Access the entire webinar series here:
https://files.asprtracie.hhs.gov/documents/aspr-tracie-healthcare-system-preparedness-considerations-speaker-series-summary.pdf
Access the recording here:
https://attendee.gotowebinar.com/recording/3402208282624517552
Access speaker bios here:
https://files.asprtracie.hhs.gov/documents/the-role-of-ophthalmologists-in-disasters-speaker-bios.pdf

TRACIE
HEALTHCARE EMERGENCY PREPAREDNESS INFORMATION GATEWAY

Healthcare System Preparedness Considerations Speaker Series: Ophthalmology in Disaster Planning and Public Health Emergencies

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Disclosure

- The opinions expressed in this presentation and on the following slides by nonfederal government employees are solely those of the presenter(s) and not necessarily those of the U.S. government. The accuracy or reliability of the information provided is the opinion of the individual organization or presenter represented.

Ophthalmology in Disaster Planning and Public Health Emergencies

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Moderator: Dr. Jen Yu, MD, PhD
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Director of Trauma and Consult Services for Ophthalmology, Harborview Medical Center
Policy Chair of the American Society of Ophthalmic Trauma (ASOT)

American Society Of Ophthalmic Trauma

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The Burden of Ophthalmic Trauma and the American Society of Ophthalmic Trauma (ASOT)

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Dr. James Auran, MD
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Executive Vice-President and Cofounder of the American Society of Ophthalmic Trauma (ASOT)

American Society Of Ophthalmic Trauma

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Administration for Strategic Preparedness and Response

The Burden of Ophthalmic Trauma and the American Society of Ophthalmic Trauma (ASOT)

Disclosures:

- None

The Societal Burden of Ophthalmic Trauma

- From 2009 through 2018, there were over 7.3 million ED visits for ophthalmic trauma in the US[1]
- The incidence of ophthalmic trauma increased from 215 to 270 per 100,000 population over the 10-year period[1]
- 6% of work-related trauma cases hospitalized in the US from 2007 to 2014 were ophthalmic injuries[2]

1. Iftikhar M, Canner JK, Latif A, Shah SMA, Justin GA, Woreta FA. Epidemiology of ophthalmic trauma in the United States from 2009-2018: A Nationwide Emergency Department Sample Analysis. Injury. 2024 Mar;55(3):111209. doi: 10.1016/j.injury.2023.111209. Epub 2023 Nov 17. PMID: 38012902.
2. Zhou B, Uppuluri A, Zarbin MA, Bhagat N. Work-related ocular trauma in the United States: a National Trauma Databank Study. Graefes Arch Clin Exp Ophthalmol. 2023; 26:2081-88.

The American Society of Ophthalmic Trauma

- The American Society of Ophthalmic Trauma (ASOT) was formed in January 2020 at the suggestion of the American Academy of Ophthalmology, to meet the growing need for ophthalmic trauma policy.

- ASOT has since:
  - Expanded educational resources for ophthalmologists at national meetings, in textbooks, and through online references and webinars
  - Developed online courses for repair of open globe injuries and imaging in ophthalmic trauma
  - Hosted annual meetings with lectures, wet labs, and poster sessions

American Society Of Ophthalmic Trauma

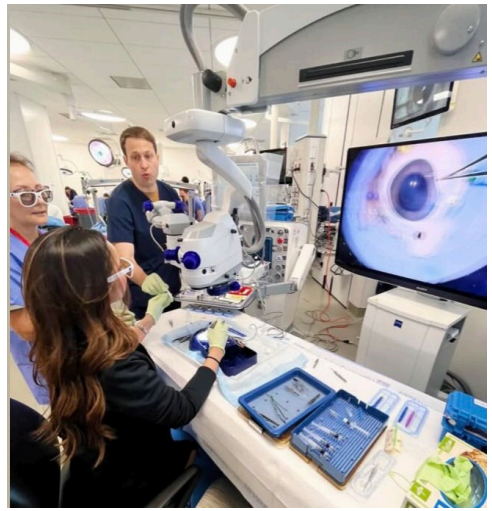
https://theasot.com/

Educational Content for Ophthalmologists: In-Person Meetings

- **Ophthalmic Trauma Symposia at AAO Annual Meeting**
  - 2021 Ophthalmic Trauma: Responsibilities of the On-Call Ophthalmologist
  - 2022 Controversies in Ophthalmic Trauma
  - 2023 Sports-related Ocular Trauma
  - 2024 Open Globe Management
- **Ocular Trauma Journal Club and Poster Sessions**
- **CME Courses**
  - Medical Malpractice in Ophthalmology
  - Anterior Segment Trauma: Management for the On-Call Ophthalmologist
  - Ophthalmic Trauma: Military lessons on Management (skills transfer course)
  - Open Globe Trauma: Surgical Management for the On-Call Ophthalmologist

