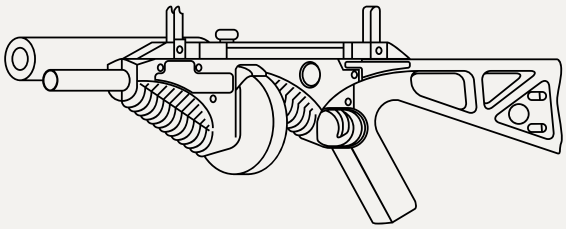
# KINETIC IMPACT PROJECTILES

Kinetic impact projectiles (KIPs), commonly known as rubber or plastic bullets, have been found to cause serious injury, disability, and death when used by law enforcement for crowd control. KIPs are inherently inaccurate when fired from afar and therefore can cause unintended injuries to bystanders and strike vulnerable body parts; at close range, they can easily turn lethal.

## How they work

KIPs are designed to inflict pain through the transfer of kinetic energy from a projectile to a person.



## Deployment mechanism

KIPs are deployed from a wide range of launchers and firearms. Some utilize, or are additions to, traditional firearms used for live ammunition. Others are specially designed for use with less lethal muntions. Single or multiple projectiles, between 2 and dozens, may be fired at once.


## Common types of projectiles

RUBBER AND PLASTIC BULLETS
These are solid projectiles of variable size and shape fired as single shots or in groups of multiple projectiles. Pellets can be made of rubber, plastic, PVC, or a composite including metal.

A

BEAN BAG ROUNDS
Also known as flexible baton rounds, bean bag rounds are synthetic cloth bags filled with small metal pellets that fit into a cartridge and expand as they travel to create a wide surface area impact.

B

SPONGE ROUNDS
This is a general term for projectiles that limit penetration of the projectile into the skin by having a tip or nose that is slightly softer. These include foam rounds with a hard foam nose or “attenuated energy projectiles” with a hollow nose.

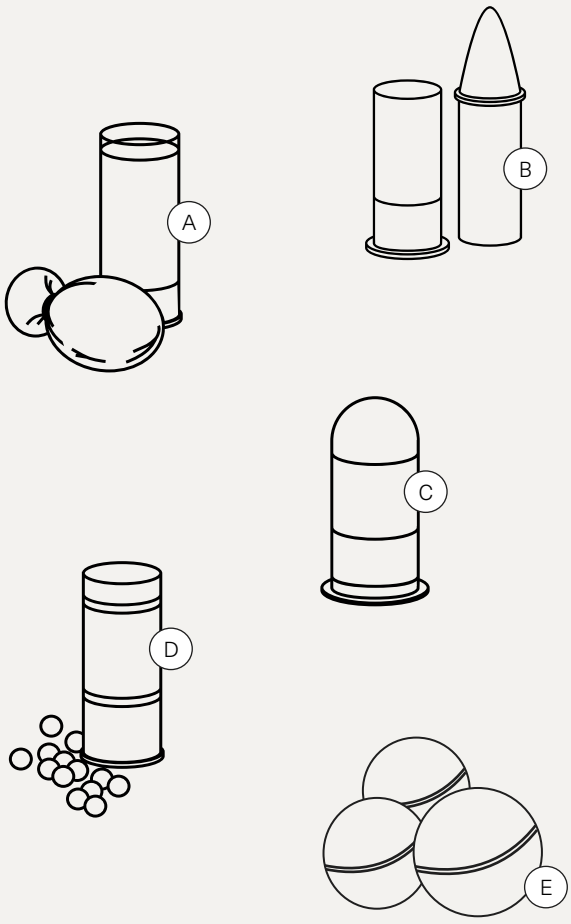
C

PELLET ROUNDS
These are cartridges filled with small lead, steel, or composite pellets that spread out when fired. Metal shots such as buck and birdshots are considered crowd- control weapons by some countries but international standards prohibit them.

D

“PEPPER-BALL” ROUNDS
These hybrid projectiles contain chemical irritants fired from compressed air rifles.

