



World Water Safety

INTERNATIONAL LIFE SAVING FEDERATION

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MEDICAL POSITION STATEMENT - MPS 05

MARINE ENVENOMATION

1. BACKGROUND

The definition of marine envenomation is a sting from a jellyfish or stinging hydroid, or introduction of a marine venom by puncture of the victim's skin: puncture wounds can be caused by fish barbs (e.g. stingrays, stonefish), other barbs (e.g. cone shell), or bites (e.g. sea snakes, blue-ringed octopus). The definition does not include poisoning where venom is swallowed (e.g. seafood and shellfish poisoning).

The treatment of marine envenomation, especially jellyfish stings, is a common first aid procedure performed by ocean lifesavers worldwide: thus, a thorough knowledge of the treatment of marine envenomation is important. Fortunately, despite the large numbers of venomous jellyfish and marine animals worldwide, with the current state of knowledge their first aid treatments can be considered in three main areas.

1. Prevention of further envenomation - from jellyfish tentacles or penetrating injuries. This step may be unnecessary in the majority of jellyfish stings.
2. Use of cold packs to reduce the skin pain of jellyfish stings
3. Use of heat (hot water) to reduce the tissue pain after penetrating spiny injuries

2. POLICY

2.1. Documentation

All marine envenomation cases should be fully documented in case of future complications. All reports of jellyfish infestations or marine animals should be reported to the appropriate authorities.

2.2. Treatment of Marine Envenomation

A) Jellyfish Stings

The majority of jellyfish stings simply cause skin pain of varying severity. In some stings there may be other effects, such as nausea, vomiting and headaches but treatment can normally be limited to pain relief and reassurance. However, if severe or life threatening symptoms are present, medical treatment should be sought immediately.

1. Prevention of further stinging - If tentacles remain on the skin, they will continue to sting and should be removed. This step is only necessary if there are remaining, adherent tentacles on the skin of the victim.
 - a. Most Jellyfish Species - Remove the tentacles by picking them off with your fingers or by spraying them with seawater. If fingers are used, only a faint prickling will be felt, as the pads of the fingers are too thick for the jellyfish stinging cells to penetrate.

Note: The hands should be washed as soon as possible as stinging cells remain on the hand and can sting more sensitive areas of the body (e.g. eyes etc.).
 - b. Sea Nettle and Mauve Stinger - The "sea nettle" (*Chrysaora* species) is common on the west coast of the USA with *Pelagia* spp. Common in other areas worldwide (especially the south-western Europe Atlantic Coast and the Mediterranean. A "slurry" or "paste" (1/2 water, 1/2 **baking soda**) of baking soda has been shown to prevent further envenomation from the sea nettle. (1)
 - c. Box Jellyfish - In tropical oceans worldwide, box jellyfish may be present. The sting of a box jellyfish is a potentially lethal, medical emergency. Such patients should be treated quickly and transported to advanced medical care. Box jellyfish stings invariably leave torn-off tentacles on the skin. The longer the tentacles remain in contact with the skin, the greater the sting, the more pain and the worse the symptoms become, possibly extending a non-fatal sting to a fatal one. Vinegar (4-6% acetic acid) totally prevents further stinging in box jellyfish stings. Vinegar must be poured on the skin for a minimum of 30 seconds - this totally deactivates the tentacle and prevents any further stinging. (2) Tentacles then do not have to be removed.

Note: Vinegar DOES NOT RELIEVE PAIN from jellyfish stings, it has simply been proven to stop further stinging, but *only in the case of box jellyfish*. If vinegar is not available, use the steps above for most jellyfish species to remove tentacles.
 - d. Major Box Jellyfish Stings - After prevention of further envenomation using vinegar application for a minimum of 30 seconds, compression / immobilisation bandaging is used to prevent further envenomation in major box jellyfish stings. Major stings are regarded as those that:
 - Affect the conscious state (the victim is difficult to rouse)
 - Affect breathing (shallow, weak breathing - or absence of breathing, needing expired air resuscitation)
 - Affect the circulation - the pulse may be weak, fast, irregular or absent (needing external cardiac compression)
 - Cover a large area - more than 1/2 the area of 1 limb.
 - Apply broad bandages (15cm) to cover the full limb firmly (a similar pressure to a bandage for a sprained ankle). Start the bandaging distally (fingers or toes), and then extend it to cover the full limb; the limb MUST then

be **immobilised** using a splint to prevent the "muscle-pump" effect helping spread the injected venom.

Note: the compression bandage is applied ONLY after 30 seconds of vinegar dousing of any remaining tentacles on the stung area.

2. Pain Relief - For all jellyfish stings, apply ice (or cold packs) to the stung area. The ice should be placed in a plastic bag (to keep the sting area dry). This bag of ice, or cold pack, is then wrapped in a cloth and applied for 5-15 minutes until the area is numb and the pain has gone. Re-apply the ice / cold packs if the pain returns. If pain persists, or if other symptoms occur, send to more advanced medical aid.

Note: Do not apply cold packs taken from a freezer directly to the skin as this may cause skin damage.

If cold packs, ice or other treatments are unavailable, the ONLY OTHER appropriate current therapy or treatment is to use a squeeze bottle to spray **seawater** on to the stung area, with plenty of reassurance by the rescuer. Seawater spray does not directly reduce pain but may provide psychological comfort to modify the patient's pain response.

Work from Hawaii that is about to be published (Dec 2000) suggests that hot water stops the pain of the Hawaiian box jellyfish (*Carybdea alata*): this is unproven for any other species.

No other treatments should be used. Such treatments are unproven and NOT currently approved.

