

SEA TURTLE CLINIC BIOSAFETY MANUAL - DIMEV

The purpose of this manual is to define the risks and procedures aimed at ensuring the safety of structured personnel of DiMeV (professors and researchers, technical staff) and unstructured personnel (support staff for educational activities such as fellows, doctoral students and assistants, students, graduates, interns, thesis students, occasional visitors) during activities related to marine turtles. This manual is valid at the Veterinary Teaching Hospital (VTH) as well as at the Sea Turtle Clinic (STC), where practical activities and internships with marine turtles take place.

1. RISK ANALYSIS

Activities related to marine turtles, whether clinical or management-related, can pose the following risks:

- **Traumatic events:** these can be identified as injuries caused by bites, flippers impacts, and scratches from claws. These injuries are associated with all stages of animal handling, positioning, and containment during clinical and management procedures. Traumatic events can also be caused by improper use of sharp instruments (syringes, needles, scalpels, etc.). To prevent injuries, it is important to be aware of the risks and it is essential to provide proper training to personnel on the correct use of procedures and Personal Protective Equipment (PPE).
- **Biological agents:** Marine turtles can be a source or reservoir of pathogens (bacteria, viruses, parasites, dermatophytes) that can be transmitted through excreta and/or secretions, bites and/or scratches, or direct contact. It is of fundamental importance that operators implement adequate disinfection measures, personal hygiene practices, properly use Personal Protective Equipment (PPE) (e.g., disposable gloves), and correctly handle sharp instruments (syringes, needles, scalpels, etc.), ensuring proper disposal of medical waste.
- **Chemical agents:** These include medications, detergents, and disinfectants that can enter the body through various routes (inhalation, skin contact, eye contact, oral or digestive routes) and cause allergic effects (hand dermatitis, urticaria, itching, rhinitis, asthma, glottis edema, and, in severe cases, anaphylactic shock).
- **Animal handling:** Manual handling of marine turtles, especially if they are of considerable size, can pose risks of injuries and pathologies to the osteo-articular, musculotendinous, and neurovascular structures if not done correctly. These risks can be determined by the characteristics of the load (e.g., heavy, bulky, difficult to grip) and the use of incorrect techniques for transport and containment of marine turtles. Such pathologies must be prevented by adopting appropriate preventive measures and correct loading and unloading techniques.

2. PREVENTION AND PROTECTION MEASURES

2.1. CLOTHING AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

Any activity related to marine turtles must be carried out wearing appropriate clothing (green and/or lab coat). It is also prohibited to wear jewelry that can be dangerous for both the operator and the animal, such as rings, bracelets, earrings, necklaces, and watches. Nails should be short, well-groomed, and in a healthy condition to avoid the possibility of injuring the animals or promoting bacterial or fungal colonization.

It is mandatory to always wear the following Personal Protective Equipment (PPE) to safeguard the operator's health:

- Sterile/non-sterile plastic shoe covers and lab coats are required in specific conditions that necessitate sterility for procedures conducted on the animal and/or pose a risk of contamination for the operator.
- Disposable gloves must be worn in all cases when handling biological material, working with animals carrying infectious diseases, and generally during all procedures related to the management of marine turtles. Additionally, gloves are necessary when handling chemical agents.

3. SAFETY BEHAVIOR GUIDELINES

3.1. GENERAL BEHAVIORAL NORMS

The procedures described below pertain to general behavioral norms to be followed at the VTH and STC during clinical and training activities.

- Avoid disturbing or stressing the animals as much as possible.
- Smoking is prohibited.
- Keep cell phones turned off or on silent mode.
- Wear appropriate clothing.
- Always follow the instructions provided by the teaching and/or technical staff present in the facility.

3.2. BEHAVIORAL AND CONTAINMENT GUIDELINES FOR MARINE TURTLES

The handling of marine turtles carries risks that can be associated with injuries caused by bites, scratches, or contusions from these animals. It is essential to establish operational plans that minimize the risk of harming and traumatizing marine turtles while ensuring the operator's safety. Turtles can carry infectious diseases typical of reptiles, which can pose a biological risk to the operator through skin and mucous membrane contact with organic fluids and animal excreta. The risk of zoonotic diseases is not well-documented but should not be underestimated. Therefore, basic hygiene measures (use of PPE, handwashing after handling contaminated equipment, disinfection of surfaces in contact with animals, etc.) are sufficient to reduce this risk to acceptable levels.

To minimize the risks associated with activities involving marine turtles, the following guidelines must be followed:

- Always wear appropriate clothing and PPE (e.g., washable green/lab coat, gloves whenever in contact with live animals, carcasses, tissues, or organic fluids).
- Maintain basic hygiene practices (e.g., handwashing and changing clothes after handling animals, tissues, and organic fluids).
- Marine turtles have a mouth structure consisting of a keratinized beak (rhamphotheca) (Fig.1). Exercise particular caution when performing maneuvers directed towards the beak, as they can pose a danger to the operator.

To minimize the risk of injury, approach the animal following the containment guidelines for marine turtles scrupulously.



- In larger individuals, there is a particular development of sharp claws located on the flippers (Fig.2). Sudden movements of the flippers, especially if equipped with these claws, can make it difficult to restrain the animal and cause traumatic injuries to the operator. To minimize the risk of injury, approach the animal following the containment guidelines for marine turtles meticulously.



- The movement of marine turtles should be carried out by at least two operators, positioning themselves facing each other on either side of the animal, firmly grasping it from the front and rear edges of the shell (Fig.3A and 3B). Although maintaining the same instructions for transportation, this operation can be performed by a single operator for smaller-sized marine turtles (Fig.4). The marine turtle should never be lifted by the front and/or rear flippers. Operators should never approach these animals by positioning themselves in front of the animal, as the excessive proximity of one of the operators to the animal's mouth could lead to injuries.



Fig.3A



Fig.3B



Fig.4

- Performing clinical procedures outside the water can cause stress to marine turtles. To maintain appropriate animal welfare and reduce stress, it is possible to cover the eyes of the animal with dark fabric caps or gauze (Fig.5) and apply temporary pressure to the central portion of the shell. These maneuvers should immediately relax the turtle and provide greater safety for the operator during clinical procedures.



Fig.5

- In case of hospitalization and the inability of the animal to lift its head out of the water to breathe, set up a dry tank where it can be housed, placing it on a suitable soft surface (e.g., foam rubber). These procedures should be performed to prevent the weight of the body from pressing completely on the plastron outside the water, causing trauma and hindering respiration (Fig.6).



- To prevent dehydration in animals housed in dry tanks, showers can be used or the animal's body can be covered with wet (warm) towels, which should be periodically replaced to avoid cooling of the body surface after water evaporation (Fig.7).



- For the containment of turtles during clinical procedures and collection of biological material from the front and dorsal parts of the animal (blood sampling, ocular swabs, swabs, buccal swabs, skin scrapings, etc.), an operator should position themselves behind the animal and hold the front flippers at the humero-radial-ulnar joint; then, the flippers should be kept close to the dorsolateral part of the animal, with the operator's chest resting on the rear portion of the shell (Fig.8).



For clinical procedures and collection of biological material from the ventral and posterior parts of the animal (cloacal swabs, skin scrapings, removal/collection of ectoparasites, etc.), the animal should be placed in dorsal recumbency on a thick layer of foam rubber. In this position, two operators should firmly hold all four flippers, gripping them at the proximal end, while ensuring they maintain a safe distance from the mouth (Fig.9).