E

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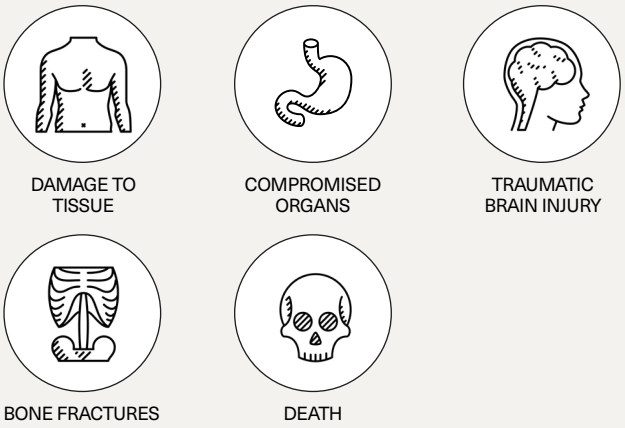
## KINETIC IMPACT PROJECTILES

### Health Impacts

KIPs have resulted in significant morbidity and mortality in crowd settings. At close range, projectiles can penetrate tissue, compromise organs, sever arteries, or impact with enough force to fracture bones. Even at longer ranges, projectiles can carry enough energy to cause bruises, internal bleeding, and permanently damage delicate tissues such as the face, eyes and genitalia. Impacts to the head and neck are especially severe and carry the risk of blindness, traumatic brain injury, and death.




### Variables that can exacerbate injuries

PROJECTILE TYPE
Metallic rounds are more dense and can cause more severe injuries. Embedded lead may cause long-term lead poisoning.

QUANTITY
Firing multiple projectiles, including discs, balls, or bullets, at once can not be targeted and can injure bystanders or hit individuals in sensitive areas.

FIRING DISTANCE
Firing distance inversely correlates with severity of injuries.

SITE OF IMPACT
Impacts to the head, neck, face, and other vulnerable body parts are responsible for the majority of severe injuries. Manufacter guidelines on where to target projectiles are inconsistent and hard to follow.

DELAYED ACCESS TO MEDICAL CARE
This includes overburdened medical facilities, checkpoints, delayed presentation because of fear of arrest or reprisal, or failure of medical personnel to recognize injury.


**At close ranges, levels of lethality and patterns of injury of some KIPS become *similar to those of live ammunition.***

### Policy recommendations

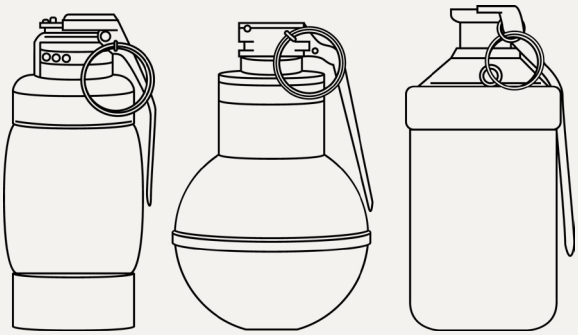
- KIPs in general are not an appropriate weapon for crowd management and, specifically, for dispersal purposes, as most cannot be used effectively and safely against crowds. At close ranges, levels of lethality and patterns of injury of some KIPS become similar to those of live ammunition. At longer ranges, KIPs are inaccurate and indiscriminate.
- Indiscriminate KIPs that fire multiple projectiles must be prohibited in the context of protest.
- Metal shots, rubber-coated metal bullets, or any projectile with a metallic component are not safe and should be prohibited.
- Some types of KIPs are able to provide a less lethal and accurate alternative. Deployment of those KIPs should be restricted to circumstances where a threat to life or a threat of serious injury exists, and where all other means to protect lives are inapplicable.

# CHEMICAL IRRITANTS

Chemical irritants (CIs), commonly known as tear gas and pepper spray, are used for crowd-control purposes by law enforcement worldwide. CIs are inherently indiscriminate and therefore the risk of exposing bystanders and individuals other than the intended targets, including vulnerable people, is high.

## How they work

CIs are potent sensory irritants that cause pain and inflammation via multiple mechanisms.



## Deployment mechanism

GRENADE OR CANISTER
CS powder is combined with a pyrotechnic in a metallic case. Upon deflagration, burning CS produces a cloud of irritant smoke. Gas canisters—designed to be fired from grenade launchers at high speed—are sometimes misused as impact projectiles when shot directly at protestors.