B) Penetrating Wounds Treatment

1. Heat/hot water - Most injuries from venomous animals are penetrating injuries from spines of the stingray, stonefish and other fish with poisonous spines (e.g. lionfish, weeverfish etc.). Other penetrating injuries occur from "spiky balls" (echinoderms) present on rocks and reefs and similar, spiny species. In most cases, these injuries cause severe localised pain: the primary goal is pain reduction. In any case of allergic reaction, breathing difficulties, or similar problems, refer immediately to advanced medical care.
In routine cases, remove any spines that can easily be removed. Place the area (usually a limb) in hot water, after first testing the temperature of the water yourself to prevent scalding the patient. Further 'top-ups' of hot water may be necessary, but the water MUST be tested each time to prevent scalding the victim. When pain subsides, clean the wound with sterile saline (sterile salt water) and dress or bandage as appropriate. Compression immobilisation bandaging is NOT used on any injury from penetrating spines (e.g. stonefish, stingray - see below) as it causes increased pain. Advise the patient to watch for redness of the wound and return of pain, which suggests infection, and to consult a physician as appropriate.
2. Compression / immobilisation bandaging - In some cases of marine envenomation, a large amount of venom is injected into one area - e.g. sea snakes, and blue-ringed octopus bites, and cone shell envenomation. In these cases, compression bandaging followed by

immobilisation of the effected limb is used to help prevent circulation of the venom within the body. (3) The person must then immediately be sent for medical care.

Apply broad bandages (15cm) to cover the full limb firmly (a similar pressure to a bandage for a sprained ankle). Start the bandaging distally (fingers or toes), and then extend it to cover the full limb. The limb **MUST** then be **immobilised** using a splint to prevent the "muscle-pump" effect that can spread the injected venom.

2.3. Justification of Marine Envenomation Treatment Principles

A) Prevention of Further Envenomation

1. Jellyfish Stings

a. Non-box-jellyfish - Salt water should be used IF there are remaining tentacles on the skin after envenomation by all non-box-jellyfish. This is not usually the case. If no tentacles remain then this step can be omitted from the first aid treatment. Recent evidence shows that fresh water will cause discharge of stinging cells, and may make the sting worse.³ Sea water should be used to wash off tentacles and ice wrapped up to keep the area dry to prevent moisture causing possible discharge of nematocysts.

b. Box-jellyfish - Vinegar has been shown to prevent further envenomation by deactivating unfired stinging cells left on tentacles that remain on the skin after envenomation by all species of box-jellyfish tested to date.⁽²⁾⁽⁵⁾⁽⁶⁾⁽⁷⁾ It has also been shown to prevent further envenomation of some stinging hydroids.⁽⁸⁾ It does not appear to increase envenomation with the single tentacled "bluebottle" but has caused discharge of the stinging cells in some multi-tentacled *Physalia* specimens in Australia,⁽⁹⁾ but not in the United States.⁽³⁾ To date, no work has been published of trials on *Physalia* species in other areas of the world.

Vinegar has not been proven in any scientific literature to have any pain-relieving properties, although one paper using an uncontrolled trial (uncontrolled trials are not acceptable to current medical standards) suggested vinegar may give some pain relief in stings from the Australian single-tentacled *Physalia*.⁽¹⁰⁾ Vinegar is therefore not recommended for the relief of pain from jellyfish stings.

2. Other Envenomations

Compression/immobilisation bandaging - Compression bandaging followed by immobilisation of the affected limb has been proven effective in the bites from terrestrial snakes in Australia.⁽¹¹⁾ It has been suggested, but the work has not been scientifically proven, as the treatment of any marine envenomation where a large amount of venom is deposited in one area on the limb of the victim.⁽³⁾⁽⁴⁾ These include: sea snakes, cone shells and the blue-ringed octopus. It is suggested for a major box-jellyfish envenomation ⁽³⁾⁽⁴⁾ with circumstantial evidence suggesting that it is effective. ⁽¹²⁾⁽¹³⁾

B) Pain Relief

1. Cold therapy - Cold therapy is used world-wide for its analgesic properties and reduction of swelling in all sporting injuries such as sprains or pains.

Cold therapy was trialed for jellyfish stings in 1987/88. The published results showed that in *Physalia* stings, 90% of the victims had complete pain relief from one application of cold therapy for 5-15 minutes, and a further 6% (96% in total) achieved complete pain relief after a second application of cold therapy for 5-15 minutes. (14)

The major problem with jellyfish stings is that they continue to cause pain and increase any systemic envenomation effects if any portion of the tentacles remains on the skin. Numerous solutions and proprietary products have been advocated throughout the world to stop this skin pain. They include lemon juice, papaya, ammonia, meat tenderiser, sodium bicarbonate, and boric acid. No product apart from ice / cold packs has been proven scientifically to be effective in relieving pain. Confusion is often caused as the pain of a jellyfish sting will often reduce with no treatment after about 30 minutes - investigations on claims for "pain relief" from many of the above compounds suggest that they take 30 minutes to work. Effective pain relief for a jellyfish sting is such that the pain is reduced to tolerable levels, or fades completely, within 5-15 minutes. This has only been scientifically proven, to date, with cold therapy.

2. Heat therapy - For many years heat therapy has been shown to be effective for penetrating wounds from fish and similar-type spines. (3) Only limbs can easily be treated with hot water, but envenomation is usually on a limb that can then be immersed. Trunk envenomations can be treated with hot packs but extreme care must be taken not to cause skin burns.

Water should be as hot as the victim can tolerate. This is usually up to 41o Celsius but may be as hot as 43 degrees Celsius - higher temperatures may cause skin damage. Because the pain in the envenomated limb is often severe it is difficult for the victim to assess the water temperature to make sure it is not too hot. The other limb should be tried first, or the rescuer should test the water before it is used.

Heat therapy for jellyfish stings has been suggested to reduce skin pain. However, to date there have been no published trials to prove this: consequently, it should not be used.

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