ASOT Annual Meetings

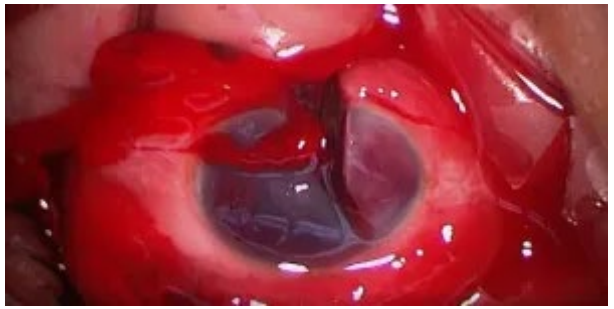
- 2022-2025: expanded from 1 virtual day to 2 days in-person, and now includes:
  - Wet lab
  - Paper and poster sessions
  - Lectures, keynote speakers, awards
  - NASA, military, and international society representation



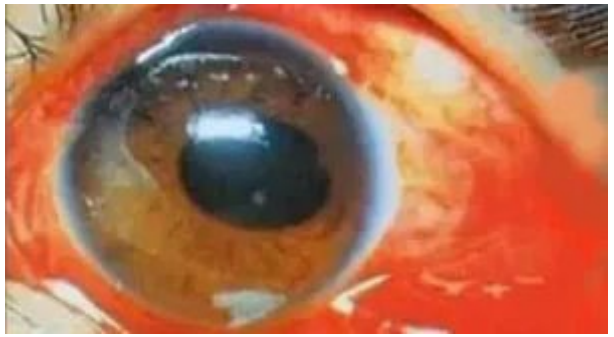
Online Courses

Imaging Acute Ophthalmic Trauma
https://www.aao.org/education/course/imaging-acute-ocular-trauma

Repair of the Open Globe
https://www.aao.org/education/course/repair-of-the-open-globe



Ocular Trauma Rotation
https://www.aao.org/education/resident-course/ocular-trauma-rotation



Online Resources - For Ophthalmologists

AAO Ocular Trauma Resources website
https://www.aao.org/education/trauma

Wills Eye Manual and the AAO Ophthalmic Education App
https://ebooks.aao.org/reader/index.html

Online Resources – Available to Public

EyeWiki - Dedicated **Ocular Trauma Section** with 76 articles
https://eyewiki.org/Category:Ocular_Trauma

Video-based surgical curriculum for open-globe injury repair five-part series, Digital Journal of Ophthalmology, Grayson Armstrong, et al
https://pmc.ncbi.nlm.nih.gov/articles/PMC10506619/

ASOT Ophthalmic Trauma Handbook
https://portal.theasot.com/files/ASOT_Handbook_with_Table_of_Contents.pdf

Publications with the American Academy of Ophthalmology

New Trauma section of the *Basic Techniques of Ophthalmic Surgery* textbook

Peer Review of Basic and Clinical Science Course (BCSC) Ophthalmic Trauma Updates,
e.g. 2021 *BCSC Section 7: Oculofacial Plastic and Orbital Surgery* (Lora Glass)

EyeNet Magazine
Monthly section devoted to trauma
Featuring Wartime Eye Trauma, September 2024
Featuring Disaster Eye Care, March 2025

Online Events for Resident Education with the American Academy of Ophthalmology

- **Virtual Resident Ophthalmic Trauma Competition**. 6/20/2020
  - ASOT and the Society of Military Ophthalmologists

- **Ophthalmic Procedures in Emergency Settings.** 8/1/2024
  - ASOT, AAO & AUPO Webinar

https://portal.theasot.com/files/ASOT_Handbook_with_Table_of_Contents.pdf

Eye Injuries and Conditions in Disasters

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INFORMATION GATEWAY

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ASPR
Administration for Strategic Preparedness and Response

Eye Injuries and Conditions in Disasters

Disclosures:

- Heidelberg Engineering (Honorarium)

