



For the Health Care Provider: WRAP-EM Information Sheet on Riot Control Agents

The tragic events leading to the death of George Floyd have been heartbreaking. We unfortunately continue to be faced with structural racism and inequality that costs human lives. We all need to stand in solidarity.

We are seeing many peaceful protests throughout the United States and we have to continue to make sure that we are prepared to ensure the safety of our community. There is a possibility of people being exposed to tear gas (pepper spray) or riot control agents. The below contains information on tear gas exposure and treatment, including unique considerations for the pediatric patient.

Please continue to be vigilant of the ongoing COVID pandemic and follow regional and local guidelines for personal protection/public health recommendations. Note that exposure to riot control agents can cause coughing and sneezing which can spread respiratory droplets. Exposure can also lead to touching one's face, increasing the risk of infection with COVID. Wearing face masks, some form of eye protection, carrying hand sanitizer, and maintaining social distancing can help to reduce your risk of exposure to COVID.

Tear Gas Fact Sheet:

If you are concerned you have been exposed to tear gas or other riot control agents, please seek medical assistance.

Involve the poison control center / toxicology consult if exposed: Call 1-800-222-1222

What is tear gas?

Tear gas/gel or pepper spray are irritant agents that are known as riot control agents. These chemicals temporarily make people unable to function due to irritation of the eyes, mouth, throat, skin, and lungs. Riot control agents are typically used by law enforcement for crowd control and by the general public for self-defense.

There are three types of riot control agents (tear gases):

- CN (2-chloroacetophenone)
- CS (o-chlorobenzylidene malonitrile)
- OC (oleoresin capsicum)

In medical terms, how does tear gas work: Tear gas activates TRP ion channel “irritant receptors” found mostly on skin and respiratory tissue to activate small-diameter sensory fibers to release substance P and similar neuropeptides to cause pain and inflammation.

Types of Exposure:

- Aerosol (airborne dispersion used for crowd control): e.g., grenades
- Handheld sprays, gels (e.g., Mace canister): may occasionally be dispersed by water cannon by law enforcement

What are the symptoms of exposure?

-For most, irritant effects spontaneously resolve within 30 minutes - 2 hours (respiratory may be longer; rarely up to 12 hours) once removed from the agent

-Risks for serious effects: enclosed spaces, prolonged exposures, larger exposures

- **Eyes and respiratory systems** are primary target organs
- **Ocular:** Pain, conjunctivitis, lacrimation, periorbital edema, erythema, photophobia, conjunctival/scleral injection
 - Rare: Severe injuries such as uveitis, necrosis
- **Respiratory:** Shortness of breath, chest pain, wheezing, rhinorrhea, salivation
 - Severe effects less common: bronchospasm, laryngospasm, acute reactive airway disease, chemical pneumonitis, pulmonary edema, hemoptysis
- **Dermal:** Burning or tingling
 - Prolonged direct contact or significant exposure: blistering, desquamation, superficial to moderate-severe chemical burns
 - Burn from delivery device (grenade canister or explosive)
- **GI:** rare nausea, vomiting, diarrhea.
- Rare clinical effects which may be seen with massive prolonged exposure: heart failure, acute liver injury, hypersensitivity reactions

Clinical Effects:

Organ	Effect	Management
<i>Eyes</i>	<ul style="list-style-type: none">· Lacrimation· Blepharospasm· Conjunctiva irritation/conjunctivitis· Periorbital edema· Corneal abrasions	<ul style="list-style-type: none">· Copious H₂O/saline irrigation with Morgan Lens or Nasal Cannula irrigation· Slit lamp/fluorescein with Wood's Lamp exam for corneal abrasions
<i>Skin</i>	<ul style="list-style-type: none">· Burning sensation· Blister· Contact dermatitis· Superficial partial thickness burn to partial thickness burn: moist, painful, blisters and swelling (mace)	<ul style="list-style-type: none">· Wash with soap and cool water· Wound care- Topical Bacitracin ointment for any second degree wounds

<p><i>Airway/respiratory tract</i></p>	<ul style="list-style-type: none"> · Respiratory tract irritation · Rhinorrhea · Laryngospasm · Bronchospasm · Chemical pneumonitis 	<ul style="list-style-type: none"> · B₂-agonists for bronchospasm (nebulizer or MDI) · Steroids if worsening underlying reactive airway disease · CXR to evaluate for possible pneumonitis · Supplementary oxygen as needed
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What are some of the considerations for pediatric patients exposed to riot control agents:

- Pediatric patients tend to have poor communication skills and may be unable to describe symptoms or localize pain
- Children with special needs or pre-ambulatory children are less able to avoid danger or seek attention effectively and prolonged exposure to riot control agents can intensify the physiologic effects of these agents
- Pediatric patients tend to have underdeveloped coping strategies that can lead to repeated exposure to an irritant (i.e. rubbing eyes or hugging an exposed caregiver)
- Physiologic differences seen in children:
 - Children have shorter stature which places them closer to the greatest gas vapor density at ground level
 - Children have a greater body surface area and more permeable skin allowing for rapid absorption and systemic effects from toxins
 - Pediatric airways are smaller than adults, potentially increasing risk for respiratory symptoms with exposure
 - Pediatric patients have a smaller pulmonary reserve leading to an increased minute ventilation, potentially increasing risk for exposure
 - Children with asthma are predisposed to serious pulmonary symptoms
- Children might be easily frightened by medical providers wearing decontamination personal protective equipment which could contribute to post traumatic response to stress.

