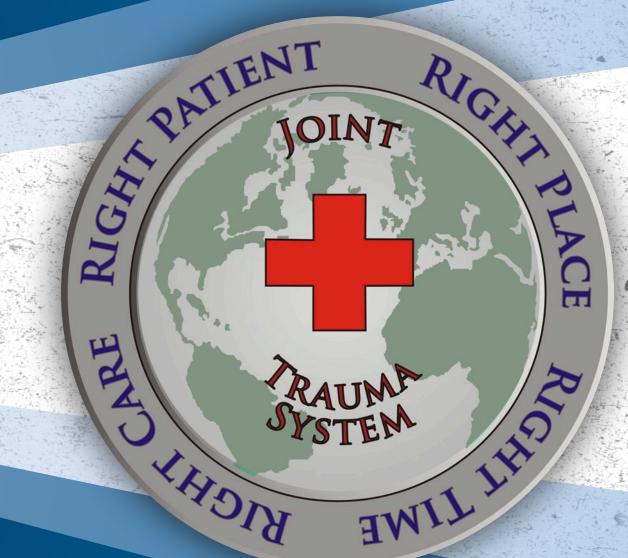
## Use of Rigid Eye Shields (Fox Shields) at the Point of Injury in Afghanistan

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### INTRODUCTION

Medical treatment priorities are accepted as "Life, Limb and Sight." However, because sight is so precious, many patients will reorder the list as "Life, Sight and Limb." Basic tenets of pre-hospital care for suspected penetrating eye injury include not putting pressure on the eye and placing a rigid shield over the eye at the point of injury to mitigate further damage during transport to definitive ophthalmic care. Antibiotics are also recommended to reduce the incidence of potentially blinding eye infections. Patches are to be avoided, even for corneal abrasions. Examples of appropriate shields include prefabricated metal eye shields (Fox shields) or improvised shields such as military combat eye protection (Fig 1); the guiding principle being to vault the injured eye so as not to induce pressure. While these principles are well known and accepted, anecdotal surveys report poor compliance in both military and civilian settings. Reasons for non-compliance can be varied:

- . In the urgency to treat bleeding and life-threatening injuries, especially under combat conditions, a pressure dressing may be applied without a protective shield;
- 2. In an effort to improve patient comfort, a head wrap across both eyes may be applied to "minimize ocular movement";
- Because eye injuries often coexist with head and facial injuries, which may be more impressive with respect to bleeding (>32%)<sup>1</sup>, a serious eye injury may be overlooked, resulting in a pressure "head" dressing or "facial" dressing over the unsuspected and unprotected eye injury;
- Lye injuries in real life may not look like the classic eye injuries taught in medical curricula—the "fishhook in the eye" scenario is common in eye trauma lectures but is rare in life;
- Shields may not be readily available at the point of injury.



Figure 1A. Pre-fabricated metal eye shield.



Figure 1B. Improvised eye shield using military combat (i.e., "What NOT to do"). eye protection.



Figure 2. Inappropriately patched eyes

To standardize care at points forward of ophthalmic capability, a Clinical Practice Guideline (CPG) for initial care of the ocular casualty was created and is available to theater providers<sup>2</sup>; recommendations are also included in Tactical Combat Casualty Care Guidelines<sup>3</sup>. Critical and core tenets include:

- . If possible, performance of a rapid vision check;
- 2. Placement of a rigid shield over the eye without an intervening dressing between the shield and the eye;
- Rapid referral to an ophthalmologist in cases with a known or suspected eye injury.

Surprisingly, there is a global lack of studies documenting the use of eye shields in ocular trauma. Therefore, a study was undertaken to document the use of rigid eye shields by primary responders in Afghanistan in an effort to set a baseline for further process improvement.

### METHODS

The DoD Trauma Registry (DoDTR) was reviewed for documentation of use of eye shields by non-ophthalmologists in theater for eye injuries sustained between January 2010 and November 2012. One hundred fifty-seven (n = 157) eye injuries were identified and analyzed for compliance. A subset of thirty (n = 30) randomly selected charts were further analyzed for compliance with other core measures as directed by the operant CPG for ocular injuries<sup>2</sup>; all of these patients required ophthalmic intervention. Of this subset, six charts did not have documentation of shield use. Fully successful mitigation was defined as a shield placed at the point of injury without an intervening dressing under the shield, regardless of clinical outcome.