Eye Injuries and Conditions in Disasters

Trauma from Debris

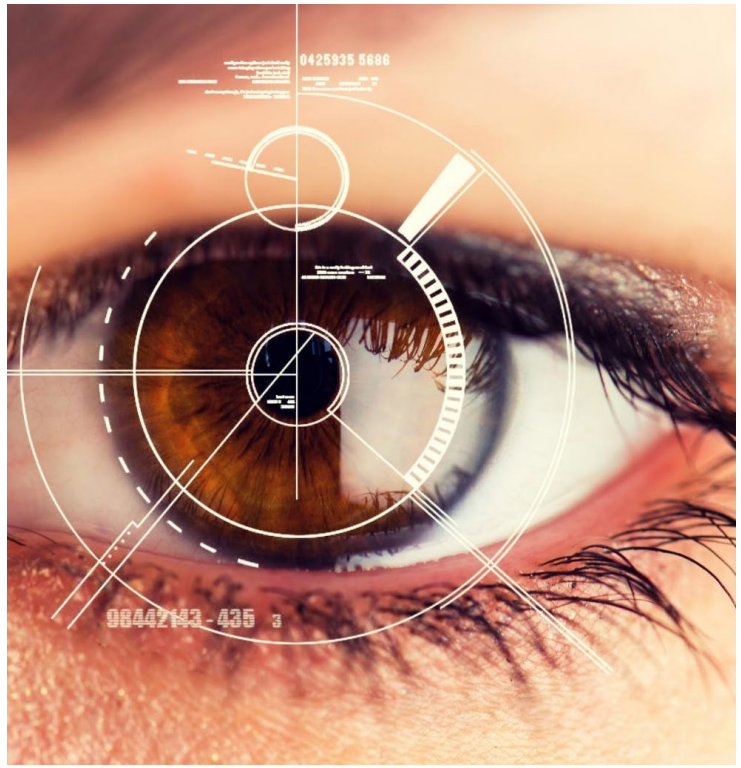
Eye injuries from flying debris can occur during blasts and natural disasters, leading to serious trauma that requires immediate medical attention.

Chemical Exposure

Chemical spills or exposure during disasters can lead to severe eye injuries, necessitating quick decontamination and treatment.

Infections

Infections can arise from contaminated water or debris in disaster scenarios, affecting eye health and requiring appropriate treatment protocols.



The Burden of Eye Injury and Care in Blasts/Bombs

- Explosions may be caused by industrial accidents as well as acts of terror and mass casualty events.
- These cause particularly severe injury to the eye and periorbital area.
- Eyes are vulnerable to debris and shrapnel from fires/explosions since our attention is naturally drawn towards the blast
- Civilian blast events have been reported to cause between **4-10% rate of ophthalmic injury**, similar to military studies.
- These injuries are often **more severe and complex**, with combined anterior and posterior segments of the globe, oculoplastic, and neuro-ophthalmic injury.
- They are often more likely to be **bilateral**, as well as be associated with systemic polytrauma.

The Burden of Eye Injury and Care in Blasts/Bombs

9/11 World Trade Center, 2001

- 19% of injuries to non-rescuer victims were ocular (MMWR January 2002)
- 9% of injuries to rescue workers occurring within 48 hours of the attack were ocular

Boston Marathon bombing, 2013

- 13% (22) of patients presenting to level 1 trauma centers had eye injuries.
- None were supplied rigid eye shields at the point of injury and 2/3rds of the eye injuries were not addressed until during or after initial life-saving surgery. (Yonekawa Y, et al. Ophthalmology 2014)

Beirut port blast, 2020

- 14% of blast injury trauma requiring surgical repair were repair of cornea-scleral lacerations (Mansour HA et al, The Lancet 2021)

Terrorist blast injuries

- Ocular injury occurs on up to 28% of terrorist blast victims; open globe injury in 20 to 50% and lid lacerations in 20 to 60% of these (CDC Fact Sheets for Professionals 2009)

The Burden of Eye Injury and Care in Natural Disasters

- **Direct eye injury** can occur from flying or falling debris
- The type, severity, and rate of eye injury after natural disasters vary based on many factors
- Past experiences have shown that about **5% of patients treated in field hospitals had eye-related injuries**
  - 2010 earthquake in Haiti
  - 2013 typhoon in the Philippines
  - 2015 earthquake and avalanche in Nepal

Osaadon P, Tsumi E, Pokroy R, Sheleg T, Peleg K. **Ocular morbidity in natural disasters: field hospital experience 2010-2015.** Eye (Lond). 2018 Nov;32(11):1717-1722

