



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



ASES[®]
(Asistencia Sanitaria en Espeleología)
Sanitary Assistance in Speleology

There are lots of natural resources in our country which are relevant for national and international tourism. National agencies promote ecotourism in several parts of the country for people in search for new and exiting activities such as caves investigation.

Tourism guides become true life bondsmen for the adventurous tourists. Because of the increase of this new type of tourism, many companies have invested in new training for its employees and for people who are in charge of rescues.

This phenomenon is known as speleology history, particularly in Spain where rescue units are connected with medical emergency services, the Spanish Federation of Speleology and volunteers from speleology rescues.

In America (Cuba and México among other countries) there are special units which have participated in rescues and have presented their reports to the public. In Argentina, despite the effort given from different special units to get trained the results are not enough.

Rescues outside the hospital environment are the centre of attention for public in general and when it comes to caves the attention gets magnified because of the rareness of the situation.

People who participate in these rescues will be under great physical and emotional pressure before, during and after the rescue itself. **That's why they need proper training to face this kind of situations.**

Speleology is a risky activity, a cave isn't just a confined space, a person specialised in speleology isn't always a rescuer and not all rescuers can develop its activities underground.

This is why the creation of speleology rescue units it's justified and by extension **the training of the human resource in sanitary specific assistance.**

ASES[®] is a programme for sanitary assistance training in speleology prepared for **speleologists** in general (basic level) and **sanitary staff** (intermediate and advanced level). The contents are organized over the **"life and survival chain"** (first aid) considering **all links from sanitary assistance needed inside a cave.**



Theoretical aspects stimulate a critic view which allows an adequate situational conciseness for the right decision making and the correct fundament for the practical activities.

The articulation between the theory and the practice allows the automatization of the evaluation of the scene given and its most accurate resolution.

As a closure, the students perform a drill where they will be able to put in practice all they have learned.

ASES[®] is a group of manoeuvres and procedures used in a cave for:

- Preserve life.
- Avoid complications of the existing leisure.
- Make sure the safe evacuation of the victims.

All topics inside **ASES**[®] are focused on the special characteristics of caves as rescue scenes and the necessity of the human resources. The people who develop this activity should have the right skills and training.

First aid on the surface consists on: Safety of the scene (biological and physical), activation of the medical emergency system, first aids and correct moving of the victims.

Life chain as regards **ASES**[®] consists on: safety on the entry and exit, activation of the response unit (technical and medical team), sanitary assistance inside and outside the cave, move of the victims.

CPR manoeuvres are performed under the **CAVE** protocol (thoracic compressions, opening of the breathing area, ventilation and oxygenation, decision making and consideration of the causes of the incident.

The **general activation protocol** is a sequence of actions to be developed by any **ASES**[®] trained person.

Safety is established by creating an adequate **semiology of the scene**. The scene might change (dehydration, lost of conscience, “harness syndrome”, etc.).

Only the correct training allows a correct situational awareness for the best resolution of the incident. The human resource, the equipment and the time must be well managed to optimize results.

Specific interventions must be quick and one-directional; following the protocols will lead to better results.



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



For speleologist the expedition does not start when they entry to the cave but when they leave their homes, different situations (for example health issues) might put them in danger, but the biggest risk of all is the fact that they have to face lots of myths related to first aids, wrong beliefs passed on by generations of topics such as rabies, tetanus, and others situations that threatens human health.

If speleologists do not prepare themselves to provide an excellent specific sanitary assistance, they must trust in who doesn't know anything about scenarios and scenes and in despite of they effort won't be able to help.

The first aid to a speleologist will be from another speleologist, his colleagues.

“One link means nothing, what matter is the chain itself.” Is true, but it is also true that a chain is as strong as its weakest link. All links must be strong enough.

Main objective

- To train and teach aspects of SANITARY ASSISTANCE IN SPELEOLOGY to speleologist and the human resource relevant to all response units. Especially those who participate in rescue activities.