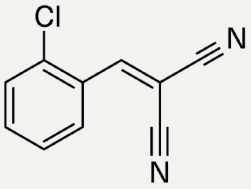
SPRAY
Aerosolized streams of irritants can be sprayed at distances of 8 – 12 feet in bursts, allowing for potentially higher doses of chemical agent directly striking targeted people or groups.

OTHER SYSTEMS
CIs can also be dissolved in water to be used in water cannons or fire hoses, or contained as a powder inside a plastic impact projectile (“pepper-ball” guns, FN-303).

## Common types

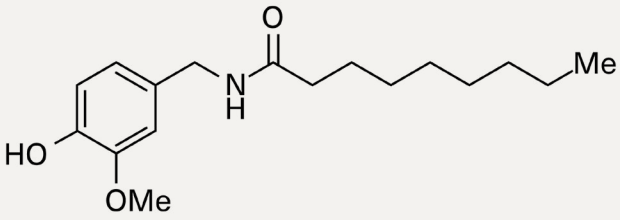
AGENT CS/TEAR GAS
(2-CHLOROBENZALMALONONITRILE)
This solid white powder is mixed with a solvent and then aerosolized, heated, or exploded to disperse it into the air. On contact with moisture, CS dissolves into an acidic liquid that provokes lachrymation (tearing), burning pain and redness on contaminated skin, and an uncontrollable cough reflex.

CS




AGENT OC/PEPPER SPRAY (OLEORESIN CAPSICUM)
Agent OC / pepper spray (oleoresin capsicum) and its highly potent synthetic form, PAVA (pelargonic acid vanillylamide or capsaicin II), is the active chemical in cayenne peppers that makes them spicy. These agents work on pain and temperature receptors (TRPV1) to cause sensations of tearing, burning and severe pain.

OC

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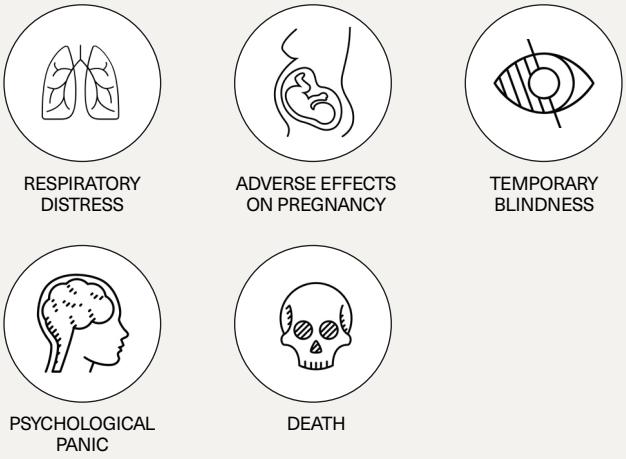
## CHEMICAL IRRITANTS

### Health Impacts

CIs cause injuries to many different body systems. The inflammatory response produced by contact with mucosal membranes and the skin can cause not only severe pain but also respiratory distress, nausea/vomiting, temporary blindness, and chemical burns of the skin, the eyes, the nasopharynx and lungs. Long-term effects of exposure to CIs are poorly understood; some case reports suggest adverse effects on menstruation, pregnancy and the fetus. Psychological panic caused by these weapons can trigger crowd crushes. Direct impact of canisters carrying tear gas causes severe blunt trauma and death.




### Variables that can exacerbate injuries

Using CIs against vulnerable populations (children, the elderly, those with diminished lung capacity).

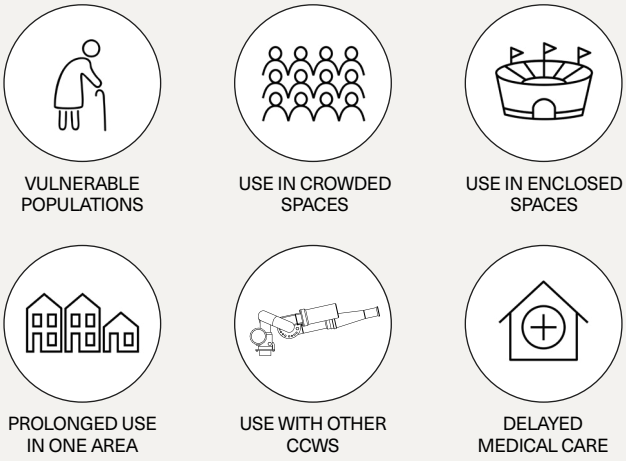
Using CIs in crowded spaces or busy areas, which can impact unintended targets and bystanders.