Pradhan E, Limbu B, Thakali S, Jain NS, Gurung R, Ruit S. **The impact of ocular trauma during the Nepal earthquake in 2015.** BMC Ophthalmol. **2017** Mar 28;17(1):32

The Burden of Eye Injury and Care in Natural Disasters

- **Indirect effects** from the disaster results in significant ophthalmic morbidity
- **Loss of prescription eyewear** (contact lenses and spectacles) can increase risk of further injury due to poor vision
- **Loss and unavailability of ophthalmic medications**
  - High risk conditions include corneal ulcers, uveitis (eye inflammation), glaucoma
- **Disease progression** due to reduced or absent health infrastructure
  - Untreated corneal ulcer can lead to perforation of the eye
  - Macular degeneration can worsen without scheduled intraocular injections

The Burden of Eye Injury and Care in Natural Disasters

- **Lack of clean water and continued use of old contact lenses** can cause corneal ulcers
- **Supply chain disruptions**

Post-hurricane evacuees

- **Hurricane Katrina** in 2005, 34% of reported needs were for eye care and eyeglasses (Ridenour ML et al, J Health Care Poor Underserved 2007)
- **Hurricane Harvey** in 2017, the risk of infections and eye disease doubled

The Visually Impaired: A Vulnerable Population At Risk in Disasters

- Patients with vision loss are particularly vulnerable after disasters
- Approximately 6 million Americans have vision loss and 1 million have blindness.
- More than 1.6 million Americans who are living with vision loss or blindness are younger than age 40.
- There is a higher risk of vision loss among Hispanic/Latino and Black individuals than among White individuals.

- https://www.cdc.gov/visionhealth/vehss/estimates/vision-loss-prevalence.html (accessed 3/24/2024)

Lessons on Ophthalmology Disaster Preparedness from the Military

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HEALTHCARE EMERGENCY PREPAREDNESS INFORMATION GATEWAY

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Lessons on Ophthalmology Disaster Preparedness from the Military

Disclosures:

- The author has no relevant financial interests to disclose.
- The views expressed in this presentation are the author's and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the U.S. Government.

High Incidence of Ocular Injury in Combat

- ~16% of all medical evacuations in recent conflicts involved ocular trauma (Eye, 2021)
- Eye injuries are increasingly common due to modern blast mechanisms—often bilateral and complex.
- These patients typically have polytrauma, requiring coordinated care across specialties.

Prioritization in Resource-Constrained Settings

- Military eye trauma management follows a **damage control approach**:
  - Stabilize the globe (globe closure is vision-saving).
  - Delay definitive surgery until the patient is stable or in a better-equipped setting.

- Civilian systems can adapt this model during disasters by triaging for stabilization first and deferring complex care.

Importance of Eye Protection

- Early in Iraq/Afghanistan conflicts (2003–2004), eye protection was not standard.
- By 2006, protective eyewear became mandatory and **reduced injury rates significantly**.
- Lesson: Incorporate **PPE and eye protection** into civilian first responder kits and public messaging during disaster events.

Rethinking Zones of Care (ZOC)

- Military planning differentiates between **prehospital and hospital zones of care**.
- For ophthalmology:
  - **Pre-ophthalmic ZOC**: Initial care before an ophthalmologist is available (includes EMTs, ED physicians).
  - **Ophthalmic ZOC**: Begins once an ophthalmologist intervenes—damage control, surgical repair, long-term visual rehab.
- **Recommendation**: Civilian systems should define and prepare for both zones, training non-ophthalmic providers in basic eye trauma protocols (e.g., eye shield placement, irrigation, canthotomy).

Military-Inspired Systems Planning

- Develop and integrate clear **eye trauma triage protocols** into hospital emergency response.
- Stockpile **basic ophthalmic emergency equipment** (eye shields, saline, fluorescein, antibiotics).
- Include ophthalmologists in NDMS, MRC, and telemedicine disaster networks.

Training & Cross-Specialty Support

- Military ophthalmologists often assist in trauma cases beyond the eye (e.g., facial trauma, triage).
- Emphasize **cross-training** and collaboration with ENT, plastics, and general surgery in disaster response teams.

Key Takeaways

- Military systems emphasize **readiness, prioritization, and modular response**—principles adaptable to civilian disaster preparedness.
- Incorporating **eye trauma protocols**, protective equipment, and ophthalmologist roles into planning strengthens response capacity.
- Use military experience to **train first responders, streamline triage, and build robust eye care systems** in emergencies.

