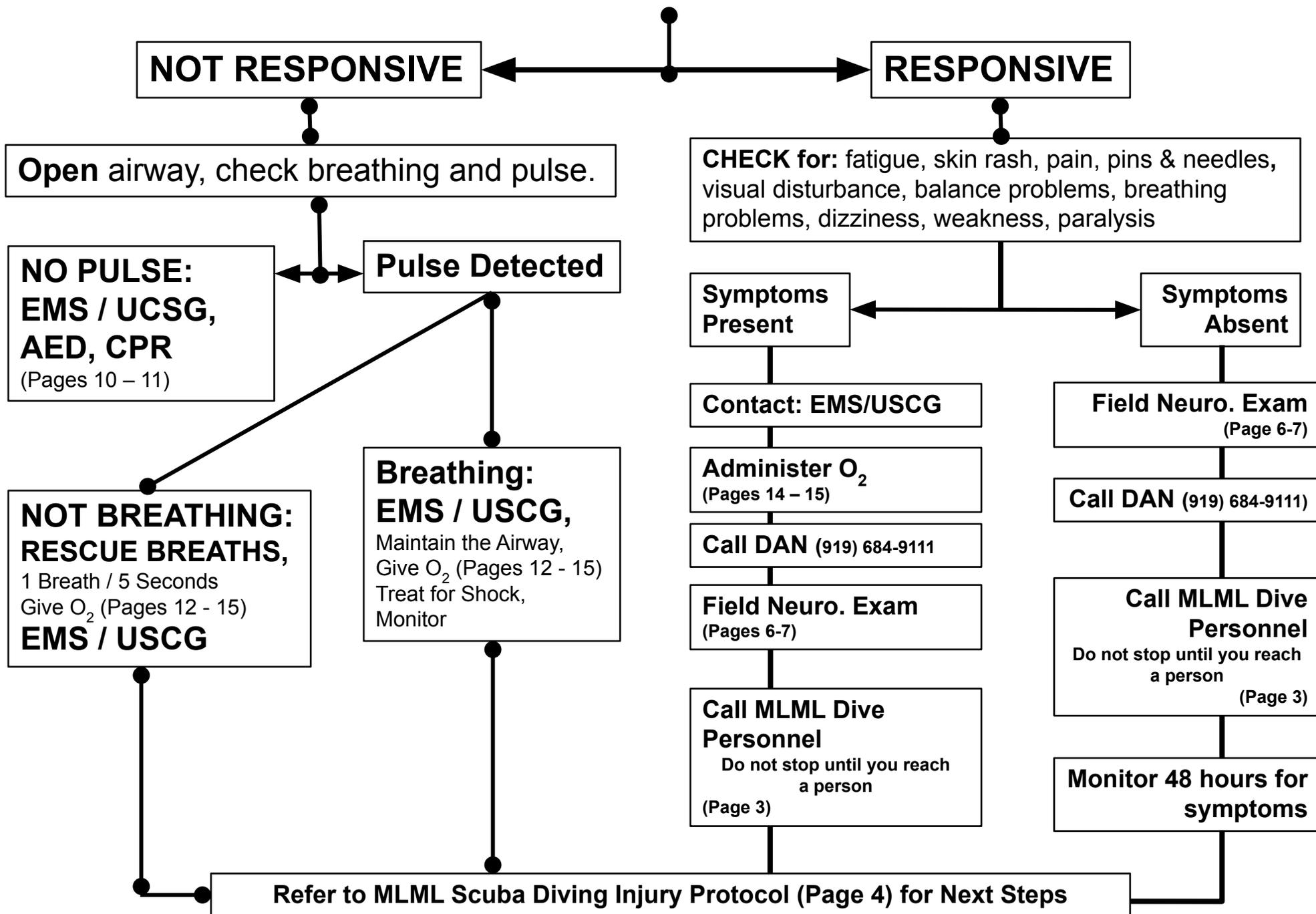


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# MLML SCUBA DIVING EMERGENCY FLOWCHART

PROTECT YOURSELF & injured person from further harm. Transport victim to a safer location if necessary.



## MLML SMALL BOATS & DIVING EMERGENCY TELEPHONE NUMBERS

**In any emergency, the correct procedure is to call 911. The following is supplementary information only. It is subject to change.**

**BOATING EMERGENCY** – If you are in immediate danger notify the US Coast Guard on CH 16 – see MAYDAY instructions below. If you need assistance and are not in immediate danger contact Small Boat Operations by VHF or phone.

### DIVING & BOATING EMERGENCY PERSONNEL OF MLML

Director	Petra Dekens	(415) 215-1820 (Cell), (831) 771-4410 (Office)
Marine Operations	John Douglas	(831) 254-7024 (Cell), (831) 771-4122 (Office)
Diving Safety Officer	Diana Steller	(831) 588-5591 (Cell), (831) 771-4440 (Office)
MLML EH&S Officer	Brian Gallagher	(831) 771-4451 (Office)
Small Boats Coordinator	Taylor Leischner	(559) 789-5338 (Cell)
Assistant DSO	Jess Franks	(312) 282-1140 (Cell)
DCB Co-Chair	Scott Hamilton	(805) 637-1105 (Cell), (831) 771-4497 (Office)
DCB Co-Chair	Amanda Kahn	(510) 936-2624 (Cell), (831) 771-4426 (Office)
MLML Main Lab Number		(831) 771-4400

**\*\*REMEMBER, all dive accidents & incidents must be reported within 24 hours\*\***

### DIVING RELATED REFERENCES FOR DIVING EMERGENCIES

<u>Divers Alert Network (DAN)</u> CALL EMS, then DAN before calling any numbers below!		Emergency (919) 684-9111 Non-Emergency (919) 684-2948 Toll Free Non-Emergency 1 (800) 446-2671
<u>Community Hospital of Monterey Peninsula (CHOMP)</u> 23625 WR Holman Highway	Monterey	Emergency 911 Emergency Department (831) 625-4900
<u>Pacific Grove Hyperbaric Facility</u> Meg Donat, Supervisor/Director of PGHC *(Closest chamber)	Pacific Grove	Emergency 911 Meg Donat cell: 831-236-6094
<u>Dominican Hospital</u> 1555 Soquel Dr.	Santa Cruz	(831) 462-7700
<u>Catalina Hyperbaric Chamber (USC)</u> 1 Big Fisherman Cove *(Chamber location)	Catalina Island	Emergency 24hr (310) 510-1053 Primary (310) 510-4020 Chamber (310) 510-4023
<u>LA CO/ USC Medical Alert Center/ USC Medical Center</u> *(Chamber location)	Los Angeles	(323) 409-1000
<u>Northridge Medical Center</u>	Los Angeles	(818) 885-8500
<u>John Muir Medical Center</u>	Walnut Creek	Emergency (925) 939-5800

### MARINE DISTRESS COMMUNICATION    \*SPEAK: CLEARLY—CALMLY – SLOWLY

1. Tune VHF radio to **Channel 16**. Select **HIGH** power.
2. Press microphone button and say, “**MAYDAY, MAYDAY, MAYDAY.**”
3. Give your **LOCATION** as soon as possible.
4. Say “**THIS IS** – your boat name.”
5. Tell **WHERE** you are and state the **NATURE** of your **DISTRESS**
6. Give the **NUMBER OF PERSONS** aboard and **CONDITIONS** of any **INJURED**
7. **BRIEFLY DESCRIBE** your **BOAT**
8. Say, “**I WILL BE LISTENING ON CHANNEL 16.**”
9. End message by saying, “**THIS IS** – your boat name – **OVER.**”
10. Release microphone button and **listen**. Someone should answer. If they **DO NOT, REPEAT CALL.**

### **\*\*EMERGENCY CALL-IN SCRIPT\*\***

“I am calling to report a diving-related emergency requiring immediate medical assistance. The victim is a \_\_\_(age) year-old \_\_\_(gender) who is (conscious/unconscious), with the following symptoms...(describe signs and symptoms). We are at the following location...(address, landmarks, etc.) have initiated care (first aid/CPR/O2), and the last vital signs were as follows...(pulse and respirations). We are requesting immediate transport to... (receiving facility of choice), via (air/ground) transport.

**\*\*Note: DO NOT TERMINATE CALL! The receiving unit will end the call.\*\***

## MLML SCUBA DIVING INJURY PROTOCOL

1. Protect yourself and victim from further injury.
2. Assess victim, follow **EMERGENCY FLOWCHART** (page 1)
3. Contact EMS and then DAN for diving emergencies. US Coast Guard if offshore (VHF 16).
4. Administer CPR/First Aid (pages 10-11) and Oxygen (pages 12-15) and treat for shock (page 21) as needed. Begin transport unless EMS recommends otherwise.
  1. If a victim is a member of DAN and you are more than 50 miles from campus, you can call 1-800-DAN-EVAC.
  2. You can call 911 and request an ambulance.
  3. You can use a private or university vehicle if they are conscious.
5. Check and monitor victim's dive buddy for any signs or symptoms of DCI.
6. If victim is unstable, check and record vital signs every 5 minutes during transport or while awaiting care.
  1. Check: Pulse (bpm), respiration rate (bpm)
  2. If stable, check and record every 15 minutes.
7. Begin filling out **PATIENT INFORMATION** (page 8) sheet to give to EMS.
8. If conscious, perform **FIELD NEUROLOGICAL EXAMINATION** (pages 6-7).
9. Contact Diving Safety Officer (Diana Steller: (831) 588-5591 (Cell) or (831) 771-4440 (Office), Supervisor/PI, or member of Diving Emergency Personnel as soon as is practical. See **Emergency Telephone Numbers** (page 3) sheet.
10. Retain victim's diving equipment.
  1. Leave gear assembled, turn off air (count number of turns it takes to close valve) and rinse with fresh water (do not exhaust air from reg). Have another person witness this procedure.
  2. Label gear with diver's name and pertinent gear information.
  3. If gear is given to police or EMS, obtain evidence receipt / chain of custody.
11. Gather dive history and other important information, fill out **PATIENT INFO** (page 8) sheet:
  1. Take note of any dive data from a computer, depth gauge, timing device, SPG.
  2. Get the names, phone numbers, and addresses of any witnesses.
  3. DO NOT share ANY information with non-essential personnel.
  4. DO NOT assign or speculate about fault.
  5. Note time and list first aid procedures initiated.
12. Collect victim's personal belongings.
13. Arrange for return transportation or any necessary phone calls for victim if needed.
14. Complete and submit the following forms to the Diving Safety Officer within 24 hours:
  1. For a student, use the following forms:
    1. MLML Accident Form (Pages 30 - 31)
    2. NAUI Accident Form (If a NAUI class, pages 32 - 34)
  2. For a staff member or volunteer, use the following forms:
    1. MLML Accident Form (Pages 30 - 31)
    2. NAUI Accident Form (if a NAUI class, pages 32 - 34)
    3. Worker's Compensation Packet or Jones Act (if on a boat).
15. Contact Environmental Health and Safety (Brian Gallagher: (831) 771-4451) and complete a CSU Property / Casualty Loss Report.