What are the long-term effects of tear gas?

Most people exposed to tear gas will have a resolution of symptoms within 30 minutes to 2 hours once removed from the agent. People who experience high-dose exposures (such as a high concentration of tear gas or if exposed within an enclosed space) may develop difficulty breathing, swelling of their airway, and possible respiratory arrest.

What should you do if you are exposed to tear gas?

If you have been exposed to tear gas:

-Immediately remove yourself from the environment where tear gas was released. If tear gas was released outdoors please go to the highest ground possible as tear gas will form a dense vapor cloud near the ground. If tear gas was released indoors, leave the building or structure immediately.

-First step in treatment is decontamination:

- Should occur as soon as possible prior to hospital, outside the emergency department, or within an emergency department
- Remove all clothing and place in a plastic bag. Do not handle these clothes again. Avoid pulling clothing over the head and cut clothing if necessary.
- Flush eyes for 15 minutes with water or saline (remove any contact lenses first)
 - Can pretreat eyes w 1-2 drops in each eye of proparacaine or tetracaine. Ophthalmologic exam (fluorescein) if symptoms are worse than only mild after irrigation.
 - Can flush via the following:
 - Eye irrigation sink
 - Morgan Lens irrigation (<https://www.youtube.com/watch?v=-zhtmNHrRiU>)
 - Use of nasal cannula and normal saline bag for irrigation (<https://www.youtube.com/watch?v=Uf6eiA9q620>)
- Decontaminate skin thoroughly with soap and cool water only if symptoms (burning) or direct sustained contact with liquid
 - Typical aerosol riot control agents disperses quickly and does not require skin decontamination.
 - Place over the counter bacitracin topical antibiotic ointment on any blistering wounds
- Respiratory: Bronchodilators (beta-agonists), oxygen; ventilation if needed
- Protect yourself: medical providers assisting with decontamination should use gloves, goggles, gowns, surgical masks in a well-ventilated area while decontaminating.
- No specific antidotes – therapy is supportive

Note: Always consider projectile or blunt trauma that may be associated with the riot-control-related visits/complaints.

What are the pediatric considerations for decontamination:

-Children will often present with caregiver or family- be prepared to decontaminate all family members

-In the event children present without their caregiver, immediate steps for patient reunification should be implemented

-Children are more susceptible to hypothermia. Please ensure warming blankets/lamps are available post decontamination

-Decontamination areas must be set up to accommodate children with special needs and the non-ambulatory child

Myths and Misconceptions

-Soaking bandana in water and tightly covering your mouth

- Riot control agents, CN and CS, at normal temperatures and pressures tend to form crystals. These crystals can be reactivated by reexposure to moisture and prolong the effects.

-Milk will decrease the symptoms of riot control agents (RCA)

- Milk can help break down the oils of pepper spray, however, when it comes to tear gas there is no benefit over water.

-Placing a baking soda and water paste under the eyes will help decrease the irritating reaction from tear gas

- Experts recommend against this practice as you are placing a new irritant to the general area, which can lead to injury to the surface of the eye
- Not knowing the type of reaction the basic solution is going to have with your skin and the type of RCA chemical being used can be extremely harmful.

Other Helpful Sites:

Wireless Information System for Emergency Responders:

<https://webwiser.nlm.nih.gov/getHomeData>

Interested in Hazmat Training? Advanced Hazmat Life Support training:

<https://www.ahls.org/site/>

Newssafety.org:

<https://newssafety.org/safety/advisories/protecting-yourself-from-tear-gas/>

How to treat tear gas:

<https://www.thecut.com/article/what-to-do-if-youre-exposed-to-tear-gas.html>

References:

CDC Facts About Riot Agents Control Agents:

<https://emergency.cdc.gov/agent/riotcontrol/factsheet.asp>

Hazard Material Exposure Guide: A Step by Step Medical Response Guide (Minnesota Department of Health)

<https://www.health.state.mn.us/diseases/idlab/labep/hazmat/MDHhazmat2018.pdf>

US Dept of Health and Human Services: Chemical Hazards Emergency Medical Management:

<https://chemm.nlm.nih.gov/riotcontrolagents.htm>

Maryland Poison Control Center- Tear Gas Information Sheet

<https://www.mdpoison.com/aboutus/facts.html>

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<https://doi.org/10.1111/nyas.13141>

Pediatric Terrorism and Disaster Preparedness A Resource for Pediatricians

<https://www.hSDL.org/?view&did=468168>

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For the Community: WRAP-EM Information Sheet on Riot Control Agents

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Tear Gas Fact Sheet:

If you have been exposed to tear gas or other riot control agents and you are experiencing persistent symptoms or are concerned, please seek medical assistance.