Using CIs in enclosed spaces, or spaces with limited opportunities for egress (which can result in stampedes and higher dose exposure).

Using CIs over prolonged periods, e.g. repeatedly in one neighborhood.

Using CIs within other crowd-control weapons, such as projectiles or water cannons.

Delayed access to medical care, including overburdened medical facilities, checkpoints, delayed presentation because of fear of arrest or reprisal, or failure of medical personnel to recognize injury.




**Using CIs in enclosed spaces, or spaces with limited opportunities for egress *can result in stampedes and higher dose exposure*.**

## Policy recommendations

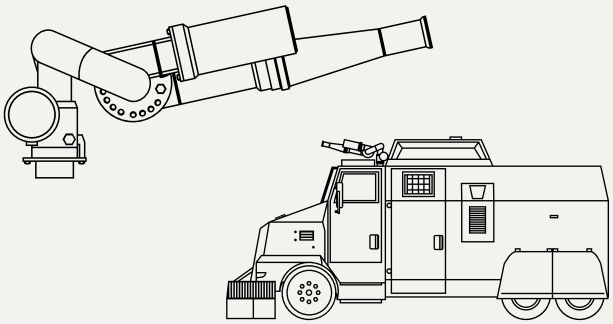
- » CIs, when deployed using canisters or grenades, are indiscriminate by nature. Caution should be used during deployment to stop the effect from spreading to unintended targets and bystanders.
- » Firing multiple canisters in the same spot or firing repeatedly must be avoided, as it produces higher concentrations of CIs, which can cause serious injury or even death.
- » Firing grenades or canisters containing CIs into closed spaces or open spaces where there is no safe egress should be prohibited.
- » Contextual factors must always be considered before making a decision to deploy indiscriminate CIs: geographical nature of the deployment site, wind patterns, and temperature, or the existence of homes, hospitals, schools, or dense, uninvolved populations in the vicinity.
- » Mixing more than one chemical agent or dissolving the agent into the liquid used in water cannons should be avoided, as its effects have not been properly studied.
- » Firing gas canisters or grenades directly into a crowd or towards individuals must be prohibited.

# WATER CANNONS

High- or low-velocity streams of water, commonly known as water cannons, are frequently used for dispersing crowds or limiting access to certain areas. Their health risks, along with practical and human rights concerns about communication, intimidation, indiscriminate and disproportionate use, and collective punishment highlight water cannons' potential for misuse.

## How they work

Water cannons propel streams of high-pressure water aimed at pushing back crowds through the force of impact, or low-pressure streams intended solely to douse. Modern water cannons can have flow rates of up to 20 liters of water per second, and can stream water 67 meters away. Like impact projectiles, the force of the stream of water is attenuated with distance, and the use of water cannons at close ranges can result in severe injuries.



### Deployment mechanism

In addition to their primary payload of water, different agents may be mixed into water cannons to create secondary impacts. Colored dyes, malodorous chemicals, and invisible UV markers are used as means of collective punishment or for the purpose of later identifying and arresting protestors. Chemical irritants in concentrated form can be dissolved or dispersed in water to add an irritant effect to water.

### Common types

Water cannons are connected to in-ground water supplies or mobile reservoirs, often vehicle mounted.

## Health Impacts

Water cannons can affect the health of individuals in a number of ways. Direct injuries may include traumatic or internal injuries from the impact of the water stream, which has enough force to break bones and cause blindness. The force of the water jet can cause individuals to lose their balance or even propel them into objects in the environment; most reported deaths from water cannons come from these "secondary" impact injuries. Chemical additives to the water may also have negative health effects. Long-lasting malodorous chemical agents have been reported to cause prolonged nausea and labored breathing.

### Variables that can exacerbate injuries

Injuries can vary in intensity depending on the pressure, distance, and duration of exposure, as well as the ability of the targeted people to disperse safely. The environment may add additional risk. Extremely hot water has the potential to burn, while the use of water cannons in cold conditions may cause hypothermia and frostbite.