## MISSING DIVER PROTOCOL

1. Mark starting point of dive OR last known location - Use GPS or anchored buoy (weightbelt, line & life jacket)
2. Note current direction/speed when diver last seen - Use floating object to help in determination - Note sea and weather conditions
3. Note time when dive began, current time & depth of dive to determine when air supply should be depleted. Note time diver was last seen.
4. Note visual reference points above & below the water of last known location
5. Look down-current and towards shore for diver
6. Question dive buddy - anything unusual about dive?
7. AT SEA - radio USCG on vhf radio Ch. 16 or call via cell phone 911 -- ON LAND call 911 and state that you have an **Ocean Rescue Situation**
8. Contact DSO & Diver's Supervisor / PI or someone on Diving Emergency Personnel list, **you must speak to a person**

## MAN OVERBOARD PROTOCOL

1. Immediately throw float & yell "man overboard", continue to point toward person, note color of clothing of person
2. Note vessel heading and speed and take visual sightings as well as GPS location
3. Note sea and weather conditions at time of loss overboard
4. Check time of day for daylight hours remaining
5. Contact USCG via VHF radio CH 16 or call 911
6. If Needed - Contact DSO & Diver's Supervisor or PI, **you must speak to a person**

# Neurological Assessment (Neuro)



## History

Date \_\_\_\_\_ Time \_\_\_\_\_

Injured Person's Name \_\_\_\_\_

## Conduct F-A-S-T (check areas of abnormal findings)

Facial Symmetry  Arms  Speech/Sudden Headache  Time \_\_\_\_\_

(call emergency services if any abnormal findings are present)

## Complete S-A-M-P-L-E (note responses in spaces provided)

**S**igns and **S**ymptoms \_\_\_\_\_

**A**llergies \_\_\_\_\_

**M**edications \_\_\_\_\_

**P**re-existing conditions \_\_\_\_\_

**L**ast oral intake (what and time) \_\_\_\_\_

**E**vents leading up to incident \_\_\_\_\_

## For Divers

### Dives during previous 24 hours

Last dive: Depth \_\_\_\_\_ Bottom Time \_\_\_\_\_ Breathing Gas \_\_\_\_\_

Surface interval \_\_\_\_\_

Previous dive: Depth \_\_\_\_\_ Bottom Time \_\_\_\_\_ Breathing Gas \_\_\_\_\_

Surface interval \_\_\_\_\_

Previous dive: Depth \_\_\_\_\_ Bottom Time \_\_\_\_\_ Breathing Gas \_\_\_\_\_

Surface interval \_\_\_\_\_

Previous dive: Depth \_\_\_\_\_ Bottom Time \_\_\_\_\_ Breathing Gas \_\_\_\_\_

Surface interval \_\_\_\_\_

Previous dive: Depth \_\_\_\_\_ Bottom Time \_\_\_\_\_ Breathing Gas \_\_\_\_\_

Unusual features of any dive \_\_\_\_\_

Diver used:  Computer  Dive Tables  Other

Location of any pain \_\_\_\_\_

Does movement change level of pain? (check one)  Yes  No

Dive buddy \_\_\_\_\_  N/A

**Notes** (attach dive buddy and/or witness comments) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Neurological Assessment (Neuro)



**Vital Signs** Time \_\_\_\_ Pulse \_\_\_\_ Resp. \_\_\_\_ **2nd** Time \_\_\_\_ Pulse \_\_\_\_ Resp. \_\_\_\_

## Mental Function

### Orientation (check erroneous answers)

- What is your name?
- Where are you?
- What is the day and time?
- Why are you here?

Ability to follow commands:  Yes  No  
"Stick out your tongue and close your eyes."

Ability to repeat a simple phrase:  Yes  No  
Ex.: "no ifs, ands, or buts"

Name three objects (able to complete):  Yes  No

Abstract reasoning (able to explain relationship):  Yes  No  
Ex.: Student/Teacher Pencil/Paper

Calculations: count backward from 100 by 7s (circle misses):  
93 86 79 72 65 58 51 44 37 30 23 16 9 2

Memory (able to recall the three items identified earlier):  Yes  No

## Cranial Nerves

Eyes (circle any direction unable to look): Left Right Up Down

Facial Symmetry "Close your eyes and smile":  Yes  No

Hearing Symmetrical from about 30 cm (1 foot):  Yes  No

## Motor Function

### Scale (note in blank next to area): Normal (N) Weak (W) Paralyzed (P)

<b>Upper Body</b>	Shoulders	L ____ R ____	<b>Lower Body</b>	Hip Flexors	L ____ R ____
	Biceps	L ____ R ____		Quadriceps	L ____ R ____
	Triceps	L ____ R ____		Hamstrings	L ____ R ____
	Finger Spread	L ____ R ____		Foot – Up	L ____ R ____
	Grip Strength	L ____ R ____		Foot – Down	L ____ R ____

## Coordination and Balance

Able to complete:

Finger – Nose – Finger: Eyes Open:  Yes  No Eyes Closed:  Yes  No

Walk:  Normal  Wobbly  Unable Romberg:  Yes  No

## Exam Repeated

Time \_\_\_\_\_ Comments \_\_\_\_\_

Time \_\_\_\_\_ Comments \_\_\_\_\_

**PATIENT INFORMATION**

DATE & TIME OF ACCIDENT:

NAME, GENDER & AGE:

CURRENT ADDRESS & ZIP:

EMERGENCY CONTACT:

CURRENT MEDICATIONS:

KNOWN ALLERGIES:

KNOWN MEDICAL CONDITIONS:

LOCATION OF ACCIDENT:

NATURE OF ACCIDENT:

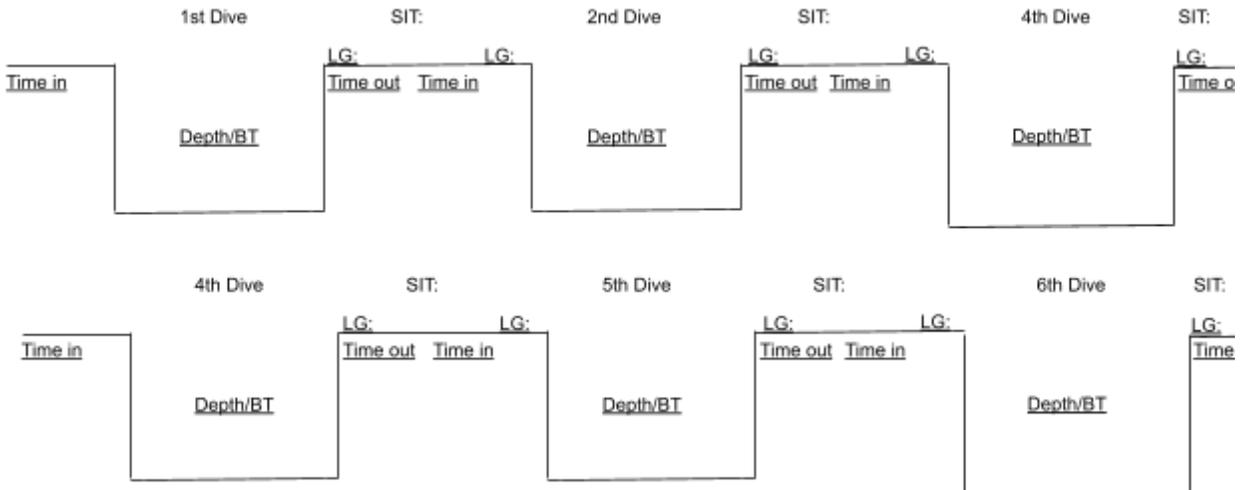
SIGNS & SYMPTOMS:

TIME O2/CPR/First Aid STARTED:

ANY CHANGES IN SIGNS/SYMPTOMS AFTER ONSET OF CARE:

LAST FOOD/FLUID INTAKE AND DISCHARGE:

DIVE PROFILE:



Please use the reverse side to document specifics of the incident. Please be sure to include:

- (1) Events leading up to incident**
- (2) Time patient was transferred to EMS/Emergency room care**
- (3) Statements from dive buddy/other witnesses**

# Basic Life Support: CPR, AED, FBAO



## Scene Safety Assessment

<b>S</b>	Stop
<b>A</b>	Assess the scene
<b>F</b>	Find oxygen kit, the first aid kit, and the AED
<b>E</b>	Exposure protection