### RESULTS

Overall, 39% (61/157) of eye injuries received an eye shield (Figs 3-4). In no subgroup of injuries was use of a shield higher than 50%, even in manifest ocular disruption. In the subset of 30 charts randomly selected for deeper analysis, documented eye shield compliance was found to be 20.8% (5/24) (Fig 5). Of the five cases that had shields placed, only one complied with guidance to avoid placing a dressing between the shield and the eye (20%). Therefore, fully successful mitigation at the point of injury defined as a shield without an intervening dressing—was documented in 4.2% of cases (1/24). Compliance with other core CPG recommendations in the subset analysis revealed 93% compliance with basic eye exam and 100% compliance with referral to ophthalmology (Fig 5).

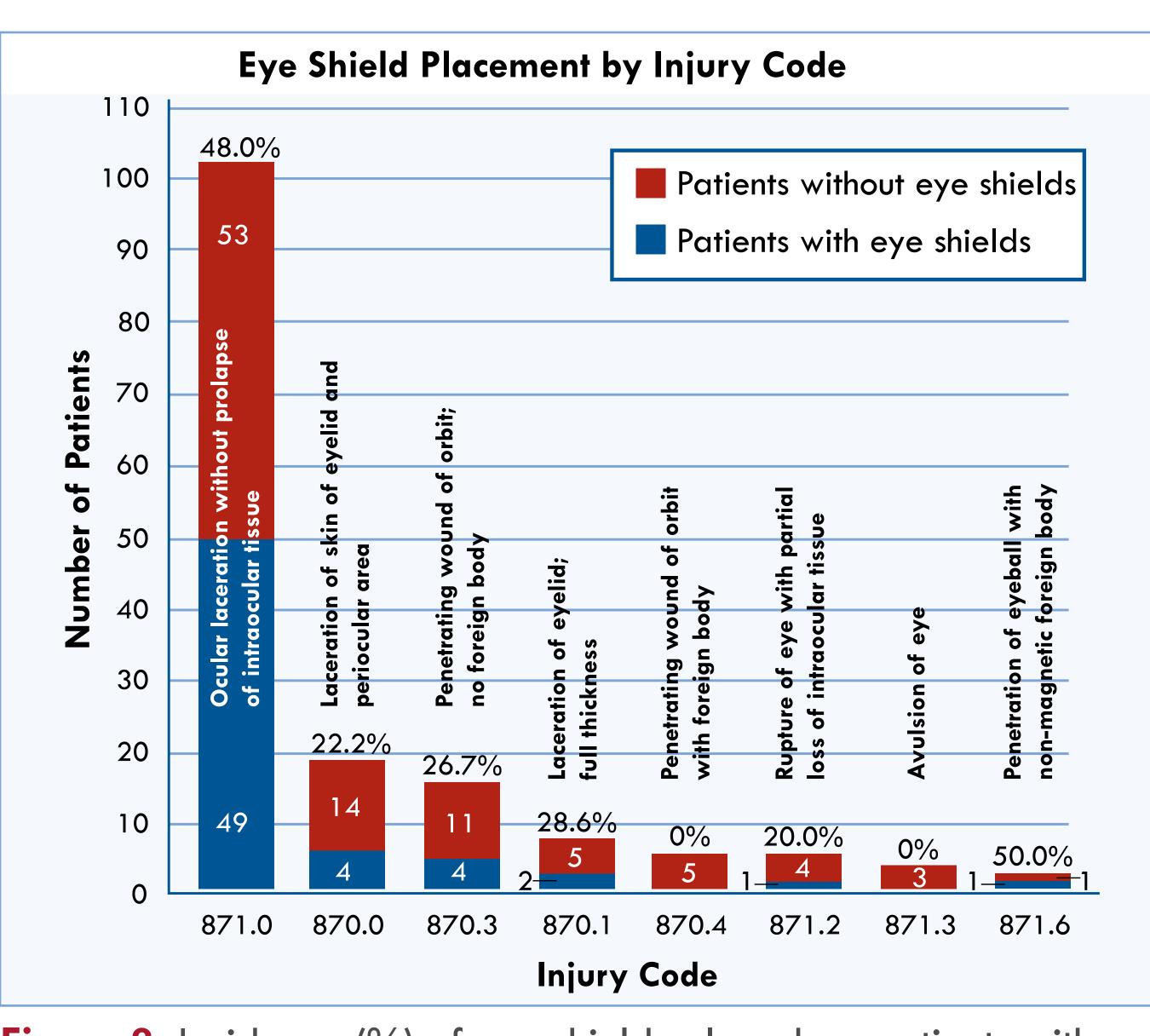


Figure 3. Incidence (%) of eye shields placed on patients with eye injuries (n = 157) by ICD-9 injury code.