## Policy recommendations

- Contextual factors must always be considered before making a decision to deploy water cannons, specifically when used in cold weather or where dispersal may not be safe.
- Dyes and other chemical agents are not appropriate for the purposes of safe management of crowds and should be prohibited. The primary outcome of these additives appears to be collective punishment and humiliation, which are not legitimate policing tactics.
- Regulations on appropriate water pressures, temperatures, and limitations on distance should be defined both by manufacturers and law enforcement departments.

PRESSURE

FIRING DISTANCE

BURNS, HYPOTHERMIA & FROSTBITE

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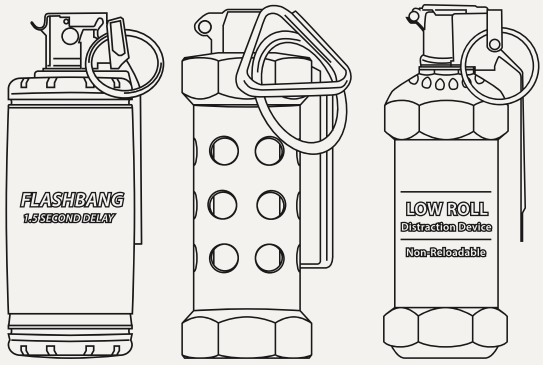
# DISORIENTATION DEVICES

Disorientation devices, also known as concussion grenades, flash-bangs, or stun grenades, are weapons that create a loud explosion and/or a very bright flash of light. While their stated objective is to cause disorientation and a sense of panic, the potential for blast injuries caused by overpressure or from fragments of the grenade is disproportionately high, and could lead to severe injuries, permanent disabilities or death.

## How they work

Disorientation devices are pyrotechnic grenades that use a combination of light, sound, and sometimes impact to distract or confuse individuals. Fundamentally explosive in nature, they carry similar hazards to any handheld explosive device.




## Deployment mechanism

Most disorientation devices take the form of handheld grenades, and are thrown at groups or individuals in order to disperse crowds.

Some disorientation devices, such as aerial warning/signalling munitions or specialty munitions found in the VENOM system, are fired as projectiles from grenade launchers. While they are designed to be fired over crowds, they can cause blunt force trauma when fired directly at individuals.

## Common types

FLASH-BANG GRENADES

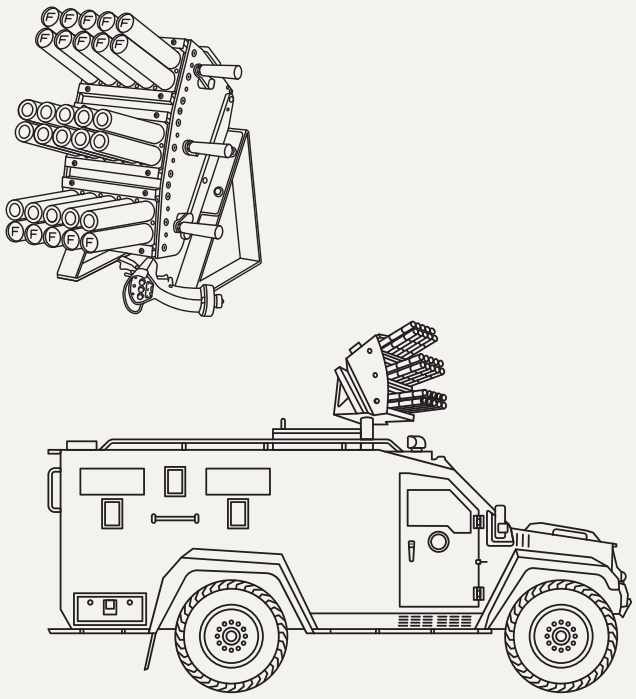
Flash-bang grenades combine light and sound to produce a disorienting effect. Upon deflagration of a pyrotechnic powder, typically magnesium, a bright flash and/or loud (160-180 dB) report is produced. These weapons are contained within a rigid grenade body and are not designed to fragment.

"BLAST-BALL," "STINGBALL" OR "STINGER" GRENADES

These consist of a combustible charge encased in a frangible housing. Combustion is violent and causes a loud report, and often causes parts of the case to travel as shrapnel. Some devices are designed specifically to fragment on detonation, often carrying a payload of rubber or plastic pellets.

