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EMERGENCY HANDLING OF COMPRESSED AIR CASUALTIES

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TABLE OF CONTENTS

ABSTRACT

Work in compressed air is associated with a number of hazards, the most serious of which are the pressure-related injuries (burst lung and decompression sickness). Modern construction methods and newer decompression tables have con-considerably reduced overall risks. The newest treatment methods have similarly reduced morbidity and fatality risks when an accident occurs. This paper outlines the basics of emergency handling of casualties and the definitive treatment of pressure related accidents.

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INTRODUCTION

Hazards of the compressed air environment are numerous and all workers must be educated to avoid them. Good safety practices, adequate planning and familiarity with emergency procedures should prevent most accidents. However, accidents can occur despite stringent safety precautions, and when a worker is injured, proper emergency handling will often prevent permanent injury or death.

Hazards that are most serious and require rapid emergency handling can be listed as follows, in order of seriousness:

(1) Burst lung syndrome (air embolism, pneumothorax and/or mediastinial and subcutaneous emphysema)
(2) Decompression sickness
(3) Incapacitation due to physical injury or pressure related injury
(4) Incapacitation due to natural diseases

Emergency handling of a casualty has been divided into four phases by Dr. Eric Kindwall of St. Luke's Hospital, Milwaukee, Wisconsin, U.S.A. (1). These phases are:

(1) Immediate emergency care
(2) Diagnosis
(3) Transportation
(4) Definitive treatment

Immediate Emergency Care

Aside from natural diseases, the worker who becomes incapacitated after surfacing is most likely suffering from burst lung or from decompression sickness.

Immediately have the victim lie down. If he has lung symptoms or nervous system symptoms, keep him lying down on his right side with his head lower than his feet. Loosen tight clothing around the neck and chest and keep him warm with covers or blankets.

If respiration is absent, apply mouth-to-mouth resuscitation. Check for heart action (over the heart itself or feel carotid or femoral pulse) and adequate pulse and apply external cardiac massage if indicated.

CONTINUE THESE MEASURES UNTIL THE PATIENT REVIVES OR IS PRONOUNCED DEAD BY A PHYSICIAN.

In moving and transporting the patient, keep him lying in the head down position at all times and do not interrupt resuscitation.

The worker who becomes incapacitated while under pressure may be suffering from burst lung, decompression sickness, physical injury (including over-exertion or exhaustion), or breathing toxic gas.

Immediately follow the steps outlined above.

All the causes of incapacitation require that the victim be placed lying down with head lower than feet, given adequate ventilation and ensured of adequate circulation.

Diagnosis

Diagnosis is important, but if a diagnosis cannot be rapidly made on the basis of the history of the pressure exposure and the status of the victim, time should not be wasted in getting the victim treated. Whether the diagnosis can be made or not, as much information as possible about the status of the victim (pulse, respiration, blood pressure, colour, consciousness, symptoms of pain, respiratory distress, etc) and the pre-accident situation should be gathered, condensed and passed on to the treatment facility. This information should be passed verbally in advance of the victim and also via detailed notes accompanying the victim.

The most immediately dangerous situation likely to be encountered is the burst lung syndrome. The victim usually experiences symptoms within minutes of surfacing, related to the lung or the nervous system. There may be frothy, bloody sputum, cyanosis and dyspnoea, unconsciousness, convulsions, paralysis or any 'stroke-like' syndrome. There is almost always chest pain. A delay of longer than 20 minutes before symptoms develop will rarely occur. Signs that may be present are:

- mottling of the tongue
- unequal pupils
- subcutaneous emphysema over the neck and upper chest (feels crunchy or crackly on pressing it with the hand)
- swelling of the neck
- voice changes
- paresthesia, anaesthesia or paralysis following definite nerve distributions

If pneumothorax alone is present, there may be:

- tachypnoea (rapid breathing)

- general cyanosis
- uneven chest expansion
- tympany (drum-like sounds when tapped) of the affected side
- absence of breath sounds on the affected side
- acute respiratory distress
- shift of the trachea to the remaining good side
- subcutaneous emphysema in the chest and neck regions

The diagnosis of burst lung syndrome obliges the examiner to transport the patient to a treatment facility for recompression as quickly as possible.

Decompression sickness is the next most likely pressure-related injury. Symptoms and signs will usually appear within two hours but may be delayed for as long as 24 hours. For this reason a worker is "at risk" for a period of 24 hours and should report any unusual symptoms or signs suggestive of decompression sickness to a doctor or treatment centre.