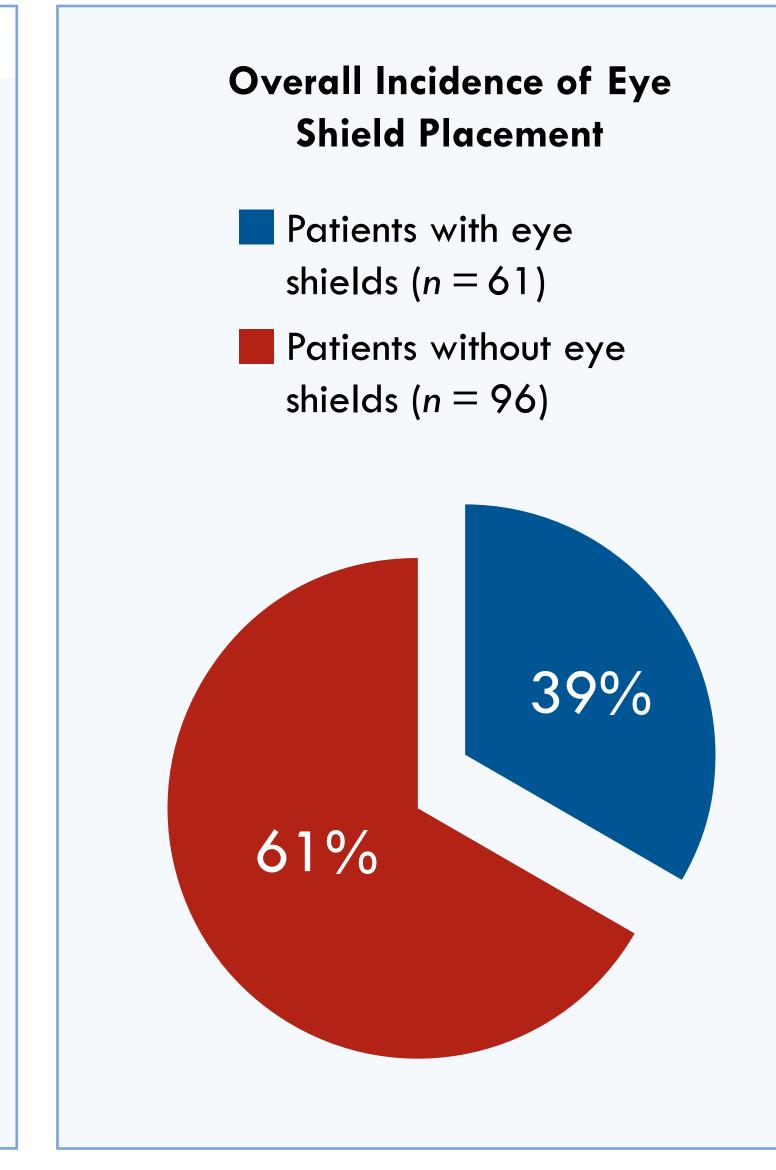


Figure 4. Incidence of eye shield placement in study population (n = 157).

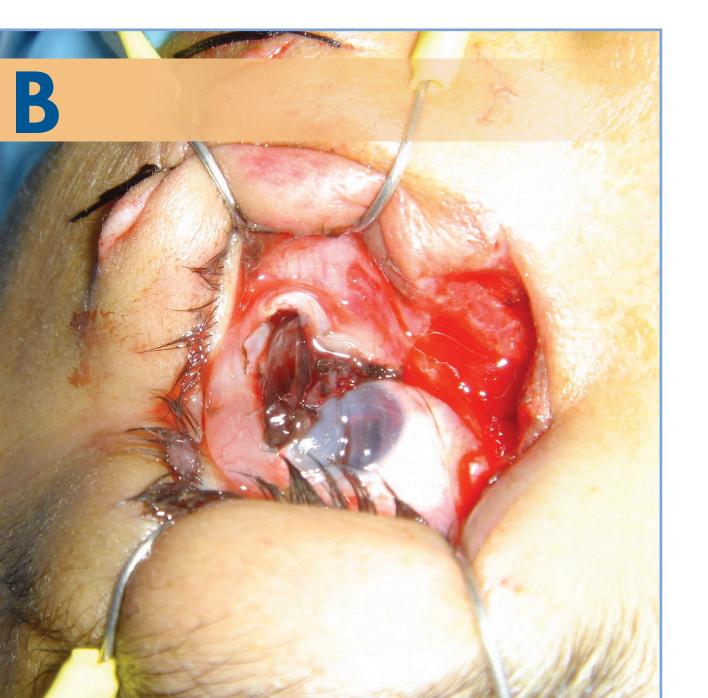
# Compliance with CPG Recommendations Did Not Comply Fox Shield Placed **S** 20 **5** 15 No Dressing Between Shield and Eye Ocular Care Measures

Figure 5. Compliance with ocular core measures in a subset of randomly selected cases (n = 30). Inset: Compliance with CPG recommendation of no dressing between Fox shield and eye (n = 5).