"HYBRID" DISORIENTATION DEVICES

These contain not only a pyrotechnic component but also a chemical component



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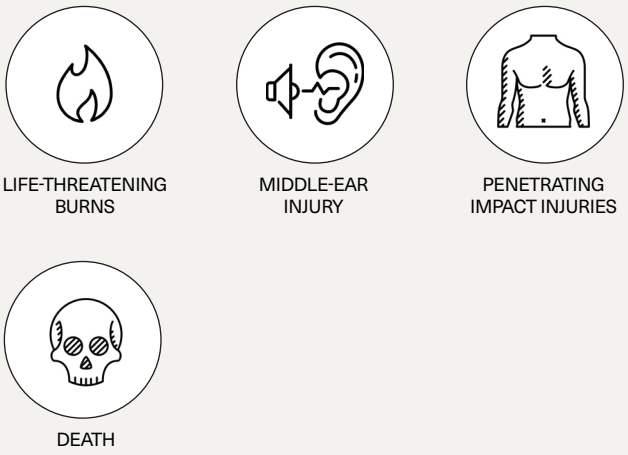
## DISORIENTATION DEVICES

### Health Impacts

Disorientation devices burn extremely hot. When deflagration occurs in close proximity to a person, life-threatening burns are possible. The intense sound and pressure produced by stun grenades risks middle-ear injury and permanent hearing loss. Cased explosive devices generate shrapnel, which can produce blunt and penetrating impact injuries. Explosive devices may produce blast injuries from overpressure, especially when detonated near an individual. Direct impact injuries are a risk with any device that is deployed as a projectile.




### Variables that can exacerbate injuries

Grenades that detonate, rather than deflagrate, generating greater pressures and higher risk of shrapnel.

Overhand throws, where the grenade is lobbed on a trajectory at or above head level, risk detonations near the upper torso or head, where resultant injuries may prove life threatening.

Severe injuries appear to occur more often when grenades are thrown or fired "blindly," either into buildings or into the midst of a crowd.


### Policy recommendations

- Deploying stun grenades into crowds, or directly at individuals, should be prohibited.
- The use of disorientation devices for crowd dispersal is inappropriate and often causes serious injury.
- Quality control and regulation of disorientation devices is poor and requires significant attention.

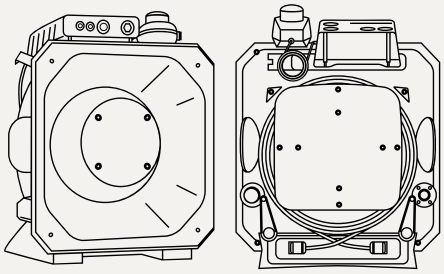
**When deflagration occurs in close proximity to a person, *life-threatening burns are possible.***

# ACOUSTIC WEAPONS

Acoustic weapons, also known as long-range acoustic devices or sound cannons, are devices that project very loud, focused sound over long distances. Serious questions remain about the safety and efficacy of acoustic weapons in crowd-control contexts.

## How they work

Acoustic weapons function by delivering loud, painful, and even dangerous levels of noise. In comparison with conventional speakers, acoustic weapons use arrays of small transducers to create highly concentrated and amplified sound. Often marketed as communications systems or "hailing devices," they are pressed into service in crowd control, leveraging their alarm functions as means to disperse crowds through aural pain.



### Deployment mechanism

The LRAD, and similar devices, require space and energy. They are therefore often found as stationary projectors, or commonly in protest settings, mounted on vehicles.

### Common types

LONG RANGE ACOUSTIC DEVICE (LRAD)
The LRAD has a range of 8,900 meters for intelligible speech and a maximum output of 162 decibels at one meter. It can cause pain (110-130dB) at 20 meters.

"MOSQUITO"
This is a type of stationary area-denial weapon. This high-pitched sound weapon produces a constant noise that is audible and painful to younger people, while leaving older people (over 30s) unaffected.

INFRASONIC WEAPON
This newer technology is under investigation. It would deliver very low frequency sounds which would be inaudible but could cause discomfort and disorientation.