Moderator Roundtable Question 1

How can the ASOT support disaster preparedness?

How can ASOT Support Disaster Preparedness

- **Preparation and response**
  - Provide recommendations on equipment and supplies
  - NDMS rapid response team
  - Strategic National Stockpile
  - Hospital emergency inventory
- **Education**
  - Laypeople
  - Per-ophthalmologist health care providers (EMTs, paramedics, emergency physicians, nurses, physician assistants
  - Ophthalmologists

How can ASOT support disaster preparedness

- **Medical care**
  - Volunteering through established systems
- **NDMS**
  - Telemedicine backup
  - Protocol development
- **MRC**
  - Eye MD recruitment
  - Organization of eye care membership
  - Ophthalmic care protocol recommendations
- **Hospitals/EDs/surgical centers/private offices**
  - Training
  - Establishment of proficiency standards

How can ASOT support disaster preparedness

- **Eye Protection recommendations**
  - Civilian population
  - First responders/rescue workers/NDMS and MRC teams
  - Clean-up crews
- **Evacuee care**
  - Eyeglass/contact lens loss
  - Continuing care of pre-existing conditions
  - Care for the visually impaired

Moderator Roundtable Question 2

What skillsets can ophthalmologists provide in a disaster, based on military experience?

Ophthalmologist Skillsets

- Triage skills: life, limb, eyesight
- Surgical assistant for other surgeons

Moderator Roundtable Question 3

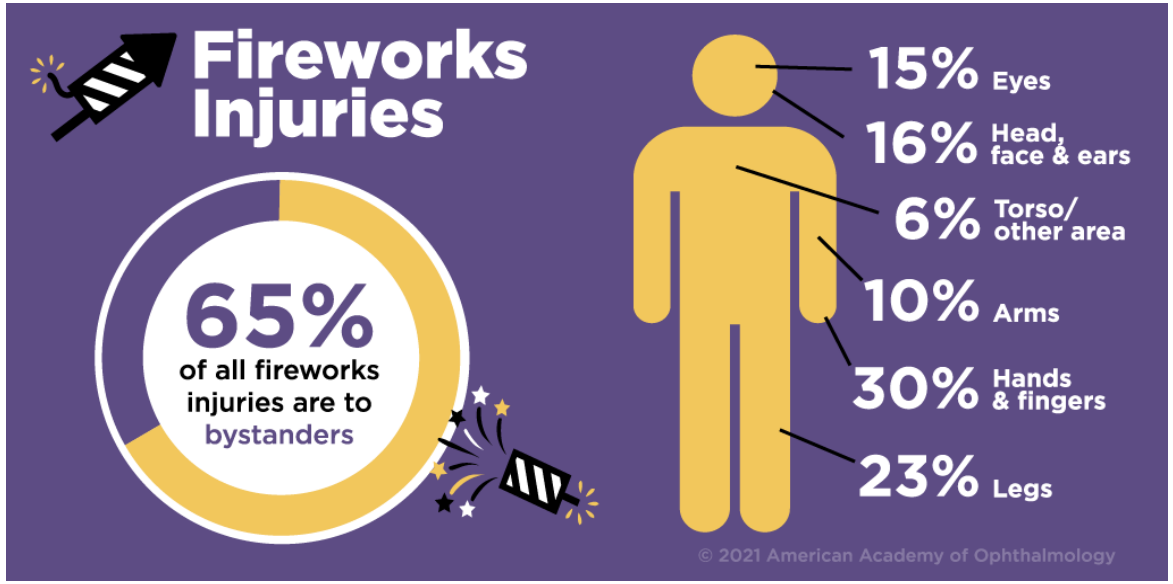
How can hospitals prepare for ophthalmic injuries in disasters and public health emergencies?

How can Hospitals Prepare for Ophthalmic Injuries?