### DISCUSSION

The eye is notoriously unforgiving of injury. Consequently, it is imperative to mitigate any potential eye injury as close to the point of injury as possible by guarding and protecting the eye from further damage by using a rigid protective eye shield and to evacuate the casualty for ophthalmic evaluation and treatment as rapidly as possible ("shield and ship"). Furthermore, unlike other wounds where pressure dressings are indicated, pressure applied to an eye injury either directly or indirectly (such as via a direct pressure wrap or a dressing placed between a shield and the eye) can cause extrusion of intraocular contents and loss of sight or the eye (Fig 6B-C). Thus—just as a cervical collar can mitigate potential aggravation of a c-spine injury—proper use of an eye shield in potential eye trauma can mitigate unintentional iatrogenic added injury.





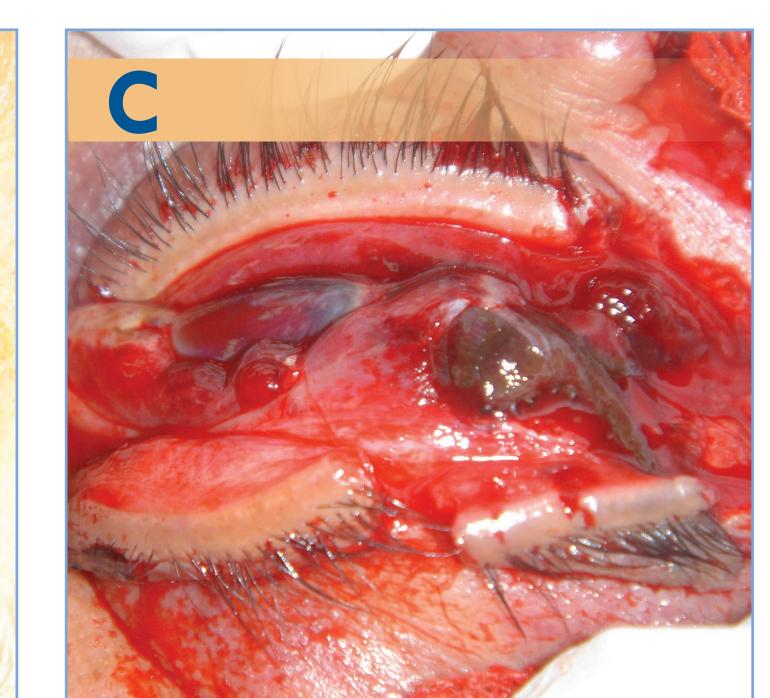


Figure 6. (A) Eye injury that was shielded and salvaged. (B-C) Eye injuries that were patched instead of shielded, resulting in enucleation.

In one of the few studies documenting the use of eye shields in ocular trauma, overall compliance with published and widely accepted recommendations was found to be approximately 39% in a military combat setting (61/157). However, our analysis found that compliance and successful mitigation (defined as a shield placement at the point of injury without an intervening dressing between the shield and eye) was only 4.2% (1/24) of cases.

While many factors undoubtedly color these findings (e.g., the urgency of treating a polytrauma patient under combat conditions and the devastating nature of IED-caused head/facial injuries) this study supports anecdotal reports of limited shield use in ocular trauma. Keeping in mind the dictum that "you can't change what you don't measure," the current study identifies areas for potential significant improvement of casualty care in the pre-hospital zone.

### REFERENCES

- Cho RI, Bakken HE, Reynolds ME, Schlifka BA, Powers DB (2009). Concomitant cranial and ocular combat injuries during Operation Iraqi Freedom. J Trauma 67(3), 516-520.
- Joint Theater Trauma System Clinical Practice Guideline; Initial care of ocular and adnexal injuries by non-ophthalmologists. JTS. 6 Mar 2012 available at http://www.usaisr.amedd.army.mil/clinical\_ practice guidelines.html
- Tactical Combat Casualty Care Guidelines 17 Sept 2012; available at <a href="http://www.usaisr.amedd.">http://www.usaisr.amedd.</a> army.mil/assets/pdfs/TCCC\_Guidelines\_120917.pdf

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