## Health Impacts

Acute exposure to focused sound can provoke pain, nausea, and temporary threshold shift (hearing loss). There is little peer-reviewed literature on the long-term effects of acoustic weapons on people, although some reports suggest prolonged ear pain, headaches, and permanent threshold shift may result from long exposures to these weapons. These weapons can be indiscriminate, causing harm or pain to protestors, bystanders, and even police officers themselves.

### Variables that can exacerbate injuries

The risk of permanent hearing loss is determined by both sound intensity and duration of exposure. Use of these weapons at close range or for prolonged periods of time create situations in which long-term adverse effects become increasingly likely.

## Policy recommendations

- There are serious concerns about the high potential of acoustic weapons to cause serious and permanent injury.
- The lack of proper research and evidence about acoustic weapons' health effects remains, despite their increased use in recent years.
- Use of acoustic weapons in protests should be suspended, at least until such concerns are addressed.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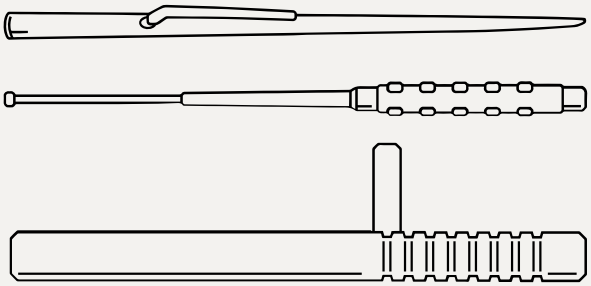
# BLUNT FORCE WEAPONS

Blunt force weapons, such as the police baton, are ubiquitous tools of policing worldwide. Due to their commonality, they are often found in crowd control settings, wherein their misuse can lead to serious health consequences.

## How they work

Blunt force weapons are striking devices that operate on the principle of pain compliance, by delivering focused impacts to an individual. Their length acts as a lever, enabling more forceful blows than through hands alone. They can also be swung to create distance, or they can be used as a leverage aid to push or hold.



### Common types

STRAIGHT RUBBER AND PLASTIC BATONS
They are club-like blunt force weapons common in Western policing.

TONFA, OR T-HANDLE BATONS
These are similar to simple batons, but have a small handle projecting from the main body of the baton.

EXPANDABLE BATONS
These are metal batons of varying lengths are designed to collapse for storage when not in use.

WOODEN BATONS
These refer to wooden sticks or clubs used for policing. The ***lathi*** is a long cane frequently used for crowd control in South Asia.

WHIPS
Whips are infrequently used as police tools, outside of improvised use by mounted units. An exception is the ***sjambok***, historically used in South Africa for crowd control.

## Health Impacts

Batons and similar weapons can result in blunt force trauma: injury severity is dependent on the force of the blow, number of blows and the targeted body part. While blunt force weapons are meant to be used against the extremities, they often hit more sensitive body parts. When used against the head, neck, and torso, severe injury or death may occur. Blunt force trauma to the head can lead to traumatic brain injury, while strikes to the torso, face or genitalia can fracture bones, damage organs, and lead to internal hemorrhaging. Choke holds using the weapon as a lever pose the risk of asphyxiation.

### Variables that can exacerbate injuries

Certain lengths, materials, and constructions of blunt force weapons can affect the risk associated with them. Longer, lighter batons can generate more energy at the tip when swung.

The tactic of the “baton charge” or “lathi charge”—wherein baton-armed police charge at a group of people to disperse them—can create crowd crush conditions, in which secondary injuries can occur from falls, trampling, or asphyxia.

Misuse or overuse of weapons against protocol or manufacturer instructions can lead to severe injuries.

Overhand strikes are more likely to impact the head or torso than horizontal strikes.

**While blunt force weapons are meant to be used against the extremities, they often hit more sensitive body parts. When used against the head, neck, and torso, *severe injury or death may occur.***