The most common manifestation of decompression sickness is pain, usually in the area of a joint. The pain may be a deep dull ache or an intolerable throbbing pain that causes the affected area to be immobilized and weak. There may also be patchy cyanosis, erythema or oedema of the skin (blueness, redness or swelling respectively) with moderate to severe itching in these and adjacent areas.

Up to 25% of all cases of decompression sickness may involve the nervous system with severe and/or dangerous effects which require urgent treatment. These may be:

- regional numbness, loss of sensation, or paralysis with a definite nerve distribution
- vertigo (staggers)
- visual disturbances (tunnel vision, flashing lights, partial or total blindness)
- nausea and malaise
- apprehension and confusion
- aphasia (loss of speech)
- unconsciousness or coma

Some 2% of cases may have involvement of the cardio-respiratory system (chokes) such as:

- dry, harsh cough, possibly paroxysmal
- wheezing
- dyspnoea
- chest pain on inspiration
- general cyanosis

Transportation

Because rapid transporation of a casualty may mean the difference between total recovery and permanent injury or death, planning should take into account what modes of transportation are available for reaching a treatment centre, and what aid can be called on for transport, e.g., ambulance services, police, military, etc.

The most rapid means of transportation is obviously by air, but it is fraught with problems that are often overlooked. It usually takes time to organize air transport and often requires some mode of secondary transport from airdrome to treatment centre. Road transport may be shorter overall than air transport.

Aid for transportation, particularly air transportation, can be obtained by contacting the local military Rescue Co-ordination Centre, which provides emergency rescue and transport services throughout Canada. If air transport is used, it must be noted that flying at moderate or high altitude, even in pressurized aircraft can cause worsening of burst-lung syndrome or decompression sickness due to the added pressure drop caused by going to altitude. Air transport should therefore be at low level.

During transportation, the victim should be kept recumbent in the head-down position and be kept warm. He should be given 100% oxygen by mask if available. He should be given fluids to drink or intravenous solutions to keep him well hydrated (dehydration can occur in pressure related accidents and complicate the disease). He must also be monitored for urinary output when given fluids since in burst lung or decompression sickness, bladder function may be lost and may be the first sign of complications.

If the victim is seen by a physician in the staging area or is taken to a hospital facility en route due to severity of conditions, definitive treatment with drugs may be initiated (see below).

Definitive Treatment

The only adequate form of treatment for the burst lung syndrome and for decompression sickness is to recompress the patient in a recompression chamber. This results in reduction in size of the gas bubbles which cause the pathology in both disease states and allows the gradual elimination of the accumulated gas. It also allows the administration of oxygen under high pressure, to counteract tissue hypoxia and to speed gas elimination.

Recompression in a dry chamber allows the use of full medical treatment regimens including artificial ventilation, intravenous fluid therapy, drug therapy, and careful patient monitoring.

Burst lung syndrome resulting in air embolism is preferably treated using the oxygen recompression treatment tables designated as 5A or 6A. Type I (mild decompression sickness) is generally treated using oxygen recompression treatment Table 5, and Type II (severe decompression sickness) is treated with Table 6 or 6A. Alternatives to these treatment tables are occasionally used, depending on the severity and progress of the case.

Other adjuncts to treatment that may be used in the chamber, and in severe cases may be used before or during transport, include anticoagulation, intravenous fluids, assisted ventilation, antibiotics, urinary catherization, etc.

Specific drug therapy that aids in counteracting some of the effects secondary to decompression sickness include the infusion of Dextran 40 (Rheomacrodex) 10% solution given at a rate of 10 ml/kg/24 hours. In very severe cases, half the total allowable dose may be given rapidly over a half hour, and the rest slowly over the remaining 12 to 24 hours. Heparin may be given as an anticoagulant, but should be used only in the hospital setting where careful monitoring of the effects of the drug can be undertaken. Steroids should not be given except in cases of severe shock or trauma, or severe central nervous system oedema, because steriods have a synergistic effect with oxygen at high pressure, producing pulmonary oxygen toxicity.

Burst-lung syndrome cases should have a chest x-ray taken after treatment, and if this shows a diffuse non-specific increased density over the lung fields, it is pathognomonic for burst lung. This clears in 24 to 72 hours and it is not related to any symptoms or signs.