Particular objectives

- To become familiar with scientific and technic aspects related to sanitary assistance in caves
- To articulate the conceptual contents learned during the training with previous knowledge
- To assume the responsibility in develop of this activities.
- To develop real and potential skills allowing the adaptation from one to the environment.
- To favour the team's integration and it's goal, leaving behind individual or selfish attitudes



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



Skills and abilities.

- Gain skills and abilities destined to protect the life itself or the quality of it avoiding all complications.
- To use the knowledge gained in any undeveloped scenario taking in account all variables and the move of the victims
- To systematize interventions in a real work team.
- To develop all aspects related to sanitary assistance even without having a defined role on the sanitary team.
- To registration in documents all instances of the assistance allowing the making of final reports.

Affective aspects.

- To understand the extreme vulnerability of the situation in which people are in, making sure their beliefs, culture and personal life are being respected.
- To compromise all the energy into the accomplishment of the individual and collective recovery of the victims.
- To accept the natural and logical limitation of the human factor despite the fact that they did their best.
- To convert new knowledge into habits through continuous training and learning.

Contents

To ten (10) thematical units we add special topics such harness syndrome, leisure, bites, hantavirus, ofidism, rabies, tetanus, myths, etc.

Within the thematical units there are topics such as protocol of intervention of the urban and undeveloped environment, situational diagnosis, **CAVE** protocol for **CPR**, evaluation, diagnosis and treatment of the injuries, luxation, broken bones, seizures, hypothermia, stress, exhaustion, hypoxia, general considerations as regards trauma (trauma golden hour on the surface); shock, evacuation and moving of the victim, cave triage.

Such contents are presented from the general aspects to the particular aspects, in growing levels of complexity.



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



Specific program

ASES I

- Presentation of the **ASES**[®] (Sanitary Assistance in Speleology) Training Program.
- ASES[®]: concept
- Life chain and survival in surface and in Speleology.
- Setting: natural earth cavity. Characteristics: access, temperature, visibility, space.
- Rescue Unit in Speleology: concept, functions, structure, flowcharts of information and orders.
- Intervention Plan
- The sanitary Team and its operation: human resources and materials.
- Sanitary Assistance in Speleology: general and specific characteristics.

ASES II

- Rescue procedures: incident and accident.
- Rescue Actions: self-aid and speleology rescue.
- General Intervention Protocol.
- Evacuation Spot: concept.
- Security, Error, transgression and distraction.
- Green, Yellow and Red alert.
- Specific intervention: RCP (cardio-pulmonary recovery) following the CAVE protocol (Norms ILCOR-AHA 2010). Partial and complete obstruction of the respiratory tract: symptomatology and treatment.

ASES III

- Safety and semiology of the setting in surface and in cavern.
- Risk factors in Speleology: of the individual, from the activity, both incidentals and accidentals.
- Safety and Biosafety ABC.
- Evaluation and risk control.
- Specific Interventions considerations: Situation diagnosis, ASES activation.



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



- Injuries: evaluation, diagnosis and treatment.
- External and internal bleedings: diagnosis, evaluation and treatment.
- Burns: evaluation, diagnosis and treatment.
- Muscular spasms (cramps): causes, prevention and treatment.
- Foreign object in eye. Photokeratitis (Snow Blindness).
- Convulsions: concept, causes, evaluation and treatment protocol.

ASES IV

- Safety-error-transgression-risk relation.
- Situational awareness and risk perception. Decision making.
- The error in Speleology.
- The Speleologist: human and professional.
- Fatigue: concept, components, stages.
- Stress: concept, classification.
- Heat illness: symptomatology, specific intervention.
- Diarrheas: classification, risks and treatment.
- Drinking water: safe water.
- Cold-related injuries: lesion mechanism, treatment.
- Hypothermia: definition, causes, classification, signs and symptoms, initial treatment. Intervention protocol.