## Initial Assessment (adults and children)

- Assess responsiveness and normal breathing
  - Tap the person’s collarbone or shoulder and loudly ask **“Are you OK?”**
  - State your name and your desire to help
- If the person responds, have them remain in the position found or position of comfort
- If unresponsive but breathing normally and you do not suspect back or neck injury, place in recovery position
- If not breathing normally, begin CPR
  - Shout for help or send a specific person to contact emergency services

## CPR – Adult (one rescuer) Do not delay CPR to wait on an AED or other equipment.

Call emergency services if not already initiated

- Begin compressions in the center of the chest, just above the xiphoid process
- Deliver 30 compressions (at 100-120 per minute)
- Deliver 2 normal breaths, about 1 second each, using a barrier device
- Continue CPR cycles of 30:2 until emergency services arrives
- If available, use AED

## Two Rescuers

- First rescuer does chest compressions
  - Pause compressions for ventilations then immediately resume compressions
- Second rescuer provides rescue breaths
- Switch roles every 2 minutes or after 5 cycles of 30:2

## CPR for Children (one rescuer) Do not delay CPR to wait on an AED or other equipment.

- Begin chest compressions using heel of one hand to about one-third chest depth
- After 2 minutes of CPR, call emergency services if someone has not already done so
- If available, use AED as with an adult; use pediatric pads if available

## Two Rescuers

- First rescuer performs compressions, second rescuer performs rescue breaths
- Compression to ventilation ratio changes to 15:2
- Pause compressions for ventilations

Person	One Rescuer	Two Rescuers	How to Compress	Depth
Adult	30:2 ratio	30:2 ratio	Two hands stacked	2-2 1/2 inches (5-6 cm)
Child	30:2 ratio	15:2 ratio	Heel of one hand or two hands stacked	1/3 chest depth
Infant	30:2 ratio	15:2 ratio	Heel of one hand or two thumbs encircling the chest	1/3 chest depth

Emergency Hotline +1-919-684-9111



# Basic Life Support: CPR, AED, FBAO



## CPR for Infants (one rescuer)

- Ask parent/guardian for consent
- Assess responsiveness: Tap bottom of foot and loudly ask **“Are you OK?”**
- Check for presence of normal breathing and a definite pulse (inside upper arm)
- If unresponsive and not breathing normally, begin CPR
  - Begin chest compressions using the heel of one hand, or encircle the chest with two thumbs placed in the center of the chest just above the xiphoid process
- Compress about one-third the depth of the chest; Use compression to ventilation ratio of 30:2
- After 2 minutes of CPR, take the infant with you to call emergency services if not already done
- For AED, place one pad on the chest and one on the back (use pediatric pads if available)

## Two Rescuers

- One rescuer performs compressions, second rescuer performs ventilations
- Compression to ventilation ratio changes to 15:2
  - Begin chest compressions using the heel of one hand, or encircle the chest with two thumbs placed in the center of the chest just above the xiphoid process
- Pause compressions for ventilations

## Using an AED

- Priority is to continue chest compressions while AED is being set up
- Expose and dry the person’s chest
  - Shave off chest hair if necessary
- Turn on the unit, and follow prompts provided by the unit
- Allow AED to analyze heart rhythm
- If the AED indicates “shock advised,”
  - Ensure everyone is clear verbally & visually
  - State: **“I’m clear, you’re clear, all clear”**;
- Deliver shock when indicated
- Immediately following the shock, resume chest compressions
- Follow prompts of the AED unit

## Foreign Body Airway Obstruction

**Call emergency services.** If person becomes unconscious, begin CPR starting with compressions.

### Adults and Children

A combination of techniques may be needed to remove the obstruction.

#### 1 Back Blows

- Stand beside and slightly behind the victim
- Support the chest with one hand and lean the victim forward
- Give up to five sharp blows between the shoulder blades with the heel of your hand
- Check after each back blow to see if it has relieved the airway obstruction

#### 2 Abdominal Thrusts

- Locate navel and place balled fist, thumb in, against stomach above navel
- Place other hand over fist, pull sharply inward and upward 5 times

#### 3 Chest Thrusts (if you cannot reach around abdomen)

- Stand behind the person, encircling their chest, placing your arms directly under their armpits
- Form a fist and place the thumb side of your fist on the middle of breastbone (avoid the xiphoid process and the margins of the rib cage)
- Place other hand over fist and deliver 5 quick forceful thrusts

### Infants

- 1 Place the infant face down on your forearm, cupping their head with your hand
  - 2 Deliver five back blows between the shoulder blades
  - 3 Place other forearm over infant, creating a sandwich, and turn infant over, face up
  - 4 Deliver five chest thrusts as with CPR
- Repeat steps 1-4 until object is released or emergency services arrive

# Oxygen Components



Delivery Device	Flow Rate	Inspired Fraction <sup>+</sup>
Oronasal mask (pocket mask)	10 lpm	≤ 0.5–0.6 (50%–60%)*
Nonrebreather mask	15 lpm	≤ 0.8 (80%)**
Bag valve mask	15 lpm	≤ 0.9–0.95 (90%–95%)
Demand valve / MTV	N/A	≤ 0.9–0.95 (90%–95%)

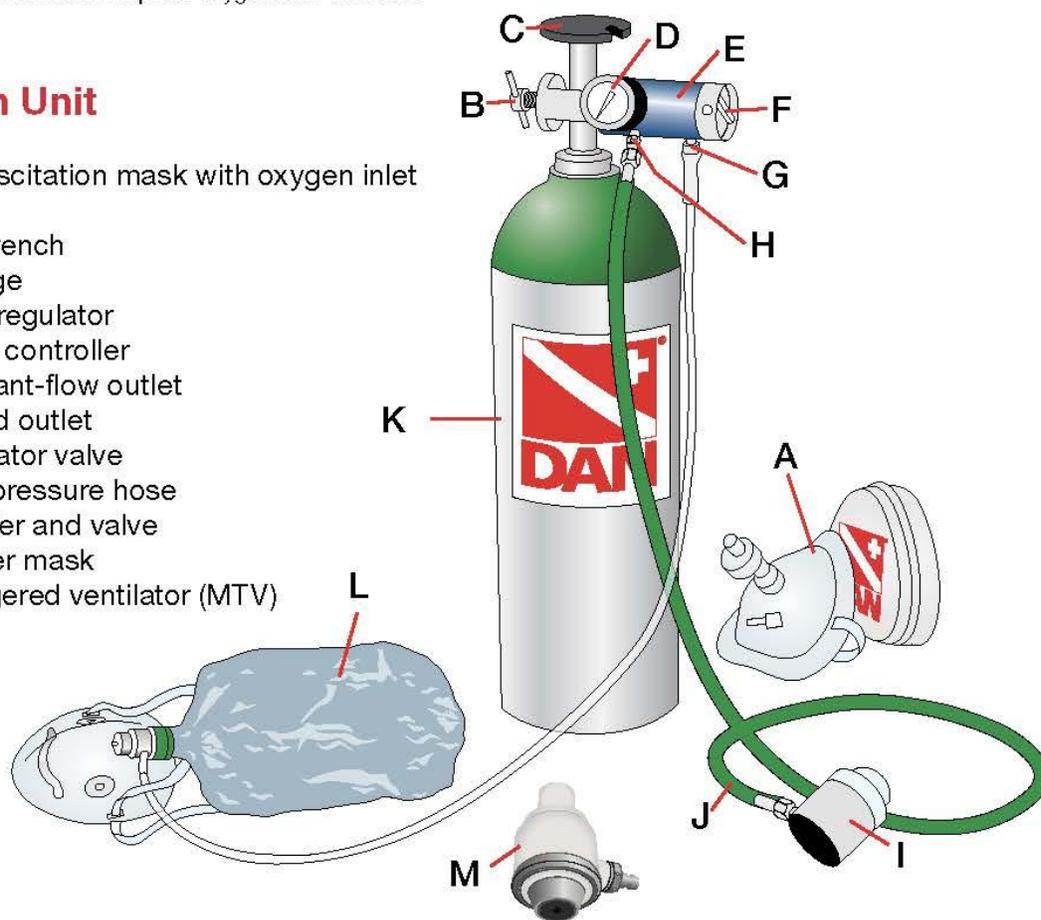
\* May vary with respiratory rate

\*\* Less variation with changes in respiratory rate

NOTE: Delivery fractions vary with the equipment and techniques used. This table summarizes various oxygen-delivery systems and potential values of inspired oxygen with their use.

## DAN Oxygen Unit

- A. oronasal resuscitation mask with oxygen inlet
- B. T-handle
- C. handwheel wrench
- D. pressure gauge
- E. multifunction regulator
- F. constant-flow controller
- G. barbed constant-flow outlet
- H. DISS threaded outlet
- I. demand inhalator valve
- J. intermediate pressure hose
- K. oxygen cylinder and valve
- L. non-rebreather mask
- M. manually triggered ventilator (MTV)



## WARNING



**Diving First Aid Equipment For Emergency Use By Properly Trained Persons Only**  
 Misuse of this equipment may result in serious injury or death.  
 Contact DAN for information about oxygen training.