The longer the delay in applying recompression treatment in cases of burst lung or decompression sickness, the greater the probability that the patient will suffer from residual effects even after long or repeated treatments. If the delay between the onset of symptoms and signs has been greater than eight hours, the likelihood of residual symptoms and signs remaining is of the order of 10%. Early treatment is therefore very important, and in the rare case in which the disease syndrome has been misdiagnosed and is not burst lung or decompression sickness, early and proper recompression treatment will have done no harm to the patient.

Oxygen Recompression Treatment Tables (2)

General Considerations:

(1) Follow the treatment tables accurately.
(2) Permit no shorting or alteration of the tables except on the order or advice of a qualified medical officer or in an extreme emergency.

(3) The normal rate of descent in the chamber is 0.76 bars per minute (11 psig per minute).

(4) If serious symptoms and signs are present - rapid descent is desirable.

(5) If pain increases on descent, stop the descent and resume descent at a rate tolerable to the patient.

(6) Go to the full pressure indicated by the table used.

(7) Do not go beyond 5.0 bars (75 psig) except on the decision of a qualified medical officer.

Examination of the Patient:

(1) Unless impossible due to the chamber configuration, examine the patient in the chamber and do not delay recompression. Examination can be adequately accomplished in the chamber under most conditions.

(2) If examination in the chamber is not possible (e.g. portable one-man chamber) then in mild cases examine the patient prior to recompression and carefully note all symptoms and signs.

(3) In any severe case do not delay recompression for examination purposes or for purposes of determining which treatment table to use.

(4) On reaching the treatment pressure, examine the patient as completely as possible to detect evidence of incomplete relief, or symptoms and signs overlooked. If possible, have the patient stand and walk the length of the chamber.

(5) Re-examine the patient completely before leaving the initial treatment pressure.

(6) Ask the patient how he feels before and after coming to each stop and periodically during the long stops.

(7) Do not let the patient sleep during the ascent phases of the treatment or for more than one half-hour at a time during any of the stops.

(8) Re-examine the patient before leaving the last stop.

(9) During the treatment make sure that the patient can obtain all the things that he needs in the way of food, drink, reading or writing material.

(10) Examine the patient carefully on completion of the treatment and again one hour after completion of the treatment.

(11) Keep the patient within easy and rapid access of the chamber for a minimum of 24 hours after treatment in case of recurrence.

(12) Do not allow a repeated pressure exposure for at least 48 hours after treatment except for the treatment of a recurrence.

Tenders:

(1) A qualified tender must be in the chamber with the patient at all times unless physically impossible (e.g. one-man chamber).

(2) The tender must be alert for any changes in the condition of the patient especially during oxygen breathing.

(3) When Tables 5, 6, 5A or 6A are used, the tender normally breathes air when the patient is on oxygen. He breathes oxyhelium at pressures greater than 1.8 bars (28 psig) if the patient is on oxyhelium. It is advisable to use oxyhelium for all portions of the Tables higher than 1.8 bars pressure, because it reduces the breathing resistance for the patient and eliminates nitrogen narcosis for both patient and tender (this can be critical in the careful examination of the patient).

(4) The tender will remain with the patient throughout the whole treatment schedule. If an urgent requirement should arise to have the tender come out of the chamber, then he must be decompressed according to an appropriate decompression schedule.

(5) Anyone entering or leaving the chamber during the progress of the treatment (such as a medical officer) must be monitored and decompressed appropriately, if required.

(6) Personnel outside the chamber must specify and control the decompression of anyone leaving the chamber and must review all decisions concerning the treatment or the decompression schedule made by personnel inside the chamber.

OXYGEN RECOMPRESSION TREATMENT - TABLE 5

PRESSURE (BARS)	PRESSURE (PSIG)	TIME (MINUTES)	BREATHING MEDIA	TOTAL ELAPSED TIME (MINUTES)
1.8	28	20	Oxygen	20
1.8	28	5	Air	25
1.8	28	20	Oxygen	45
1.8 to 0.9	28 to 14	30	Oxygen	75
0.9	14	5	Air	80
0.9	14	20	Oxygen	100
0.9	14	5	Air	105
0.9 to 0	14 to 0	30	Oxygen	135

TOTAL ELAPSED TIME DOES NOT INCLUDE TIME REQUIRED TO PRESSURIZE TO 1.8 BARS

USE : Treatment of Type I decompression sickness when oxygen can be used and when symptoms and signs are relieved within TEN minutes at 1.8 bars (28 psig). The patient breathes oxygen from the surface.

DESCENT RATE: 0.76 bars/minute (11 psig/minute).