ASES V

- Avalanche: definition and causes. Avalanches of polder snow and avalanches plates. Mortality. Search for localization points and ARVA search by perpendicular method.
- Rescue dogs.
- Rescue helicopters: their landing spot and the behaviour of the speleologist on the land.
- Stress triggers in speleology: definition, classification, causes, signs and symptoms, treatment.
- Lightning: concept, signals, shine.
- “puna” “soroche” of the Andes: definition, symptoms and treatment.
- Hyperbaric medicine: concept. Hyperbaric portable chamber: types, emergency uses.
- Brain oedema: symptoms and treatments.
- Lung oedema: symptoms and treatments.



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



ASES VI

- Trauma: general considerations.
- Trauma scenarios: urban and undeveloped environments.
- ASES as regards trauma: CAVE protocol.
- Trauma: Classify injuries and damage mechanisms.
- Tri-modal distribution of the trauma mortality.
- Trauma golden hour and “**TOER en ASES®**”
- Speleology trauma.
- Physics law and kinetic energy. Fall factor and stop strength.
- Falls: vertical fast slowing.
- Evident and occult injuries.
- Falling of objects and energy transference.
- ABCDE evaluation
- Decision making: fast evacuation or terminal tent?
- Trauma victim registration and ASES intervention.

ASES VII

- Trauma in Speleology: the speologist's ghosts.
- TEC (Traumatic brain injury): general characteristics, evaluation of the victim, primary and secondary brain lesion, skull fracture. Evaluation and treatment in Speleology, evacuation.
- TRM (Spinal cord trauma): lesion mechanism, evacuation of the victim, lesion to the bone marrow (primary and secondary damage), signs and symptoms of spinal injury, neurogenic shock. ASES in TRM.
- Restriction of spinal movements and extrication: concept, quick and classic extrication.
- Spinal board: transfer, fixation and adaptation of the victim.
- Kendrick extrication device.

ASES VIII

- Thoracic trauma: signs and symptoms, lethal lesions.
- Open pneumothorax, tension pneumothorax, massive hemothorax, unstable thorax, cardiac tamponade: concept, treatment.
- Embedded objects: ASES conduct.
- Abdominal trauma: bruised and penetrating, mortality causes, evisceration. ASES conduct.
- Trauma in extremities: generalisation.
- Closed fractures: initial treatment, splints in Speleology.



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



- Open fractures: initial treatment.
- Compartment syndrome: concept, early and late signs.
- Luxation: shoulder (in relation to clavicle fracture), elbow and kneecap. Diagnosis and treatment.
- Hip fracture and hip luxation.
- Fractures in the lower extremities.
- Lesions on hands and feet.
- Amputations.

ASES IX

- Shock: concept, classification, stages, consideration as regards ASES.
- Shock bleedings.
- Initial treatments and decision making.
- Treatments objectives as regards traumatic shock.
- Trauma heart attacks: basic and advanced management, bleeding control, neurological deficit evaluation, complete exposition and stabilization.

ASES X

- ASES protocol for the cave victim.
- Evaluation, information and decision making.
- NEST stretcher and materials.
- Vertical and horizontal progression: characteristics on the surface and in caves.
- Triage.
- Scores in ASES: unique victim with TSR.
- SOS signals.
- ASES protocol as regards rescue intervention.
- Move on surface.
- Aerial rescue.

Rescue speleology unit

- Speleotourism: rescue opportunities.
- Caverns scenarios: characteristics.
- Level classifications.
- Recue unit mission in natural cavities.



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



- General and particular objectives.
- Rescue unit structure
- Information and orders flow.
- Members: general profile, competition.
- Rescue objectives and protocols.
- Intervention plan.
- Documentation and registers.

Bites and stings.