**Emergency Hotline +1-919-684-9111**

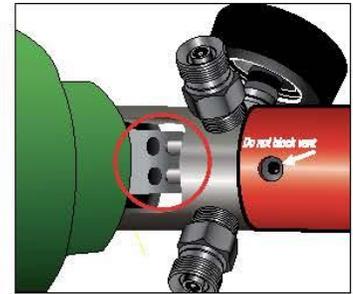


# Oxygen Kit Assembly



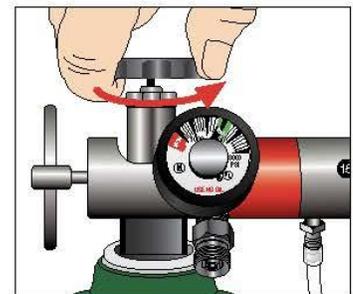
## Oxygen Regulator

1. Place cylinder in upright position
2. Check for O<sub>2</sub> washer placement on regulator
3. Slide regulator down from the top of the valve and align the two pins to match holes on valve
4. Gently tighten T-handle until regulator is snug on valve



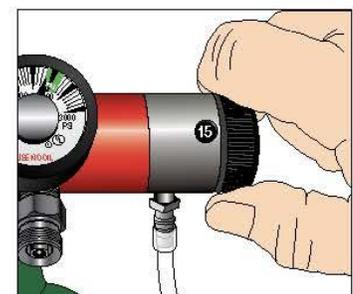
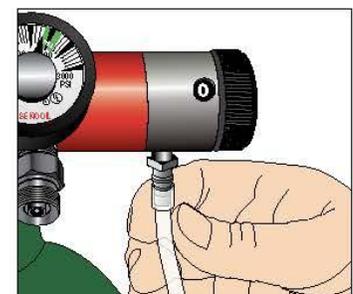
## Demand Valve (DV), Manually Triggered Ventilator (MTV)

1. Attach hose to one of the DISS threaded outlets on the regulator finger tight
2. Attach demand or MTV valve to other end of hose, also finger tight
3. Attach pocket mask to demand or MTV valve
4. Attach handwheel wrench to top of valve
5. Slowly open the valve of O<sub>2</sub> cylinder and listen for gas leaks
  - If a gas leak is detected, turn off the valve and check the constant flow controller, hoses, and O<sub>2</sub> washer
6. Slowly open the valve one full turn
7. Test demand valve or MTV function by inhaling from mask and exhaling away from mask and over-pressure valve on MTV
  - Ask injured person for consent



## Bag Valve Mask (BVM), Non-Rebreather Mask

1. Remove non-rebreather mask from packaging
2. Stretch out clear tubing
3. Attach end of oxygen tubing to barbed constant-flow outlet
4. Attach handwheel wrench to top of valve
5. Slowly open valve of oxygen cylinder and listen for gas leaks
  - If a gas leak is detected, turn off the valve and check constant flow controller, hoses, and O<sub>2</sub> washer
6. Slowly open valve one full turn
7. Activate O<sub>2</sub> flow by turning the constant flow controller until it reads 15 lpm
8. Prime the reservoir bag by blocking the one-way valve until it is full



**Note:** All hose connections are hand-tightened; don't use a wrench.

# Emergency Oxygen for Scuba Diving Injuries (EO<sub>2</sub>)



## Scene Safety Assessment

<b>S</b>	Stop
<b>A</b>	Assess the scene
<b>F</b>	Find oxygen kit, the first aid kit, and the AED
<b>E</b>	Exposure protection

## Initial Assessment (adults and children)

- Assess responsiveness and normal breathing
  - Tap the person's collarbone or shoulder and loudly ask **"Are you OK?"**
  - State your name and your desire to help
- If the person responds, have them remain in the position found or position of comfort
- If unresponsive but breathing normally and you do not suspect back or neck injury, place in recovery position
- If not breathing normally, begin CPR
  - Shout for help or send a specific person to contact emergency services

## Steps to Initiate Oxygen Delivery

Oxygen kits should be stored with the regulators assembled and the gas flow turned off

- Slowly open the valve of O<sub>2</sub> cylinder and listen for gas leaks
  - If a gas leak is detected, turn off the valve and check constant flow controller, hoses, and O<sub>2</sub> washer
- Check the pressure gauge on the tank to ensure cylinder has adequate gas supply
- Ask the injured diver for permission to assist:
  - **"This is oxygen. It might help you feel better. Would you like it?"**
  - If the diver is unresponsive, consent is implied

## Breathing Diver – Demand Valve

- Constant flow setting should be in the OFF position or 0 position
- Place an oronasal mask on the demand valve
- Take a breath from the oronasal mask and exhale away from the mask
- Place the mask over the injured diver's mouth and nose
- Adjust the elastic strap to ensure a snug fit
  - Check for leaks
  - Instruct the injured diver to hold the mask
- Instruct the injured diver to breathe normally from the mask

## Breathing Diver – Non-Rebreather Mask

- Stretch oxygen tubing to remove kinks
- Attach tubing to constant flow outlet
- Set constant flow control at 15 lpm
- Prime mask reservoir bag
- Place mask over injured diver's mouth and nose
- Adjust nose clip and elastic strap to ensure a seal
- Adjust the flow up or down to meet the needs of the diver as indicated by maintaining the reservoir volume of at least one-third full during inhalation
  - If flow has been increased to maximum lpm and bag still fully deflates, switch to demand valve

# Emergency Oxygen for Scuba Diving Injuries (EO<sub>2</sub>)



## Non-Breathing Diver – Bag Valve Mask (BVM)

After calling emergency services, **first rescuer** begins CPR

**Second rescuer** prepares oxygen equipment, maintains airway and seal then monitors oxygen supply

- Stretch tubing to remove kinks
- Connect tubing to constant flow outlet
- Set constant flow to 15 lpm; allow reservoir bag to fill
- Position mask over injured diver's mouth and nose
- Open airway using head tilt/chin lift, lifting jaw into mask and creating seal
- **First rescuer** ventilates injured diver by gently and slowly squeezing the bag about one-third of volume causing chest to rise
  - Deliver two ventilations for 1 second each
  - Watch for chest to rise and then fall between ventilations
- Continue CPR cycles of 30:2

If oxygen supply runs out, continue to ventilate using ambient air.

## Non-Breathing Diver – Manually Triggered Ventilator (MTV)

After calling emergency services, **first rescuer** begins CPR

**Second rescuer** prepares oxygen equipment, maintains airway and seal, then monitors oxygen supply

- Check MTV safety valve to ensure proper function
  - Press resuscitation button, block outlet – flow should stop or bypass to exhaust
  - Do not use if it does not function properly
- Connect oronasal resuscitation mask to MTV
  - Take a breath from the oronasal mask, and exhale away from the mask
- Position mask over injured diver's mouth and nose; adjust elastic strap to ensure snug fit
- Open airway using head tilt/chin lift, lifting jaw into mask, and creating seal
- **First rescuer** ventilates injured diver by pressing resuscitation button.
  - Deliver two ventilations for 1 second each
  - Watch for chest to rise and then fall between ventilations
- Continue CPR cycles of 30:2

If oxygen supply runs out, switch to another ventilation method.

## General Guidelines

- Activate emergency action plan (EAP) if not already initiated
- Monitor oxygen supply
- Monitor injured diver for changes in level of consciousness and signs of circulation
- Never leave an injured diver alone

# Basic Life Support: First Aid Skills



## Scene Safety Assessment

<b>S</b>	Stop
<b>A</b>	Assess the scene
<b>F</b>	Find oxygen kit, the first aid kit, and the AED
<b>E</b>	Exposure protection

## Initial Assessment (adults and children)

- Assess responsiveness and normal breathing
  - Tap the person's collarbone or shoulder and loudly ask **"Are you OK?"**
  - State your name and your desire to help
- If the person responds, have them remain in the position found or position of comfort
- If unresponsive but breathing normally and you do not suspect back or neck injury, place in recovery position
- If not breathing normally, begin CPR
  - Shout for help or send a specific person to contact emergency services

## Secondary Assessment

- Use eyes and hands to check for abnormalities, bleeding, and other body fluids
- Inspect person from head to foot, palpating gently and visually checking:
  1. Scalp, face, nose, and ears
  2. Neck and collarbones
  3. Arms and grip strength
  4. Ribs and abdomen
  5. Hips and legs
  6. Ability to wiggle fingers and toes
- Stop if any life-threatening injuries are found, and intervene as necessary
- Note any abnormal findings

## Bleeding

### Direct Pressure

- Apply direct pressure to the wound until the bleeding is controlled
  - Apply dressing; use additional absorbent material if needed
- Bandage the dressing in place, wrapping toward the heart
  - Check for CMS (circulation, movement, sensation); adjust dressing and bandage if necessary
- Do not remove impaled objects; secure them in place to prevent further injury

### Applying a Tourniquet

- Apply the tourniquet high and tight above the wound
- Turn windlass until bleeding stops, and secure
- Note "T" or "TK" and time of application on injured person's forehead
- Continue to monitor and provide verbal support

### Wound Packing

- Pack dressing material to the depth of the wound
- Apply lateral pressure to the wound walls, holding gauze in place on one side while additional gauze is packed on the opposite side
- Maintain lateral pressure on wound walls during the packing process, then apply a dressing
- If wound packing or hemostatic impregnated gauze is employed, alert emergency services as it is not always obvious after the wound is dressed

# Basic Life Support: First Aid Skills



## **Splinting** (Can be used if emergency services will be significantly delayed or the injured person must be moved)

- Apply splint to injured limb in the position found
- Immobilize joints above and below the injury
- Pad injured area to support and protect
- Use a sling with arm splints
- Check for CMS (circulation, movement, sensation); adjust splint or sling if necessary

## **Suctioning**

### **For adults and children**

- Place in recovery position if not already
- Use size-appropriate suction tube
- The distance from earlobe to mouth determines how far to insert the tube
- Use scissor technique to open mouth
- Suction for no more than 15 seconds for adults and 10 seconds for children
- Repeat suction as necessary