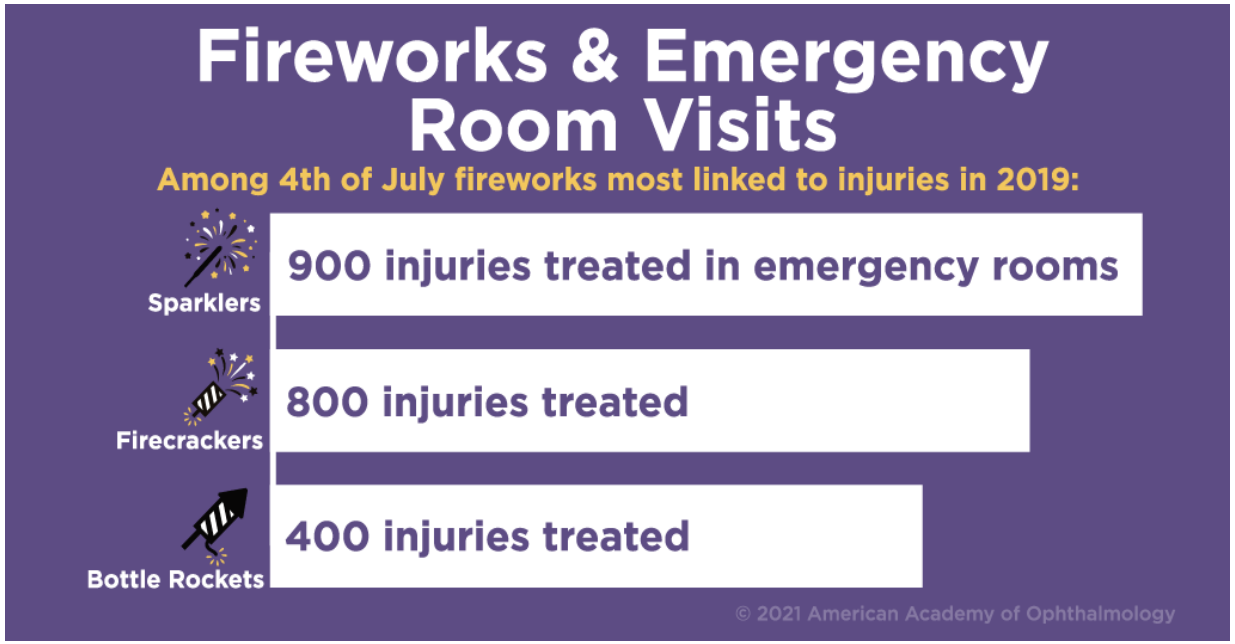
- Ophthalmology is outpatient based, not many ophthalmologists are in hospitals or even take call
  - **Establish partnerships** with local outpatient ophthalmology clinics
  - **Divert triaged patients** to outpatient clinics to help decompress ED and hospitals
- **Update equipment and supplies** needed to stabilize eye emergencies
  - Chemical injury
  - Compartment syndrome from retrobulbar hemorrhage
  - Open globe injuries
- Timing of **open globe repair ideally within 24 hours** from time of injury

How Can Hospitals Prepare for Ophthalmic Injuries?

- Most disasters are unpredictable
- However, there is one predictable and repeated cause of eye injury that happens every year



Fireworks Eye Injuries



How Can Hospitals Prepare for Ophthalmic Injuries?

Mitigation strategies from 4th of July eye trauma

- Schedule extra staff in the evenings and overnight to help with patient volumes
- Shorten shifts to avoid work overload and burnout
- Consider utilizing other clinical areas for eye exams to decompress ED space
- Reduce elective surgeries to have open OR blocks
- Reduce routine outpatient clinic appointments to accommodate surge in follow-up care
- Maintain communication with ED leaders and personnel

Public Health Recommendations

- Strongly advise **against the use of contact lenses** during natural disasters due to the increased risk of eye infections from airborne debris.
- Beware of **contaminated environments**. Always thoroughly clean hands before touching eyes to prevent infections.
- **Safety glasses** for the first responders
- Other considerations:
  - Patients with lost glasses and contact lenses
  - Patients with loss of sight-preserving eye medications (glaucoma, corneal ulcer antibiotics)

Public Health Recommendations

- AAO resources:
- https://www.aao.org/eye-health/tips-prevention/eyeglasses-medication-evacuation-checklist

AMERICAN ACADEMY OF OPHTHALMOLOGY®

Make Eyeglasses and Medication Part of Your Evacuation Checklist

Leer en Español: Asegúrese de que los anteojos y los medicamentos sean parte de su lista de evacuación

By Beatrice Shelton
Reviewed By Thomas L Steinemann, MD
Published Nov. 27, 2018

When disaster strikes, will you be prepared? If you had just minutes to leave your home, what would you take? If you have ever thought about an emergency preparedness plan, then you've probably thought about packing nonperishable items, batteries, and water. But don't forget about eyeglasses and medication.

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