficiency, and safety.

Challenges to federal regulations⁸ and voluntary ANSI standards⁹ which disallowed the use of contact lenses with a respirator, resulted in an OSHA-funded research project conducted by Lawrence Livermore

National Laboratories (LLNL).¹⁰ The research concluded that the “prohibition against wearing contact lenses while using a full-facepiece respirator should be revoked or withdrawn in spite of the limitations stated. Wearers of corrective lenses should have the option of wearing either contacts or eyeglasses with their full-facepiece respirators.” In consideration of LLNL’s research and other articles that support contact lens use, OSHA considered the prohibition unwarranted. OSHA published an enforcement procedure authorizing the use of rigid gas-permeable and soft contact lenses in all workplaces and with all types of respirators.¹¹

Contact lenses provide the best visual ergonomics for users of full face respirator masks. For those unable to wear contacts or those who experience problems with the contacts when using the mask (i.e. dryness), spectacles can be used. The spectacles must be of a type that will not interfere with the seal of the mask (elastic strap, intra-mask lenses).

OSHA, in paragraph (g) 1 (iii) of its preamble to Respiratory Protection rule states that “Because the final standard allows contact lenses to be worn, full facepiece respirators can be worn by persons needing corrective lenses; contact lenses obviously do not interfere with facepiece seal.”¹²

Further, the preamble of the Personal Protective Equipment (PPE) for General Industry rule states, “Based on the rulemaking record, OSHA believes that contact lenses do not pose additional hazards to the wearer, and has determined that additional regulation addressing the use of contact lenses is unnecessary. The Agency wants to make it clear, however, that contact lenses are not eye protective devices. If eye hazards are present, appropriate eye protection must be worn instead of, or in conjunction with, contact lenses.”¹³

Currently, OSHA statutes/rules recommends against contact lens use when working with acrylonitrile, 1,2 dibromo-3-chloropropane, ethylene oxide, methylene chloride, and 4,4'-methylene dianiline chemicals. These recommendations are presumably based on best professional judgment of 1978, as no specific bases are provided in the preamble to these standards, and they must be adhered to until the rule is changed.

The 1978 National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards recommended that workers not wear contact lenses during work with chemicals that present an eye irritation or injury hazard.¹⁴ This policy was recommended by the 1978 Standards Completion Program and is based on the “best professional opinion of the committee membership based on literature data” (NIOSH 1978). The policy was also consistent at that time with general industry practice. The NIOSH Pocket Guide to Chemical Hazards, Table 6 – Codes for First Aid Data (February 2004) – no longer states that “contact lenses should not be worn when working with these chemicals.”

Recommendations

The following recommendations for contact lens use in an eye-hazardous environment will guide occupational safety and health professionals to safely implement the contact lens use policy.

1. *Establish a Written Policy.* Establish a written policy documenting general safety requirements for the wearing of contact lenses, including the required eye and face protection, and contact lens wear restrictions, if any, by work location or task. Evaluate restrictions on contact lens wear on a case-by-case basis. Take into account the visual requirements of individual workers wearing contact lenses as recommended by a qualified ophthalmologist or optometrist, in order to be able to perform the essential visual functions, and this policy statement.
2. *Conduct an Eye Hazard Evaluation.* Conduct an eye injury hazard evaluation in the workplace that includes an assessment of eye-hazardous environments per OSHA Personnel Protection

Standards (29CFR 1910.132), and appropriate eye and face protection for contact lens wearers (OSHA 29CFR 1910.133 and ANSI Z87.1A 2003). The eye injury hazard evaluation should be conducted by a competent, qualified individual such as a certified industrial hygienist, a certified safety professional, toxicologist, or occupational health physician or nurse as appropriate. This information should be provided to the examining occupational health nurse or occupational medicine physician.

3. *Provide Training.* In addition to providing the general training required by the OSHA personal protective equipment standard (29 CFR 1910.132), provide training on employer policies on contact lens use, and first aid for contact lens wearers with a chemical exposure. Routinely train medical and first aid personnel in the removal of contact lenses, management of pain, blepharospasm, and the appropriate equipment available. In the event of a chemical exposure, begin eye irrigation immediately and remove contact lenses as soon as practical. Do not delay irrigation while waiting for contact lens removal as the lens may come out with the irrigation or can be removed when irrigation is complete. Instruct workers who wear contact lenses to remove the lenses at the first signs of eye redness or irritation. Removal of contact lenses should only be done in a clean environment and after the worker has washed his or her hands. Evaluate continued lens wear with the worker and an ophthalmologist (Eye MD). Encourage workers to routinely inspect their contact lenses for damage and/or replace them regularly.
4. *Provide Personal Protective Equipment.* Comply with current OSHA regulations on contact lens wear and eye and face protection. The *Code of Federal Regulations Preamble on Respiratory Protectors* (29 CFR 1910.134) and *Personal Protective Equipment (PPE)* (CFR 1910.132) allows contact lenses to be worn under full-face respirators and other PPE for the eyes. Provide suitable eye and face protection for all workers exposed to eye injury hazards, regardless of contact lens wear. The wearing of contact lenses does not appear to require enhanced eye and face protection. For chemical liquid or caustic hazards, the minimum protection consists of well-fitting indirectly vented goggles or full-facepiece respirators. Close-fitting safety glasses with side shields provide limited chemical protection, but do not prevent chemicals from bypassing the protection. Face shields should be worn over other eye protection when deemed necessary for additional face protection, but workers should not wear face shields instead of goggles or safety glasses regardless of contact lens wear.
5. *Notification to Visitors.* Notify employees and visitors of any denied areas where contact lenses are restricted without appropriate eye and face protection.
6. *Notification to Supervisors, First Aid Responders and EMS Responders.* Identify to supervisors and first aid responders all contact lens wearers working in eye hazardous environments.

Conclusion

ACOEM recommends that workers be permitted to wear contact lenses when handling hazardous chemicals and in other eye hazardous environments provided that the safety guidelines listed above are followed and that contact lenses are: 1) not banned by regulation; or 2) not contraindicated by medical or industrial hygiene recommendations. In addition, under current OSHA rules, contact lenses should not be worn while working with acrylonitrile, 1,2 dibromo-3-chloropropane, ethylene oxide, methylene chloride, and 4,4'-methylene dianiline. ACOEM concurs contact lenses are not eye protective devices and that contact lens wear does not reduce the requirement for eye and face protection.

The National Institute for Occupational Safety and Health (NIOSH) in its Current Intelligence Bulletin (CIB) 59, *Contact Lens Use in a Chemical Environment*, states that several professional groups (i.e. American College of Occupational and Environmental Medicine, American Optometric Association, American Academy of Ophthalmology, etc.) have issued guidelines removing restrictions regarding contact lens use in the industrial environment.¹⁵ NIOSH has reviewed these guidelines, company policies on contact lens use and injury incidents, and the limited literature on contact lens use in a chemical

environment. It concluded that injury data are insufficient to support the previous recommendation that wearing of contact lenses should be restricted during work with hazardous chemicals. Therefore, NIOSH recommends that contact lens wear be permitted provided safety guidelines in CIB 59 are followed.

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