### **For infants**

- Depress suction bulb before inserting into the mouth or nose
- Remove the suction bulb from mouth or nose, and depress it away from the infant to clear it
  - Suction the mouth and then the nose
  - Limit suctioning to no more than 5 seconds

## **Recovery Position**

- Kneel beside the person lying on their back, and make sure their legs are straight
- Place the arm nearest you at a right angle to their body
- Bring the far arm across their chest, placing their hand against their cheek
- Hold their hand in place
- With your other hand, pull the far knee up by placing your hand under the leg just above the knee or grab that pant leg; keep the foot on the ground
- Pull the elevated knee toward you with one hand while supporting their hand that is against their cheek with your other hand, rolling them onto their side
- Adjust the top leg so 90° angles are formed at the hip and knee
- Adjust the head and hand if necessary to keep the airway open
- Monitor the person for any changes

## **Shock**

### **Call emergency services immediately!**

**Anaphylactic Shock:** Signs/Symptoms (swelling, itching, airway narrowing, respiratory distress)

- Assist with any prescribed allergy medications

**Cardiogenic Shock:** Signs/Symptoms (pale, clammy skin; severe shortness of breath; weak pulse)

- Have the person lay on their back or in a position of comfort; monitor responsiveness

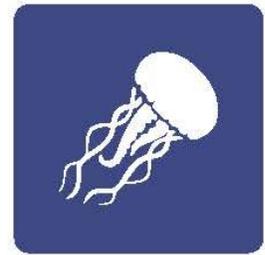
**Hypovolemic Shock:** Signs/Symptoms (pale, clammy skin; confusion; weakness; rapid breathing)

- Control any bleeding; lay person on back or in position of comfort; monitor responsiveness

### **Standard Care**

- Maintain normal body temperature (provide warmth/cooling as needed)
- Elevate the feet 6-12 inches (15-30 cm) if there is not a neck, spine, or pelvis injury
- Do not provide food or drink
- Monitor responsiveness

# First Aid for Hazardous Marine Life Injuries (HMLI)



## Scene Safety Assessment

<b>S</b>	Stop
<b>A</b>	Assess the scene
<b>F</b>	Find oxygen kit, the first aid kit, and the AED
<b>E</b>	Exposure protection

## Initial Assessment (adults and children)

- Assess responsiveness and normal breathing
  - Tap the person's collarbone or shoulder and loudly ask **"Are you OK?"**
  - State your name and your desire to help
- If the person responds, have them remain in the position found or position of comfort
- If unresponsive but breathing normally and you do not suspect back or neck injury, place in recovery position
- If not breathing normally, begin CPR
  - Shout for help or send a specific person to contact emergency services

## CPR (Do not delay CPR to wait on an AED or other equipment.)

- Deliver 30 compressions followed by two ventilations
- Continue CPR cycles of 30:2
- Deploy AED if available

## Shock Management (jellyfish, fire coral, anemones, hydroids)

- Place person on their back or in position of comfort
- Consider elevating legs 6-12 inches (15-30 cm) if no neck, spine, or pelvis injuries
- Maintain normal body temperature
- Monitor responsiveness continuously
- Do not give fluids

## Stings (jellyfish, fire coral, anemones, hydroids)

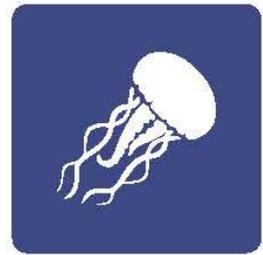
### Signs and Symptoms (Symptoms may progress rapidly.)

- Pain (can be extreme)
- Muscle cramps (may be severe)
- Welts
- Burning and itching
- Localized redness and swelling
- Blisters (formation may be delayed)
- Nausea, fatigue, general malaise
- Shock (rare)

### First Aid (Call emergency services immediately if symptoms progress.)

1. Inactivate: Irrigate with generous amounts of white household vinegar
2. Wear gloves. Remove tentacles with tweezers
3. Wash/irrigate with seawater or sterile saline, avoid rubbing, and do not use fresh water
4. Treat the symptoms: Manage pain using hot or cold packs, pain medication, topical anesthetic agents and topical anti-inflammatory agents
5. Monitor for allergic reaction and/or infection
6. Treat for allergic reaction if necessary

# First Aid for Hazardous Marine Life Injuries (HMLI)



## Spiny Envenomations

(lionfish, stonefish, stingrays, seastars/urchins, crown-of-thorns)

### Signs and Symptoms

- Puncture or laceration
- Pain (intense, sharp, stinging)
- Protruding spines and/or tissue damage
- Local swelling
- Blisters
- Purple or black skin discoloration (possibly)
- Nausea and vomiting
- Shock (rare)
- Respiratory arrest (rare)
- Cardiac arrest (rare)

### First Aid

1. Thoroughly wash area
2. Remove foreign material with tweezers.  
(Leave stingray spines in place for removal at medical facility)
3. Control any bleeding
4. Manage pain by immersing in hot (nonscalding) fresh water (45°C / 112°F maximum) for 30-90 minutes  
(Cold packs may also be used)
5. Leave blisters intact
6. Apply topical antibiotic ointment
7. Monitor responsiveness
8. Seek medical evaluation
9. Monitor for allergic reaction and/or infection

## Contact Injuries

(sponges, corals, bristle worms)

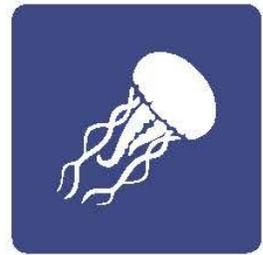
### Signs and Symptoms

- Sharp, stinging pain
- Localized redness
- Mild to severe itching
- Swelling
- Burning sensation, numbness
- Blisters
- Bleeding associated with cuts/scrapes

### First Aid

1. Wash with soap and water
2. Remove foreign material
  - a. Cellophane tape may help with bristle removal
  - b. Irrigate to dislodge debris
3. Control any bleeding
4. Leave blisters intact
5. Eye contact: Flush with fresh water and seek medical attention
6. Monitor for infection

# First Aid for Hazardous Marine Life Injuries (HMLI)



## Pressure Immobilization Technique

(sea snake and blue-ringed octopus bites, cone shell envenomations)

### Signs and Symptoms

Symptoms may progress rapidly and vary with type of injury.

- Immediate pain
- Mild swelling and / or redness
- Numbness / changes in sensation
- Confusion
- Progressive weakness
- Bleeding associated with cuts / scrapes

### First Aid

1. Keep injured person still to limit heart rate
2. Wash with soap and water
3. Remove foreign material if present
4. Apply dressing over bite
5. Apply elastic bandage snugly but not excessively tight over the site
  - Wrap at least 6 inches (15 cm) on either side of the wound if possible
6. Check for adequate circulation/pulse at fingers/toes (capillary refill)
7. Splint affected extremity
8. Use a sling when the wound is on the hand or arm
9. Do not remove until at a medical facility
10. Call emergency services or transport immediately

(Use of a cold pack may slow localized blood flow and spread of venom)

## Traumatic Injuries

(Control of external bleeding)

### Signs and Symptoms

- Bites (teeth in wound)
- Severe scrapes

### First Aid

1. Wash with soap and water
2. Control bleeding with direct pressure
3. Apply dressing and bandage
4. Seek medical evaluation
5. Monitor for signs of infection

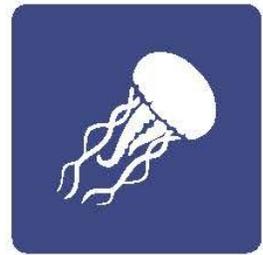
## Applying a Tourniquet

- Apply the tourniquet high and tight above the wound
- Turn windlass until bleeding stops, and secure
- Note "T" or "TK" and time of application on injured person's forehead
- Continue to monitor and provide verbal support

## Wound Packing

- Pack dressing material to the depth of the wound
- Apply lateral pressure to the wound walls, holding gauze in place on one side while gauze is packed on the opposite side
- Maintain lateral pressure on wound walls during the packing process, then apply a dressing. If wound packing or hemostatic impregnated gauze is employed, alert emergency services as it is not always obvious after the wound is dressed

# First Aid for Hazardous Marine Life Injuries (HMLI)



## Shock

**Call local emergency services immediately!**

**Anaphylactic Shock:** Signs/Symptoms (swelling, itching, airway narrowing, respiratory distress)

- Assist with any prescribed allergy medications

**Cardiogenic Shock:** Signs/Symptoms (pale, clammy skin; severe shortness of breath; weak pulse)

- Have the person lay on their back or in a position of comfort; monitor responsiveness

**Hypovolemic Shock:** Signs/Symptoms (pale, clammy skin; confusion; weakness; rapid breathing)

- Control any bleeding; lay person on back or in position of comfort; monitor responsiveness

## Standard Care

- Maintain normal body temperature (provide warmth/cooling as needed)
- Elevate the feet 6-12 inches (15-30 cm) if there is not a neck, spine, or pelvis injury
- Do not provide food or drink
- Monitor responsiveness

## Seafood Poisoning

**Symptoms may progress rapidly with tetrodotoxin (TTX) poisoning.**

**Call emergency services immediately if neurological symptoms appear.**

### Signs and Symptoms

- Abdominal pain, gastroenteritis
- Nausea, vomiting
- Diarrhea
- Numbness, tingling
- Itching
- Lack of muscle coordination
- Paralysis
- Reversal of hot and cold perception

### First Aid

1. Monitor responsiveness
2. Treat for shock if necessary
3. Contact the local poison control center. Save fish or vomitus for analysis if available.
4. Seek evaluation from a medical professional when seafood poisoning is suspected