ASCENT RATE : .03 bars/minute (0.47 psig/minute). Do not compensate for slower ascent rates. Compensate for faster ascent by halting the ascent for the appropriate time period.

TIME : At 1.8 bars begins upon arrival at that pressure.

If oxygen breathing must be interrupted due to toxic reactions, discontinue the oxygen for 15 minutes after the reaction has completely subsided, and then resume the schedule at that point of interruption. If the interruption occurred at 1.8 bars, switch to TABLE 6 upon arrival at 0.9 bars.

TENDER : The tender breathes air throughout the treatment and must stay for the duration of the treatment. (See note on Tenders)

OXYGEN RECOMPRESSION TREATMENT - TABLE 6

PRESSURE (BARS)	PRESSURE (PSIG)	TIME (MINUTES)	BREATHING MEDIA	TOTAL ELAPSED TIME (MINUTES)
1.8	28	20	Oxygen	20
1.8	28	5	Air	25
1.8	28	20	Oxygen	45
1.8	28	5	Air	50
1.8	28	20	Oxygen	70
1.8	28	5	Air	75
1.8 to 0.9	28 to 14	30	Oxygen	105
0.9	14	15	Air	120
0.9	14	60	Oxygen	180
0.9	14	15	Air	195
0.9	14	60	Oxygen	255
0.9 to 0	14 to 0	30	Oxygen	285

TOTAL ELAPSED TIME DOES NOT INCLUDE TIME REQUIRED TO PRESSURIZE TO 1.8 BARS

USE : Treatment of Type I decompression sickness when oxygen can be used and symptoms and signs are not relieved within TEN minutes at 1.8 bars (28 psig) and the treatment of Type II decompression sickness. The patient breathes oxygen from the surface.

TENDER : 0.76 bars/minute (11 psig/minute).

ASCENT RATE : 0.03 bars/minute (0.47 psig/minute). Do not compensate for slower ascent rates. Compensate for faster ascent rates by halting the ascent for the appropriate time period.

TIME : At 1.8 bars begins upon arrival at that pressure.

If oxygen breathing must be interrupted due to toxic reactions, discontinue the oxygen for 15 minutes after the reaction has completely subsided, and then resume the schedule at the point of interruption.

TENDER : The tender breathes air throughout the treatment and must remain for the duration of the treatment. (See note on Tenders).

Oxygen Recompression Treatment Table 6 (continued)

EXTENSION : Table 6 may be extended by 25 minutes (20 minutes O_2 - 5 minutes air) at 1.8 bars; by 75 minutes (60 minutes O_2 - 15 minutes air) at 0.9 bars, or by a combination of both. Use these extensions in serious cases or in cases where significant relief is not obtained on completion of the stop at 1.8 bars. Table 6A may be used in place of the extensions or with them, in serious cases. (For more detailed selection criteria for the Tables, see above).

OXYGEN RECOMPRESSION TREATMENT - TABLE 5A

PRESSURE (BARS)	PRESSURE (PSIG)	TIME (MINUTES)	BREATHING MEDIA	TOTAL ELAPSED TIME (MINUTES)
5.0	75	15	Oxyhelium	15
5.0 to 1.8	75 to 28	4	Oxyhelium	19
1.8	28	20	Oxygen	39
1.8	28	5	Air	44
1.8	28	20	Oxygen	64
1.8 to 0.9	28 to 14	30	Oxygen	94
0.9	14	5	Air	99
0.9	14	20	Oxygen	119
0.9	14	5	Air	124
0.9 to 0	14 to 0	30	Oxygen	154

TOTAL ELAPSED TIME INCLUDES TIME REQUIRED TO PRESSURIZE TO 5.0 BARS RAPIDLY AS POSSIBLE

USE : Treatment of Burst Lung Syndrome (gas embolism, pneumothorax and/or emphysema) when oxygen can be used and symptoms and signs are relieved within 15 minutes at 5.0 bars (75 psig). Oxyhelium is the breathing mixture of choice for the portion of the treatment schedule at pressures greater than 1.8 bars (28 psig). If oxyhelium is not available, use air as the breathing mixture.

DESCENT RATE : As fast as possible.

ASCENT RATE : From 5.0 bars to 1.8 bars at a rate of 0.8 bars/minute (11 psig/min). From 1.8 bars to surface at a rate of 0.03 bars/min. (0.47 psig/min). Do not compensate for slower ascent rates. Compensate for faster ascent rates by halting the ascent for the appropriate time period.