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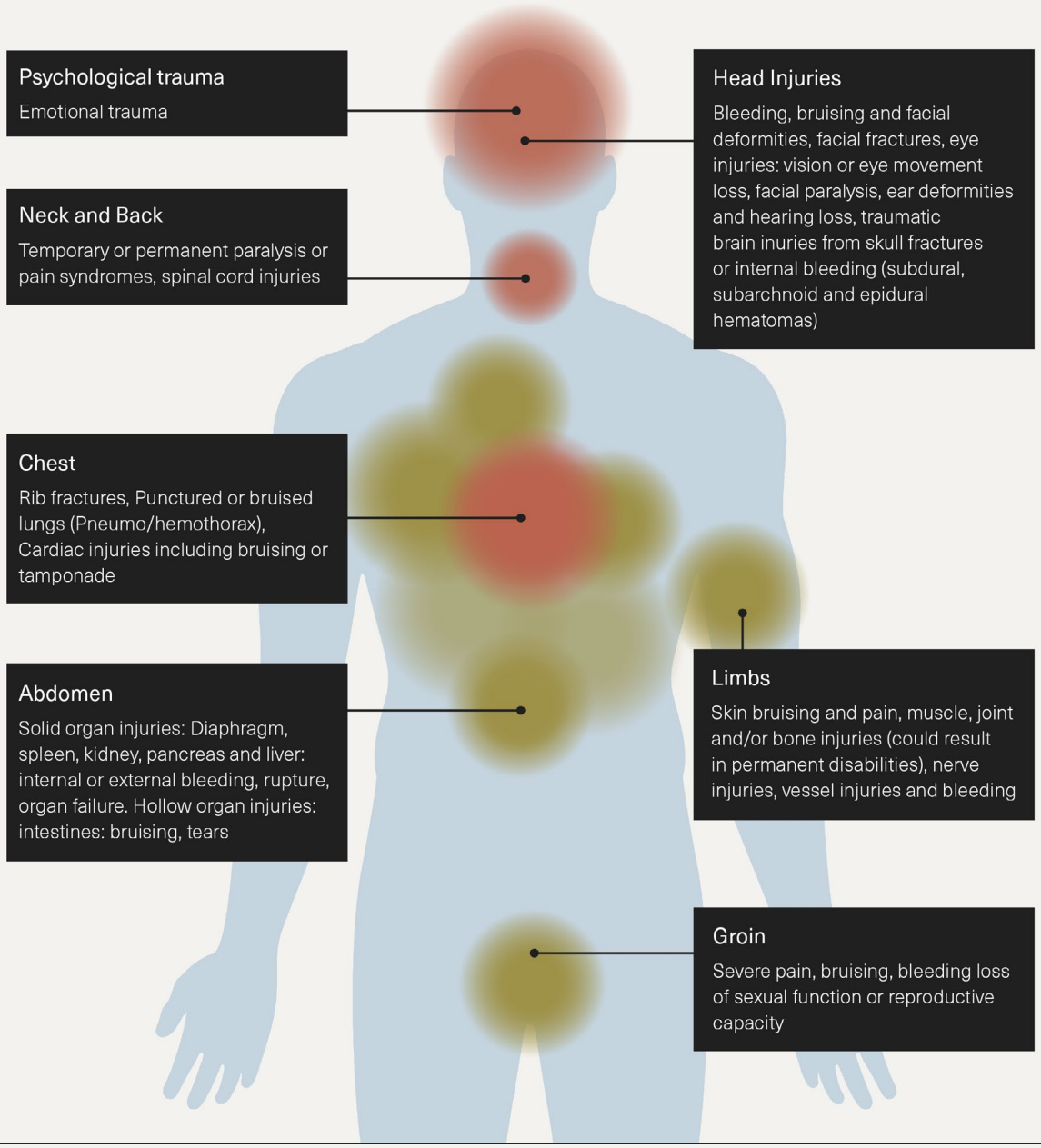
## BLUNT FORCE WEAPONS

Moderate to serious level of resultant trauma. Injury tends to be more long-lasting, but may also be temporary.

Highest level of resultant trauma. Injury tends to range from serious to long-lasting rather than temporary and may include unconsciousness, serious bodily injury, shock or death.




## Policy recommendations

- Batons should not be used for mere crowd dispersal, but rather in exceptional circumstances against violent individuals posing risks to themselves or others.
- Baton use against persons neither engaged in nor threatening violent behaviour is likely to amount to cruel, inhuman or degrading treatment, or even torture, and should be avoided.
- Batons should never be used against persons already restrained, or persons unable to remove themselves from the situation prompting baton use.
- Driving jabs and hammer strikes to the torso, as well as any strike to the head, should be avoided due to the risk of internal injury.
- Neck or choke holds should never be used.