## Notes

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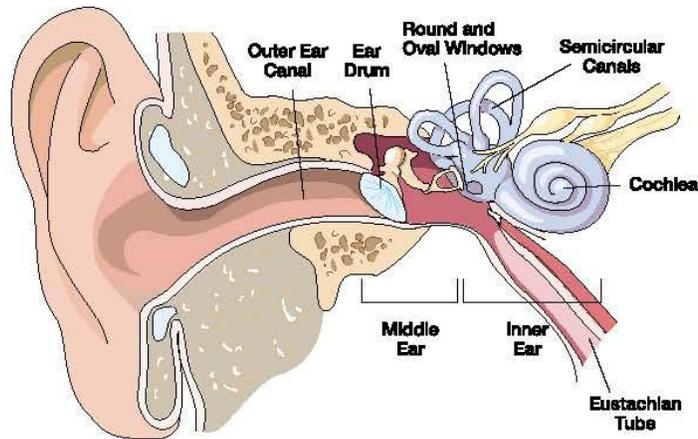
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# Divers Guide to The Ears and Sinuses



## Middle-Ear Barotrauma

- This is the result of impaired or incomplete equalization of the middle ears or forced equalization
- It can occur during descent (“squeeze”) or ascent (“reverse block”)
- It may or may not involve eardrum perforation
- Contributing factors include a recent cold, allergy symptoms, congestion/ runny nose
- Symptoms can include a feeling of ear fullness, sensation of water or fluid in the ear, muffled hearing, ear pain or crackling sounds
- Do not use ear drops (the problem is behind the ear drum)
- Seek medical evaluation to rule out more severe injury and prevent infection



## Prevention

- Avoid diving when congested
- If you feel pressure or discomfort during the ascent, stop. Remain at a comfortable depth and wait briefly. Allow equalization to occur naturally while you ascend slowly.
- Do not hold your breath.
- Do not wear earplugs while diving

## Inner-Ear Barotrauma versus Inner-Ear Decompression Sickness

- Inner-ear barotrauma can be the result of impaired or incomplete equalization or a forceful equalization
- Inner-ear DCS is a manifestation of gas bubbles in the inner ear
- Symptoms of both conditions often include vertigo, tinnitus, hearing loss, nausea and vomiting
- Provide oxygen, and transport the patient to the nearest emergency department
- Evaluation by an ENT specialist and/or hyperbaric physician is generally required
- Inner-ear DCS will require prompt hyperbaric chamber treatment. Inner-ear barotrauma is a contraindication for hyperbaric treatment

## Three Tips To Protect Your Ears

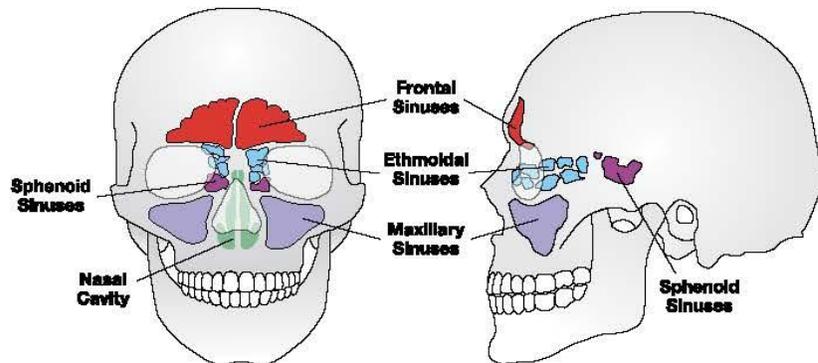
1. Never dive when congested
2. Don't descend unless you have relieved ear discomfort with equalization
3. If you frequently have difficulty with equalization, visit an ENT specialist

# Divers Guide to The Ears and Sinuses



## Sinus Barotrauma

- It is the result of impaired or incomplete equalization of the sinuses
- It can occur during descent ("squeeze") or ascent ("reverse block")
- Contributing factors include recent cold, allergy symptoms, congestion/ runny nose
- Primary symptoms are facial pain, especially in the forehead, eye, cheek, upper teeth or at the back of the head
- Blood from the nose or mouth is common
- Seek medical evaluation to rule out more severe injury and prevent infection



## Prevention

- Avoid diving when congested
- If you develop sinus pain or discomfort during the ascent, stop. Remain at a comfortable depth and wait briefly. Do not hold your breath or blow your nose. Allow equalization to occur naturally while you ascend slowly.
- Do not wear earplugs while diving

## Alternobaric Vertigo/Caloric Vertigo

- Alternobaric vertigo results from differential equalization of the two middle-ear spaces
  - Can occur during ascent or descent, and resolves when pressure equalizes
- Caloric vertigo is a result of the eardrums being exposed to unequal water temperatures
  - Typically results when colder water enters one ear canal

## Otitis Externa ("Swimmer's Ear")

- This is an infection of the ear canal
- Symptoms include pain that may worsen with tugging the outer ear, tenderness, and itching
  - Do not use ear drops unless prescribed by a physician
- Seek medical evaluation if symptoms last more than a day
- Otitis externa can often be prevented by rinsing the ears with clean, fresh water and carefully drying them after every dive
  - Use 1 or 2 drops of a 50/50 solution of white vinegar and rubbing alcohol after every dive for prevention or other drops per doctor's recommendation
  - Refer to an ENT for chronic conditions

# AIR DIVE TABLES

**TABLE 1: END-OF-DIVE LETTER GROUP**

**WARNING: EVEN STRICT COMPLIANCE WITH THESE TABLES WILL NOT GUARANTEE AVOIDANCE OF DECOMPRESSION SICKNESS. CONSERVATIVE USAGE IS STRONGLY RECOMMENDED.**

**RNT** RESIDUAL NITROGEN TIME  
**+ADT** ACTUAL DIVE TIME  
**TNT** TOTAL NITROGEN TIME  
 (USE THIS FIGURE TO DETERMINE END-OF-DIVE LETTER GROUP)

START DEPTH	MAXIMUM DIVE TIME (MDT)		DIVE TIME REQUIRING DECOMPRESSION	
	MSW	FSW	00	00
6	20	26	43	61
9	30	17	27	38
12	40	12	20	27
15	50	9	15	21
18	60	7	12	17
21	70	6	10	14
24	80	5	9	12
27	90	4	7	11
30	100	4	6	9
33	110	3	6	8
36	120	3	5	7
40	130	2	4	6

MSW FSW	NEW GROUP											A	B	C	D	E	F	G	H	I	J	K	L	M	N		
	06	09	12	15	18	21	24	27	30	33	36															40	
27	18	13	11	9	8	7	6	5	5	5	4	4	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00
<b>434</b>	<b>205</b>	<b>117</b>	<b>64</b>	<b>41</b>	<b>32</b>	<b>23</b>	<b>19</b>	<b>15</b>	<b>10</b>	<b>7</b>	<b>4</b>	<b>4</b>	0:10	1:17	2:12	3:04	3:56	4:49	5:41	6:33	7:25	8:17	9:10	10:02	10:54	11:46	
44	28	21	17	14	12	10	9	8	8	7	6	6	1:16	2:11	3:03	3:55	4:48	5:40	6:32	7:24	8:16	9:09	10:01	10:53	11:45		
<b>417</b>	<b>195</b>	<b>109</b>	<b>58</b>	<b>36</b>	<b>28</b>	<b>20</b>	<b>16</b>	<b>12</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>2</b>	0:10	0:56	1:48	2:40	3:32	4:24	5:17	6:09	7:01	7:53	8:45	9:38	10:30		
62	39	29	23	19	16	14	12	11	10	9	8	8	0:55	1:47	2:39	3:31	4:23	5:16	6:08	7:00	7:52	8:44	9:37	10:29			
<b>399</b>	<b>184</b>	<b>101</b>	<b>52</b>	<b>31</b>	<b>24</b>	<b>16</b>	<b>13</b>	<b>9</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59	7:51	8:43	9:35			
83	51	37	29	24	20	18	16	14	13	12	10	10	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42	9:34				
<b>378</b>	<b>172</b>	<b>93</b>	<b>46</b>	<b>26</b>	<b>20</b>	<b>12</b>	<b>9</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59	7:51	8:43				
106	63	45	35	29	25	22	19	17	15	14	12	12	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>355</b>	<b>160</b>	<b>85</b>	<b>40</b>	<b>21</b>	<b>15</b>	<b>8</b>	<b>6</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59	7:51					
134	77	55	42	35	29	25	22	20	18	16	14	14	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>327</b>	<b>146</b>	<b>75</b>	<b>33</b>	<b>15</b>	<b>11</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59						
166	92	64	49	40	34	29	25	22	19	17	15	15	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>295</b>	<b>131</b>	<b>66</b>	<b>26</b>	<b>10</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59						
206	108	74	57	46	39	30	25	22	19	17	15	15	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>255</b>	<b>115</b>	<b>56</b>	<b>18</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59						
257	126	85	65	50	40	30	25	22	19	17	15	15	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>204</b>	<b>97</b>	<b>45</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59						
331	146	97	73	57	46	39	30	25	22	19	17	15	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>130</b>	<b>77</b>	<b>33</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59						
461	168	109	75	57	46	39	30	25	22	19	17	15	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>0</b>	<b>55</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59												
194	122	88	65	50	40	30	25	22	19	17	15	15	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>29</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59						
223	130	88	65	50	40	30	25	22	19	17	15	15	0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42					
<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59						

**AVOID REPETITIVE DIVES OVER 30 MSW (100 FSW)**

**TABLE 3: REPETITIVE DIVE TIMETABLE**

**00** LIGHT FACE / BLUE NUMBERS ARE RESIDUAL NITROGEN TIMES (RNT)  
**00** **BOLD** FACE / **RED** NUMBERS ARE ADJUSTED MAXIMUM DIVE TIMES (AMDT). ACTUAL DIVE TIME SHOULD NOT EXCEED THIS NUMBER.