If oxygen breathing must be interrupted due to toxic reaction, discontinue the oxygen for 15 minutes after the reaction has entirely subsided and then resume the schedule at the point of interruption. If the interruption occurred at 1.8 bars, switch to Table 6 upon arrival at 0.9 bars.

Oxygen Recompression Treatment Table 5A (continued)

TENDER : The tender breathes oxyhelium if available, at pressures greater than 1.8 bars, and air throughout the rest of the schedule. The tender must stay for the duration of the treatment. (see note on Tenders).

OXYGEN RECOMPRESSION TREATMENT - TABLE 6A

PRESSURE (BARS)	PRESSURE (PSIG)	TIME (MINUTES)	BREATHING MEDIA	ELAPSED TIME (MINUTES)
50	75	30	Oxyhelium	30
5.0 to 1.8	75 to 28	4	Oxyhelium	34
1.8	28	20	Oxygen	54
1.8	28	5	Air	59
1.8	28	20	Oxygen	79
1.8	28	5	Air	84
1.8	28	20	Oxygen	104
1.8	28	5	Air	109
1.8 to 0.9	28 to 14	30	Oxygen	139
0.9	14	15	Air	154
0.9	14	60	Oxygen	214
0.9	14	15	Air	229
0.9	14	60	Oxygen	289
0.9 to 0	14 to 0	30	Oxygen	319

TOTAL ELAPSED TIME INCLUDES THE TIME REQUIRED TO PRESSURIZE FROM SURFACE TO 5.0 BARS

USE : The treatment of severe Type II decompression sickness and Brust Lung Syndrome when oxygen can be used and symptoms and signs of a moderate to major nature are relieved within 30 minutes at 5.0 bars (75 psig). Oxyhelium is the breathing mixture of choice for the portion of the treatment schedule at pressures greater than 1.8 bars (28 psig). If oxyhelium is not available, use air as the breathing mixture.

DESCENT RATE : As fast as possible.

ASCENT RATE : From 5.0 bars to 1.8 bars at a rate of 0.8 bars/minute. From 1.8 bars to surface at a rate of .03 bars/minute. Do not compensate for slower ascent rates. Compensate for faster ascent rates by halting the ascent for the appropriate time period.

If oxygen breathing must be interrupted due to toxic reaction, discontinue the oxygen for 15 minutes after the reaction has entirely subsided and then resume the schedule at the point of interruption.

Oxygen Recompression Treatment Table 6A (continued)

TENDER : The tender breathes oxyhelium, if available, at pressures greater than 1.8 bars, and air throughout the rest of the schedule. The tender must stay for the duration of the treatment. (See note on Tenders).

EXTENSION : Table 6A may be extended by 25 minutes (20 minutes oxygen, 5 minutes air) at 1.8 bars and by 75 minutes (60 minutes oxygen, 15 minutes air) at 0.9 bars, or by the combination of both.

LACK OF RELIEF AT 5.0 BARS : If there is no relief or improvement after the 30 minutes at 5.0 bars, switch to the ALTERNATE to Table 6A (BRITISH METHOD), provided Table 6A has been initiated with oxyhelium.

ALTERNATE TO TABLE 6A (BRITISH METHOD)

For the treatment of Decompression Sickness and Burst Lung Syndrome not relieved at 5.0 bars:

1. Recompress the patient to pressure of relief on oxyhelium (20/80) mixture.
2. Remain at pressure of relief for 30 minutes after relief has been obtained.
3. Decompress in stages as defined by the formula with each stage consisting of a period of continuous decompression (ascent) at a constant rate lasting five hours.

FORMULA:

$$\frac{\text{INITIAL PRESSURE} + 1 \text{ Bar}}{1.3} - 1 \text{ bar} = \text{FINAL PRESSURE}$$

$$\left(\frac{\text{INITIAL PRESSURE} + 14.7 \text{ psig}}{1.3} - 14.7 \text{ psig} = \text{FINAL PRESSURE} \right)$$

INITIAL PRESSURE = Pressure at the beginning of the decompression stage. (This will equal the Pressure of Relief for the first STAGE and for subsequent STAGES will equal the FINAL PRESSURE of the preceding STAGE).

FINAL PRESSURE + Pressure at the end of a decompression STAGE.

4. At pressures less than 1.8 bars (29 psig) put the patient on oxygen for periods of 25 minutes, interrupted by 5 minutes breathing oxyhelium or air.

5. The tender will breathe oxyhelium at pressures greater than 1.8 bars and either air or oxyhelium at pressures less than 1.8 bars.