Involve the poison control center / toxicology consult if exposed: Call 1-800-222-1222

What is tear gas?

Tear gas/gel or pepper spray are irritant agents that are known as riot control agents. These chemicals temporarily make people unable to function due to irritation of the eyes, mouth, throat, skin, and lungs. Riot control agents are typically used by law enforcement for crowd control and by the general public for self-defense.

Types of Exposure:

- Aerosol (airborne dispersion used for crowd control): e.g., grenades
- Handheld sprays, gels (e.g., Mace canister): may occasionally be dispersed by water cannon by law enforcement

What are the symptoms of exposure?

- Seek medical attention if you have any concerns and/or for persistent symptoms
- For most, irritant effects spontaneously resolve within 30 minutes - 2 hours (breathing problems may be longer; rarely up to 12 hours) once removed from the agent
- Risks for serious effects if exposed in an enclosed spaces, prolonged exposures, or larger exposures
 - **Eyes and respiratory systems** are primary target organs
 - **Ocular:** Pain, eye redness and irritation, tearing, eye and facial swelling, redness, sensitivity to bright lights, redness of eyes
 - Rare: severe inflammation, skin tissue breakdown
 - **Respiratory:** Shortness of breath, chest pain, wheezing, runny nose, salivation
 - Severe effects less common: significant difficulty breathing, swelling of the airway
 - **Skin:** Burning or tingling
 - Prolonged direct contact or significant exposure: blistering, peeling of skin, superficial to moderate-severe chemical burns
 - Burn from delivery device (grenade canister or explosive)
 - **GI:** rare nausea, vomiting, diarrhea
 - Rare clinical effects which may be seen with massive prolonged exposure: heart failure, acute liver injury, allergic type reactions

Clinical Effects:

Organ	Effect	Management
<i>Eyes</i>	<ul style="list-style-type: none"> · Eye tearing · Eye twitching · Irritation and redness of the eyes · Swelling around the eyes 	<ul style="list-style-type: none"> · Copious H₂O/saline irrigation
<i>Skin</i>	<ul style="list-style-type: none"> · Burning sensation · Blistering · Redness of skin · Skin burns; typically moist, swollen, painful, blisters (especially seen with mace) 	<ul style="list-style-type: none"> · Wash body with soap and cool water · Wound care- place over the counter bacitracin ointment on any blistering skin wounds*
<i>Airway/respiratory tract</i>	<ul style="list-style-type: none"> · Irritation of the lungs · Runny nose · Difficulty speaking and/or breathing 	<ul style="list-style-type: none"> · Seek medical treatment for persistent airway/respiratory symptoms

*If you have concerns about possible skin burns, please seek medical assistance or call your local burn center. Seek medical care if you think the skin burns cover more than 10% of your body surface area. As a reference, your hand is approximately 1% of your body surface area.

What are some of the considerations for children exposed to riot control agents:

-Children tend to have poor communication skills and may be unable to describe symptoms or localize pain

-Children with special needs or pre-ambulatory children are less able to avoid danger or seek attention effectively and prolonged exposure to riot control agents can intensify the physiologic effects of these agents

Children tend to have underdeveloped coping strategies that can lead to repeated exposure to an irritant (i.e. rubbing eyes or hugging an exposed caregiver)

-Physiologic differences seen in children:

- Children have shorter stature which places them closer to the greatest gas vapor density at ground level
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- Remove all clothing and place in a plastic bag. Do not handle these clothes again. Avoid pulling clothing over the head and cut clothing if necessary
- Flush eyes for 15 minutes with water or saline (remove any contact lenses first)
- Decontaminate skin thoroughly with soap and cool water only if symptoms (burning) or direct sustained contact with liquid
 - Typical aerosol riot control agents disperse quickly and do not require skin decontamination.
- Respiratory: may require prescription medication or supplemental oxygen to assist with breathing
- Protect yourself: any one assisting with decontamination should use gloves, goggles, gowns, masks and ensure you are in a well-ventilated area while decontaminating
- No specific antidotes – therapy is supportive as listed above

What are special considerations for decontamination of children:

Children are more susceptible to hypothermia. Please ensure children receive warming blankets and dry clothes after decontamination.

Myths and Misconceptions

-Soaking bandana in water and tightly covering your mouth

- Riot control agents, CN and CS, at normal temperatures and pressures tend to form crystals. These crystals can be reactivated by re-exposure to moisture and prolong the effects.

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<https://newsafety.org/safety/advisories/protecting-yourself-from-tear-gas/>

How to treat tear gas:

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