**TABLE 2: SURFACE INTERVAL TIME (SIT) TABLE**

TIME RANGES IN HOURS : MINUTES



# EAN 32 DIVE TABLE

USE ONLY WITH 32% OXYGEN ENRICHED AIR

### TABLE 1 - END-OF-DIVE LETTER GROUP

\* HIGHEST ATTAINABLE GROUP AT THIS DEPTH REGARDLESS OF BOTTOM TIME  
 00 MAXIMUM NO-STOP TIME  
 00 DIVE TIME REQUIRING DECOMPRESSION MINUTES REQUIRED AT 5-MSW STOP (15-FSW)  
 SHADE INDICATES PO<sub>2</sub> GREATER THAN 1.4 ATM OR O<sub>2</sub> TIME LIMIT EXCEEDED

WARNING: EVEN STRICT COMPLIANCE WITH THESE TABLES WILL NOT GUARANTEE AVOIDANCE OF DECOMPRESSION SICKNESS. CONSERVATIVE USAGE IS STRONGLY RECOMMENDED.

RNT RESIDUAL NITROGEN TIME  
 +ADT ACTUAL DIVE TIME  
 TNT TOTAL NITROGEN TIME

(USE THIS FIGURE TO DETERMINE END-OF-DIVE LETTER GROUP)

PO <sub>2</sub>	START DEPTH																			
	msw	fsw	36	60	88	121	163	217	297	449	*									
0.5	6	20	36	60	88	121	163	217	297	449	*									
0.6	9	30	20	33	47	62	78	97	117	140	166	198	236	285	354	465	500			
0.7	12	40	17	27	30	50	62	76	91	107	125	145	167	193	223	260	300			
0.8	15	50	12	20	27	36	44	53	63	73	84	95	108	121	130		135			
0.9	18	60	9	15	21	28	34	41	48	56	63	71	75		80					
1.0	21	70	7	12	17	22	28	33	39	45	50			55						
1.1	24	80	6	10	14	19	23	28	32	37	40			45						
1.2	27	90	5	9	12	16	20	24	28	30			35							
1.3	30	100	4	7	11	14	17	21	24	25			30							
1.4	33	110	4	6	9	12	15	18	21	25			30							
1.5	36	120	4	6	9	12	15	18	20				25							
1.6	40	130	3	6	8	11	14	15					20							

PO <sub>2</sub>																	NEW GROUP				
	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6									
msw	6	9	12	15	18	21	24	27	30	33	36	40									
fsw	20	31	40	50	60	70	80	90	100	110	120	130									
**	444	242	117	64	41	32	23	19	20	15	10										
**	431	232	109	58	36	28	20	16	17	12	7										
**	417	221	101	52	31	24	16	13	14	9	5										
**	402	209	93	46	26	20	12	9	11	6	2										
**	386	197	85	40	21	15	8	6	8	3	0										
**	367	183	75	33	15	11	5	3	5	0											
**	347	168	66	26	10	6	1	0	2												
**	324	152	56	18	4	1	0		0												
**	298	134	45	10	0	0															
**	267	114	33	2																	
**	228	92	21	0																	
**	179	66	8																		
**	111	36	0																		
**	465	260																			
**	0	0																			

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00	24:00
0:10	1:17	2:12	3:04	3:56	4:49	5:41	6:33	7:25	8:17	9:10	10:02	10:54	11:46	12:38	
	1:16	2:11	3:03	3:55	4:48	5:40	6:32	7:24	8:16	9:09	10:01	10:53	11:45	12:37	
	0:10	0:56	1:48	2:40	3:32	4:24	5:17	6:09	7:01	7:53	8:45	9:38	10:30	11:22	
		0:55	1:47	2:39	3:31	4:23	5:16	6:08	7:00	7:52	8:44	9:37	10:29	11:21	
		0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59	7:51	8:43	9:35	10:28	
			0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42	9:34	10:27	
			0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59	7:51	8:43	9:35	
				0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42	9:34	
				0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59	7:51	8:43	
					0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	8:42	
					0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59	7:51	
						0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	7:50	
						0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	6:59	
							0:52	1:44	2:37	3:29	4:21	5:13	6:06	6:58	
							0:10	0:53	1:45	2:38	3:30	4:22	5:14	6:07	
								0:52	1:44	2:37	3:29	4:21	5:13	6:06	
								0:10	0:53	1:45	2:38	3:30	4:22	5:14	
									0:52	1:44	2:37	3:29	4:21	5:13	
									0:10	0:53	1:45	2:38	3:30	4:22	
										0:52	1:44	2:37	3:29	4:21	
										0:10	0:53	1:45	2:38	3:30	
											0:52	1:44	2:37	3:29	
											0:10	0:53	1:45	2:38	
												0:52	1:44	2:37	
												0:10	0:53	1:45	
													0:52	1:44	
													0:10	0:53	
														0:52	
														0:10	

### TABLE 3 - REPETITIVE DIVE TIMETABLE

00 LIGHT FACE / BLACK NUMBERS (TOP) ARE RESIDUAL NITROGEN TIMES (RNT)  
 BOLD FACE / RED NUMBERS (BOTTOM) ARE ADJUSTED NO-STOP REPETITIVE DIVE TIMES. ACTUAL DIVE TIME SHOULD NOT EXCEED THIS NUMBER.  
 \*\* RESIDUAL NITROGEN TIME (RNT) EXCEPTION (see rule on reverse)

### TABLE 2 - SURFACE INTERVAL TIME TABLE

TIME RANGES IN HOURS : MINUTES  
 ENTER FROM THE TOP, MOVE DOWN TO FIND SURFACE INTERVAL TIME.  
 MOVE LEFT TO FIND THE NEXT PRESSURE GROUP.

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 #35502-32 (Rev. 07/19)



Maximum Operating Depth (in fsw) for Various Nitrox Mixes										
Percent O2	21%	22%	24%	26%	28%	30%	32%	34%	38%	40%
1.0 ata	124	117	104	93	84	77	70	64	58	49
1.1 ata	139	132	118	106	96	88	80	73	67	57
1.2 ata	155	147	132	119	108	99	90	83	77	66
1.3 ata	171	162	145	132	120	110	101	93	86	74
1.4 ata	187	177	159	144	132	121	111	102	95	82
1.5 ata	202	192	173	157	143	132	121	112	104	90
1.8 ata	218	207	187	170	155	143	122	122	113	99

TABLE SHOWS MAXIMUM OPERATING DEPTH FOR BREATHING GASES FROM AIR TO EAN40. FOR INTERMEDIATE OXYGEN FRACTIONS, USE THE NEXT RICHER MIX. FRACTIONAL DEPTHS HAVE BEEN ROUNDED DOWN TO THE NEXT SHALLOWER WHOLE NUMBER. DEPTHS GREATER THAN 130 FSW ARE SHADED DARK. MODS FOR THE RECOMMENDED MAXIMUM EXPOSURE OF 1.4 ATA ARE LIGHTLY SHADED

Maximum Operating Depth (in msw) for Various Nitrox Mixes										
Percent O2	21%	22%	24%	26%	28%	30%	32%	34%	38%	40%
1.0 ata	38	35	31	28	26	23	21	19	17	15
1.1 ata	42	40	36	32	29	26	24	22	20	17
1.2 ata	47	44	40	36	33	30	27	25	23	20
1.3 ata	52	48	44	40	36	33	30	28	26	22
1.4 ata	57	54	48	43	40	36	33	31	28	25
1.5 ata	61	58	52	47	43	40	36	34	31	27
1.8 ata	66	63	57	51	47	43	40	37	34	30

TABLE SHOWS MAXIMUM OPERATING DEPTH FOR BREATHING GASES FROM AIR TO EAN40. FOR INTERMEDIATE OXYGEN FRACTIONS, USE THE NEXT RICHER MIX. FRACTIONAL DEPTHS HAVE BEEN ROUNDED DOWN TO THE NEXT SHALLOWER WHOLE NUMBER. DEPTHS GREATER THAN 40 MSW ARE SHADED DARK. MODS FOR THE RECOMMENDED MAXIMUM EXPOSURE OF 1.4 ATA ARE LIGHTLY SHADED

# Equivalent Air Depth (EAD) Tables

Equivalent Air Depth (in fsw)															
Percent O2	26%	27%	28%	29%	30%	31%	32%	33%	34%	35%	36%	37%	38%	39%	40%
EAD fsw															
40	44	46	47	48	49	50	51	53	54	55	57	58	60	61	63
50	55	56	58	59	60	62	63	64	66	67	69	71	72	74	76
60	66	67	69	70	71	73	75	76	78	80	81	83	85	87	89
70	76	79	80	81	83	84	86	88	90	92	94	96	98	100	89
80	87	89	90	92	94	98	98	100	102	104	106	108	105	102	
90	98	100	101	103	105	107	109	112	114	116	113	109			
100	108	110	112	114	117	119	121	123	122	117					
110	119	121	123	126	128	130	132	127							
120	130	132	134	137	139	137									
130	141	143	145	148	143										
MOD/1.4 ata	145	138	132	126	121	118	111	107	102	99	95	91	88	85	82
MOD/1.6 ata	170	162	155	149	143	137	132	127	122	117	113	109	105	102	99
EQUIVALENT AIR DEPTH FOR VARIOUS NITROX MIXES. A DIVER DIVING UP TO THE DEPTH SHOWN IN THE CORRECT EANx COLUMN WOULD USE THE DEPTH IN THE LEFT-HAND COLUMN OF THE SAME ROW WITH AN AIR DIVE TABLE. SHADED AREAS HAVE A PO2 BETWEEN 1.4 ATA AND 1.6 ATA.															

