

Optimizing Cost/Benefit in Protective Eyewear with Uvision U18 Surgical Eyewear (OSHA)

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Introduction

Employers are required to provide, and employees are required to use, appropriate personal protective equipment (PPE) to reduce exposure hazards "when engineering and administrative controls are not feasible or effective in reducing these risks to acceptable levels."⁽¹⁾ Under Occupational Health and Safety Act (OSHA) Standards 29CFR "masks in combination with eye protection devices, such as goggles, glasses with side shields or chin length face shields shall be worn whenever splashes, spray, splatters or droplets of blood or other infectious materials may be generated and eye, nose or mouth contamination can reasonably be anticipated."

How common is the occurrence of this problem today? More common than you might suspect. In the operating room the use of power instrumentation aerosolizes blood and tissue, creating a mist which can transfer pathogens to unprotected health care workers. A prospective study reported in the Journal of Bone and Joint Surgery, showed that during common orthopedic operations, 65% of the protective eyewear worn by surgeons were contaminated.⁽²⁾ The use of electrosurgical instruments and lasers generate smoke plume from which reproducible DNA has been extracted for diseases such as HIV/AIDS and HPV (Human Papilloma Virus).⁽³⁾ Oral and tracheal secretions expectorated by patients arising from anesthesia can expose workers to aerosolized contamination as well.

In the emergency department, as in surgery, uncontrolled arterial spray or venous spatter can be a source of exposure. Coughing or vomiting can introduce another high velocity source. In departments such as Radiology, Special Procedures and Cath Lab, the use of pressure infusion devices adds another dynamic; a system failure which results in a high pressure leak. The healthcare environment today presents multiple hazards, both seen and unseen, which place the healthcare provider at increased risk. "Since there is no population that is risk free for HIV, HBV or other bloodborne disease infection, any employee who has occupational exposure to blood or other potentially infectious material will be included within the scope of this standard."⁽⁴⁾ All of the scenarios listed here occur on an all too frequent basis and many times go unreported so that accurate statistics can not be tracked. For that reason it is imperative

that protective eyewear be a high priority within each organization.

In the **Perioperative Standards and Recommended Practices** of the Association of Perioperative Registered Nurses for 2008, the AORN mirrors the OSHA requirements, stating "Protective eyewear, masks and face shields must be worn when splashing or spraying is likely.

Masks should be worn, along with protective eyewear, (e.g. goggles, glasses with side shields, chin length shields) whenever eye, nose or mouth contamination reasonably can be anticipated as a result of splashes, spray, or spatter of blood droplets, or other potentially infectious material."⁽⁵⁾

What constitutes appropriate personal protective equipment (PPE)? According to the AORN, "Personal Protective Equipment is considered appropriate only if it prevents blood and other potentially infectious materials from contaminating an employee's work cloths, undergarments, skin, eyes, mouth or other mucous membranes under normal conditions of use and for the duration of time for which the protective equipment will be used."⁽⁶⁾

Product Use and Availability

Protective eyewear is available in many styles and products from several vendors in the current marketplace. These products range from surgical masks with attached acetate shields, to partial and full face acetate shields, to plastic goggles and glasses and devices which can be worn over prescription eyewear. In evaluating the needs of the OR staff there are several considerations which must be weighed; fit, comfort, visual distortion, availability and cost all must be considered. Each parameter must be reviewed to determine the correct product for the OR.

When evaluating the UVISION U18 Surgical Eyewear recently while Director of Surgical Services at a Medical Center in Dallas Texas, I had the opportunity to consider each of these parameters. The staff was asked to use and comment on the protective eyewear provided. Following a two week trial period the staff responded favorably to the UVISION product. "When asked to describe the product benefits, the staff indicated that the glasses were comfortable due to their light weight and flexible bows, which held them in place without slipping and endangering the sterile field.

They also commented on the lack of optical distortion and fogging often encountered with other products. These were important observations as they address some of the reasons why staff sometimes neglect to wear protective eyewear when needed. Loose fitting eyewear or eyewear which fogs or distorts the field of vision can decrease the efficiency for the individual team member.

In addition to performance factors which will impact product acceptance, are unit cost when compared to the current product, compliance with standards, usage volume and recommended product life. Unit cost will be determined in part by the contractual agreements between vendors and the individual organization. For example, combination mask and acetate shield products can range from \$.55 to \$.57 per unit.⁽⁷⁾ Acetate shields which utilize a reusable frame require the purchase of the frames in addition to the shields. These shields are intended to be disposed of after each procedure.

Cost Analysis

Evaluation of comparative cost for personal protective equipment can be made using an exemplar surgical suite in which the following criteria are met:

- 1) Staff members are compliant with OSHA and AORN guidelines for the use of personal protective equipment as outlined.
- 2) Staff members are compliant with manufacturer's recommended use of their products.
- 3) The surgical suite consists of ten OR's with three staff member per suite.
- 4) The surgical volume is such that the average OR performs four procedures per day.
- 5) Access to Personal Protective Equipment is readily available for all staff.

Using these criteria, the following comparison is possible:

Mask/Acetate Shield Combination: Recommended Use – 1 procedure

120 units per day @ \$0.56 per unit	
Day	\$67.20
Week (5 days)	\$336.00
Quarter	\$4,368.00

Acetate Visor and Frame

Recommended Use: Frame – 1 day

Visor – 1 procedure

30 Frames per day @ \$0.52 per unit 120 Shields per day @ \$0.52 per unit	
Day	\$78.00
Week (5 days)	\$390.00
Quarter	\$5,070.00

Uvision U18 Limited Reuse Eyewear

30 units @ \$13.70 for 10 days	
Day	\$41.10
Week (5 days)	\$205.50
Quarter	\$2,671.00

Based on the exemplar model, while the individual unit cost for the Uvision U18 Limited Reuse Eyewear is higher, the extended cost represents an opportunity for significant savings.

Conclusion

In the real world we recognize that compliance with recommended practice always leaves opportunity for improvement. This can be realized by providing a product which meets the needs of the users for comfort, quality and cost. In my opinion these are met by the Uvision product. In addition to improving the compliance by the OR staff, the unit dispensing system which increases accessibility will stimulate surgeon satisfaction and compliance as well making this a winning solution for all.

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- (1) Occupational Safety and Health Act 1970; OSHA Standards 29CFR; bloodborne Pathogens 1910.1030 (d)(3)(x)
 - (2) **Transmission and Prevention of Occupational Infection in Orthopedic Surgeons**
Journal of Bone and Joint Surgery (American)
86:1065-1076(2004);
Kwok Chuen Wong, Kwok Sui Leung
 - (3) OSHA Hazard Information Bulletin; Hazard of Laser Plume, April 11, 1988
 - (4) Occupational Safety and Health Act 1970; OSHA Standards 29CFR; bloodborne Pathogens 1910.1030 (a)
 - (5) Perioperative Standards and Recommended Practices 2008 Edition; Recommended Practices for Surgical Attire; Recommendation VI(3)(a) p289
Association of Perioperative Registered Nurses (AORN)
 - (6) **Perioperative Standards and Recommended Practices 2008 Edition; Recommended Practices for Surgical Attire; Recommendation VI(3)(b) p289**
Association of Perioperative Registered Nurses (AORN)
 - (7) Source: Vendor cost information