- Animal – human interaction. Defensive and offensive strategies.
- Complexity of the attention services centers.
- ASES behaviour
- Black widow, line spider, *Latrodectus mactans*: habitat, composition and action of the poison, treatment.
- Brown spider, homicidal spider, *Loxosceles laeta*: habitat, characteristics of the poison, skin action, treatment.
- Tarantula (*Phoneutria*) and garden spiders (*Lycosa*)
- Scorpions (*Tityus*): habits, composition and action of the poison, signs and symptoms, treatment.
- Scorpions *Bothriurus bonariensis* and *Tityus trivittatus*.
- *Linepithema humile* and *Solenopsis invicta* ants: habitat, characteristics of the sting, poison composition and action, treatment.
- Bee sting, characteristics, prevention and treatment.
- Paederus: habitat, poison action and treatment.
- Others.

Ofidism.

- *Bothrops*, *Crotalus* and *Micrurus*: habitat, poison action and composition.
- Snakes poisons: characteristics and quimical compositions.
- Ofidism: differences between snakes and vipers, Jacobson's organ, real coral and fake coral.
- Prevention
- Treatment.
- Antiofidic serum.

Harness syndrome.

- Harness syndrome, orthostatic shock, fatigue – hypothermia syndrome.
- Harness general characteristics, types, stages.
- Physiopathology and compensative mechanism.



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



- Risk factors: individuals' components and harness role.
- Rescue and late death
- Crushing syndrome relation with harness syndrome.
- Prevention.
- Rescue stages.

Hantavirus

- Syndrome history
- Etiology.
- Syndrome's presentation in Europe Asia and America
- Evaluation of suspicious cases
- Argentina's situation
- Andes Virus: diagnosis and treatment.
- Prevention.

Rabies

- General characteristics.
- Vectors, infection.
- Human contact
- Signs, symptoms, evolution and treatment
- Prevention
- Vaccination.

Tetanus

- General characteristics
- Etiology
- Disease presentation
- Prevention
- Treatment, vaccination and serum.

DRILL

Main objective:

To apply the training given during the drill to



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



STAFF

It's integrated by speleologist from the ARGENTINIAN FEDERATION OF SPELEOLOGY (FAdeE), teachers from the ARGENTINIAN SCHOOL OF SPELEOLOGY (EAE). These are professionals who develop teaching activity in their different working activities.

Sanitary team.

- Ivanna Bustos: M.D. specialized in internal medicine and legal medicine. Emergentologist.
- Patricia Bustos: first responder, disability assistant.
- Sabrina Diaz: first responder.
- Gladys Ferrari (†): clinical psychology

Technical team

- Pablo Grosso Andersen: EAE director, scuba diving instructor, climbing instructor, Argentinean protocols author.
- Monica Adriana Salvetti: member of search and rescue team, climbing instructor, fitness instructor.

ASES consultants:

- Marta Brojan (†): founding member of FAdeE and current president of INAE (Argentinean speleological investigation institute). Argentinean representative member for the Bibliographies comition from the UIS (Union Internacional de Speleology)
- Carlos Benedetto: Founding member and current president of FAdeE and INAE. Co-founder and of ULE (Union Latino Americana de Espeleología). Argentinean representative member for the general assembly UIS.
- Antonio Marcos Nuez: fire-fighter specialized in mountain rescues from the Madrid Community. Director and instructor of the EEE (Escuela Española de Espeleología)

Profile



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



- Adults who understand the reach of this training and it applying to unusual situations.
- People who acknowledge their professions and its limits.
- People who can leave all selfishness behind for the success and the rescue of the victims.
- People with spiritual and moral values allowing connection with the victim without compromising.
- People who are able to work in a multidisciplinary area.
- The profile desired of the speleologist from ASES is the one able to acquire knowledge and be capable of internalize procedures.
- All theoretical and practical stages will be considered.

The main objective of this training is to students to be able to use not the new gained knowledge and skills but also the attitude and aptitude necessities to deliver a good performance.

Each stage completed will give them a real vision of its potential and of its limits allowing them to work as a unit with unified techniques and to share with different participants of the event.

The organization and structure of **ASES[®]**.

