Adaptive Eyewear: Freeing the (Visually) Oppressed

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Abstract

It is difficult for Special Operations Forces (SOF) to provide meaningful long-term medical solutions for the indigenous population in their area of operation (AO). Limited time, equipment, supplies, the inability to follow-up, and re-exposure to disease are common obstacles to effective local national patient care.[1] Poor vision due to uncorrected refractive errors has a significant negative impact on quality of life in under-developed countries.[2] New eyewear technology will give SOF Medics the ability to provide definitive care for this chronic, burdensome condition which will benefit both patient and mission.

Introduction

There are an estimated 153 million people around the world aged five-years and older with visual impairedment due to uncorrected refractive errors.[3] Based on World Health Organization data, uncorrected refractive errors affect 6.4 million (1%) indigenous people in AFRICOM's area of operations, 3.2 million (1.19%) in CENTCOM, 7.2 million (1.4%) in SOUTHCOM, 15.5 million (1.58%) in EUCOM, and 115.5 million (3.6%) in PACOM.[4] Actual rates of visual impairment caused by unrefracted errors in your area of operations may be higher. Most of these people live in third-world countries where optometry services are located only in urban areas and basic eyeglasses are cost-prohibitive.

Impact

In any culture, uncorrected vision impairment hinders societal development and has a negative effect on quality of life. Students are unable to read and drop out of school. Adults are unable to work.[5,6] Without education and economic security, individuals are unable to participate in the process that moves a population toward democracy. Uncorrected refractive errors are a burden on family, community, health and social services, and society.

For SOF personnel, the focus of any Medical Civic Action Program (MEDCAP) is patient care and interaction with the population to forge new relationships. Previously, MEDCAPs that incorporated vision services were time and resource intensive and required a specialist (refractionist, optometrist, or ophthalmologist), specialized testing equipment, and donated prescription eyeglasses. Individuals were examined and fitted with the pair of glasses that best corrected their vision. If their prescription was not matched, they went without – not a win-win situation.[7]

The Solution

Adaptive eyewear has revolutionized vision correction and is simple, quick, and inexpensive. One-size-fits-all glasses with adjustable lenses allow the wearer to dial in the refraction to fit his or her needs without the assistance of an eyecare professional. The power range is +6 to -6 diopters, which is effective for over 90% of patients and corrects hyperopia (farsightedness), myopia (nearsightedness), and presbyopia (limited accommodation).[8]

Adjustment is simple; seat the person in an area with good light and have him look at a distant object to relax the eyes. Set both lenses to +6 diopters using the adjustment wheels. Have the person put on the eyewear, cover the left eye and adjust the right lens using the adjustment wheel until they can clearly see an object that is 20 feet away, and repeat with the other eye. Then have the person look at the same object with both eyes, adjust the focus until the object blurs, and then bring the object back into focus again. Seal the lenses by turning two sealing valves (crosshead screws) clockwise, cut the tubing and remove the adjustment wheels and pumps. The adjustment wheels, pumps, and tubing are left intact for people who have a bifocal requirement. This self-prescription results in an improvement in vision almost identical to that provided by a trained professional.[9]

Adaptive eyewear doesn't work for everyone. For those with poor results, perform an eye exam. Refer people with pathology, common after age 50, to an eye care professional if available, or send a SOAP note to eye.consult@us.army.mil if you can follow up with the patient. Correcting refractive error in children may be challenging due to an increased range of accommodation, difficulty following directions, and language barriers.

The sole manufacturer of adaptive eyewear is Adaptive Eyecare Limited, a United Kingdom company.

Figure 1

Costs range from $15 to $21.50 per pair depending on use (humanitarian vs non-humanitarian) and order size. A new, lighter version is in development and will be available on a limited basis in the first quarter of 2009.[10] For sales information contact sales@adaptive-eyecare.com.

Operational Benefits and Concerns

Visual impairment presents a significant barrier for the military trainer – there's not much you can teach someone who can't see hand signals, his fellow trainees, or the target over the sights on his rifle. The same holds true for indigenous medic trainees in a guerilla hospital; it's hard to manage a bleed if you can't see it.[11] Adaptive eyewear turns an individual who cannot contribute into someone who can learn how to shoot, move, communicate, and render aid.

Adaptive eyewear can even serve as replacement eyewear for members of your unit. However, it does not substitute for protective eyewear since its performance when subjected to blast overpressure is unknown.

Restoring vision may have unintended effects. When operating in a hostile environment you should be aware that new glasses readily identify those people who have interacted and benefited from a SOF presence. There is also the potential to improve the enemy's vision (read "aim") if they obtain such adaptive eyewear either by posing as patients or by taking the eyewear from someone you treated. You can minimize this if you seal the lenses and remove the wheels and pumps to prevent adjustment for multiple users.

Conclusion

The socioeconomic impact of uncorrected refractive error is surely underestimated, when you consider the positive second- and third-order effects on family and community when a person regains their sight.[12,13] SOF personnel should educate key personnel in country health systems and encourage programs that provide eye exams and adaptive eyewear for the population. About 30,000 pairs of adaptive eyewear have been delivered in over 15 countries, the majority by U.S. government humanitarian assistance programs.[14]

What is the potential impact of adaptive eyewear for SOF operations? Having 153 million new friends in under-developed countries around the world could only be considered positive.

Adaptive eyewear were provided free of charge to the author for evaluation. The author has no financial, R&D, or other relationship with the manufacturer. Images are used with permission. .

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