Equivalent Air Depth (in msw)															
Percent O2	26%	27%	28%	29%	30%	31%	32%	33%	34%	35%	36%	37%	38%	39%	40%
EAD msw															
12	13	13	14	14	14	15	15	16	16	16	17	17	18	18	19
15	16	17	17	17	18	18	19	19	20	20	20	21	21	22	22
18	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26
21	23	23	24	24	25	25	26	28	27	27	28	28	29	30	30
24	26	26	27	27	28	28	29	30	30	31	32	32			
27	29	30	30	31	31	32	33	33	34	35					
30	32	33	33	34	35	35	36	37	37						
33	36	36	37	37	38	39	39	40							
36	39	39	40	41	41										
40	43	44	44	45											
MOD/1.4 ata	43	41	40	38	36	35	33	36	31	30	28	27	26	25	23
MOD/1.6 ata	51	49	47	45	43	41	40	38	37	35	34	33	32	31	30
EQUIVALENT AIR DEPTH FOR VARIOUS NITROX MIXES. A DIVER DIVING UP TO THE DEPTH SHOWN IN THE CORRECT EANx COLUMN WOULD USE THE DEPTH IN THE LEFT-HAND COLUMN OF THE SAME ROW WITH AN AIR DIVE TABLE. SHADED AREAS HAVE A PO2 BETWEEN 1.4 ATA AND 1.6 ATA.															

**EAN<sub>32</sub> DIVE PLANNING WORKSHEET**

use with 32% oxygen-enriched air only

○ : ○      ○ : ○      ○

MDT = \_\_\_\_\_  
 MDT = \_\_\_\_\_

AMDT = \_\_\_\_\_  
 AMDT = \_\_\_\_\_

AMDT = \_\_\_\_\_  
 AMDT = \_\_\_\_\_

RNT = 0      RNT = \_\_\_\_\_      RNT = \_\_\_\_\_  
 ADT/BT = \_\_\_\_\_      ADT/BT = \_\_\_\_\_      ADT/BT = \_\_\_\_\_  
 PO<sub>2</sub> \_\_\_\_\_      PO<sub>2</sub> \_\_\_\_\_      PO<sub>2</sub> \_\_\_\_\_  
 TNT = \_\_\_\_\_ % Limit      TNT = \_\_\_\_\_ % Limit      TNT = \_\_\_\_\_ % Limit

**ADT — Actual Dive Time** — The time from the moment of descent until arriving at safety stop.

**AMDT — Adjusted Maximum Dive Time** — (for a repetitive dive.) The no-stop time limit for a repetitive dive, minus the RNT.

**BT — Bottom Time** — Time from the moment of descent to beginning of ascent.

**Letter Group** — A letter symbol for the Residual Nitrogen Remaining in the body from a previous dive. Place in circle.

**MDT — Maximum Dive Time** — Maximum dive time allowed without requiring a decompression stop.

**Oxygen Exposure Limit** — Maximum time on a single dive that the diver can be exposed to a certain partial pressure of oxygen.

**PO<sub>2</sub> — Partial Pressure of Oxygen** — It is recommended that this be kept below 1.4 atm (atmospheres).

**Repetitive Dive** — Any dive made within 24 hours of a previous dive.

**RNT — Residual Nitrogen Time** — The time to be considered in planning a repetitive dive due to nitrogen remaining in the body from previous dives within the last 24 hours.

**Safety Stop** — A 3- to 5-minute stop at 5 msw (15 fsw). Strongly recommended for all no-stop dives.

**SIT — Surface Interval Time** — The time spent at the surface between dives.

**TNT — Total Nitrogen Time** — The sum of the RNT and ADT. This figure is used to obtain a letter group on Table 1 for a repetitive dive.

**Remember**

- Consider all dives made shallower than 6 msw (20 fsw) as 6-msw (20-fsw) dives.
- Ascend no faster than 9 msw (30 fsw) per minute (1 fsw every 2 seconds).
- **\*\*RNT Exception Rule:** Any repetitive dives to 9 msw (30 fsw) or shallower should be summed and calculated as a single dive for accurate inert gas loading information.

**Single Dive Oxygen Exposure Limits**

PO <sub>2</sub> atm	Minutes
1.60	45
1.55	83
1.50	120
1.45	135
1.40	150
1.35	165
1.30	180
1.25	195
1.20	210

#35502-32 (Rev. 07/2019) Revisions based on U.S. Navy Diving Manual Revision 7, published Dec. 2016

MLML Diving Injury/Incident Report Form

**MLML/AAUS - Diving Injury/Incident Report Form**

Required Incident Reporting: All diving incidents requiring decompression treatment, or resulting in moderate or serious injury, or death shall be reported to the AAUS Statistics Committee. The report will specify the circumstances of the incident and the extent of any injuries or illnesses. This form is confidential and for statistics purposes only. The MLML Diving Control Board must review and release this report before it is submitted to the AAUS Statistics Committee.

Definition: An incident is defined as ‘An occurrence that interrupts normal procedure or brings about a crisis’

**Check all appropriate spaces and complete the back of this form:**

<b>Dive Classification:</b>	<b>Decompression Profile Method:</b>		
Scientific	Dive Tables		
Training / Proficiency	Dive Computer		
	PC Computer Deco Software		
<b>Dive Mode:</b>			
Open Circuit SCUBA	<b>Incident Classification:</b>		
Surface Supplied	Hyperbaric		
Hookah	Simple Barotrauma		
Rebreather	Near Drowning		
	Hyperoxia		
<b>Breathing Gas:</b>	Hypoxia		
Air	Hypercapnea		
Nitrox (% gases)	Fatality		
Mixed Gas (% gases)	Other		
<b>Referred Physician</b>	<b>Depth Range:</b>		
Yes      No	0-30'	101-130'	191-200'
(If yes, name of physician)	31-60'	131-150'	
	61-100'	151-190'	
<b>Hyperbaric Treatment:</b>			
Yes      No	<b>Did this incident involve a workers compensation claim?</b>		
(If yes, complete & submit DAN form)	Yes	No	

Organizational Member: \_\_\_\_\_

Name & Title of Person Submitting Report \_\_\_\_\_

Signature \_\_\_\_\_ Date: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Phone # \_\_\_\_\_ Email \_\_\_\_\_

-----Please complete the descriptive report on the back of this sheet-----

MLML Diving Injury/Incident Report Form

(use additional sheets as needed)

**Date of incident** \_\_\_\_\_

**Details of Incident:**

**Treatment Provided and Results:**

**Recommendations to avoid repetition of incident:**



**NAUI INCIDENT REPORT FORM**

Date of Report: \_\_\_\_\_ Time of report: \_\_\_\_\_  AM  PM

Date of injury: \_\_\_\_\_ Time of injury: \_\_\_\_\_ : \_\_\_\_\_  AM  PM

Name of company: \_\_\_\_\_

Address of company: \_\_\_\_\_

Activity Involved: \_\_\_\_\_ Location of incident: \_\_\_\_\_

**Weather:**  Cloudy  Rain  Snow  Windy  Ice

**Temp at time of incident:** \_\_\_\_\_

Nature of suspected injury: \_\_\_\_\_

Treatment rendered: \_\_\_\_\_

Name of person rendering treatment: \_\_\_\_\_

**TRANSPORTATION OF INJURED PERSON:**

Left on their own  Ambulance  Medical Evacuation Helicopter

**When possible, describe what occurred in the injured person's own words:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**NAUI INCIDENT REPORT FORM**

**Injured Person's Information:**

Name: \_\_\_\_\_

Date of Birth: \_\_\_\_\_ (Month) \_\_\_\_\_ (Day) \_\_\_\_\_ (Year)

Address: \_\_\_\_\_  
(Street) (City) (State) (Zip) (Country)

Phone Number: \_\_\_\_\_ Cell Number: \_\_\_\_\_

E-Mail: \_\_\_\_\_

Health Insurance:  Yes  No

**Witness Information (use separate pages for statements):**

1. Name: \_\_\_\_\_

Date of Birth: \_\_\_\_\_ (Month) \_\_\_\_\_ (Day) \_\_\_\_\_ (Year)

Address: \_\_\_\_\_  
(Street) (City) (State) (Zip) (Country)

Phone Number: \_\_\_\_\_ Cell Number: \_\_\_\_\_

E-Mail: \_\_\_\_\_

2. Name: \_\_\_\_\_

Date of Birth: \_\_\_\_\_ (Month) \_\_\_\_\_ (Day) \_\_\_\_\_ (Year)

Address: \_\_\_\_\_  
(Street) (City) (State) (Zip) (Country)

Phone Number: \_\_\_\_\_ Cell Number: \_\_\_\_\_

E-Mail: \_\_\_\_\_



**NAUI INCIDENT REPORT FORM**

**Person Completing Form:**

Name: \_\_\_\_\_

Date of Birth: \_\_\_\_\_ (Month) \_\_\_\_\_ (Day) \_\_\_\_\_ (Year)

Address: \_\_\_\_\_  
(Street) (City) (State) (Zip) (Country)

Phone Number: \_\_\_\_\_ Cell Number: \_\_\_\_\_

E-Mail: \_\_\_\_\_

**Supplemental Information:**  Yes  No

**Witness Statements Taken:**  Yes  No

**Photographs of incident scene taken:**  Yes  No

**Diagram of incident scene prepared:**  Yes  No

**Equipment Involved in Incident:**  Yes  No

**Identify Equipment involved:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
**Name of Injured Person**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Name of Person Completing Form**

\_\_\_\_\_  
**Signature**