Trainers will write a detailed report at the end of each stage and at the very end of the training programme. These reports will registrate gained objectives, evolution and difficulties of each student.

Work schedule, methodology and evaluation

Work schedule:

The training will consist of four (4) stages; each of them will have a 20 hour duration being developed during a weekend (two days) from 9:00 am to 19:00 pm; or during three (3) days with a different schedule organization.

Methodology:

Each meeting will deal with a different topic (an oral exposition of the teacher) and a workshop to train the practical aspects. This theoretical-practical approach will be based on observation, cases analysis and group resolution. Each student will have lecture material for each topic.

Evaluation



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



- To consider the **ASES**[®] programme completed, each student will have to attend 80 per cent of the theoretical classes and 100 per cent workshops.
- Each stage will give each student a partial credit for 20 hours of training.
- In case any student has to drop the course, they could join a new group from the stage they need to complete. (unless they dropped for a period longer than a year, in which case they will have to take all the stages again)
- Is not possible to take isolated stages because of the fact that this programme constitutes a training accumulative programme.
- Students have to complete every activity of each stage.
- The evaluation is continuant during stages and the final evaluation results must be above 70.
- At the end of each stage, students will be able to expose their queries and difficulties.
- The last part of the programme consists in a drill as a final evaluation.



**FEDERACION
ARGENTINA
de ESPELEOLOGIA**



Why do we need to create a sanitary assistance commission in speleology (**ASES[®]**)

- Speleology is science, art and a sport discipline, therefore, a risky activity.
- A cave is not just a confined space, a speleologist is not always a first responder and not all first responders are always able to develop their activity in an underground environment.

This is why the creation of Speleology Rescue Units and their human resource training is necessary.

Caves are one of the most visited environments by a diverse public:

- Different researchers carry out their practical investigation inside the caves: Biologist, geologist, paleontologist, and engineers.
- Earth science students, tourism students, mountain guides.
- Tourists who are in search for adventures and exiting activities framed what is newly called “adventure tourism”.
- Explorers, walkers, photographers.
- Rural and construction workers.

Inexperienced people presence increase the possibility of accidents and incidents and this **determines that specific help interventions and assistance is necessary.**

The ones who develop this activity must have a special training. **Even if their activities take place in the surface they must be prepared to perform in the underground.**

To assist an individual in an underground environment presents a great amount of difficulties, mainly, the access to the victims and the small place in which maneuvers and movements take place, to this we must add that caves usually are away from human settlements.

Another concern is the environmental factors of these undeveloped places such as obscurity, low temperatures, humidity, communication difficulties, low temperature water, fear and anxiety, family and mass media pressure.

Even though incidents and accidents are situations that carry great amounts of fear, anguish, physical and emotional pain in their protagonists and families, first responders' greatest risk is panic and disorientation, increased by the absence of light.



People involved in these activities have to be trained to give a correct performance as regarding **time of action and intervention possibilities**.

Caves (as a rescue scenario), **make health professionals work with few elements, make quick decisions and evacuations and specially to understand that the cares that victims receive inside the cave will not be final.**

Health professionals must find a balance between what they now it must be done and what they can actually do with the resources at hand. These differences constitute something more than an obstacle, a real challenge.

Rescue situations of victims inside a cave imply a risk not only for the victim but for the whole sanitary team.

The human resource is the key to a successful intervention, especially if the training received is specialized for that environment. There is a small amount of health professionals in the world developing their activities in the underground but they are not clone to one another to exchange experiences and techniques with international colleagues.

To conclude:

1. It is necessary the creation of a **sanitary assistance commission in speleology**.
2. This commission must integrate all the **human resource specialized in sanitary assistance**.
3. The commission must **reunite all existing knowledge about sanitary assistance**.
4. It has to spread this knowledge in three areas: **health professionals** involved in a rescue, to all **security forces** and to all **speleologist** to provide security and expertise.
5. It should contribute to **research, learning and training**.