Recurrence of Symptoms and Signs

1. If there is recurrence during treatment, recompress to depth of relief, but never less than 0.9 bars (14 psig) or deeper 5.0 bars (75 psig), except on the advice of a qualified medical officer.

2. It has been shown that pressure of relief for decompression sickness is frequently 1.5 times the pressure of occurrence of symptoms and signs (measured in absolute terms) and rarely higher. E.g. if the recurrence is at 2 bars absolute, the depth of relief will be 3.0 bars absolute.

3. If the recurrence involves serious symptoms and signs not previously present, recompress the patient to 5.0 bars on oxyhelium and treat according to Table 6A or its alternative.

4. If there is recurrence following treatment, recompress the patient on Table 6 or Table 6A, depending on the seriousness of the recurrence. If the recurrence is less severe than the original, use Table 6. If the recurrence is equal to or greater than the original incident, use Table 6A.

5. Always re-examine the patient carefully at start of treatment and during treatment, as outlined for initial treatments.

6. Do not omit the use of special ancillary treatment modes for decompression sickness in serious recurrent cases, and consider carefully the use of the alternative to Table 6A (British Method).

The Most Frequent Errors Related to Treatment

a. Failure of the worker to report symptoms early.

b. Failure to treat doubtful cases.

c. Failure to treat promptly.

d. Failure to treat adequately.

e. Failure to recognize serious symptoms.

f. Failure to keep the patient near the chamber after treatment.

Notes on Artificial Respiration

1. Start artificial respiration immediately whenever a man is not breathing due to any cause:

   a. Never wait for mechanical resuscitator.
   b. Interrupt only to stop serious bleeding (if possible have another person tend to such measures while you start artificial respiration).
   c. Send another person for a medical officer or other competent aid.

2. Before starting, remove victim from cause of his trouble, but do not waste time moving him any further than necessary.

3. Get on with artificial respiration. Leave details to others or try to get them done quickly between cycles.

   a. Recheck position of victim:

      (1) In position for mouth-to-mouth resuscitation.
      (2) Head slightly lower than feet, if possible.
      (3) Chin pulled upward.

   b. Recheck airway:

      (1) Remove froth, debris or other material.
      (2) See that tongue stays forward; have someone hold it if it draws back. Use an airway if available.
      (3) If artificial respiration does not move any air, there is an obstruction. Strangulation must be overcome.

   c. Loosen any tight clothing - collar, belt.

   d. Keep victim warm.

   e. Check pulse. If feeble, maintain victim lying in head down position.

4. Continue artificial respiration without interruption. (Minimum time is 4 hours unless victim revives or is pronounced dead by medical officer).

   a. Do not apply too much back pressure. (A strong operator can crack ribs of a small victim).
   b. If you become tired, let another operator take over. Do not break rhythm during shift.
   c. Watch carefully for signs of return of natural breathing movements. If they appear, time your movements to assist them.

d. Shift to a mechanical resuscitator if one is available, ready and operating properly.
e. If victim starts breathing himself, watch him carefully. Resume artificial respiration if he stops or if movements become too feeble.

5. If victim revives, continue care:

a. Keep him lying down.
b. Remove wet clothes; keep him warm.
c. Give nothing by mouth until fully conscious.
d. Attend to any injuries.
e. Be sure he is seen promptly by medical officer.
f. Do not manhandle him roughly if moving him.

Use of Oxygen

Use oxygen wherever permitted by the treatment tables unless the patient is known to tolerate oxygen poorly.

If a medical officer trained in hyperbaric medicine or diving medicine is available, he may recommend the use of oxygen for patients who are known to tolerate oxygen poorly.

Take all precautions against fire.

Tend carefully, being alert for such symptoms of oxygen poisoning as:

1. Twitching of the face and lips.
2. Nausea.
3. Dizziness and vertigo.
4. Vomiting.
5. Anxiety.
6. Convulsions.
7. Confusion.
8. Restlessness and irritability.
9. Malaise or excessive tiredness.
10. Changes in vision - as blurring or narrowing of the visual field.
11. Incoordination.
12. Tremors of the arms and legs.
13. Numbness or tingling of the fingers or toes.
14. Fainting.
15. Spasmodic breathing.

Know what to do in the event of convulsion:

1. Halt ascent.
2. Remove mask at once.
3. Protect the convulsing patient from injury but do not restrain or forcefully oppose the convulsive movements.

4. Maintain pressure.
5. If the patient is not convulsing, have him hyperventilate with chamber air for a few breaths.

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