

The Diving Medical Advisory Committee

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Medical Equipment to be Held at the Site of an Offshore Diving Operation

DMAC 15 Rev. 4 – December 2014

Supersedes DMAC 15, DMAC 15 Rev. 1, Rev. 2 and Rev. 3, which are now withdrawn

Commercial diving operations include both surface supplied and saturation diving operations and cover a wide range of work activities. Appropriate medical equipment to be held at any particular site is best determined by an occupational health service with special knowledge of commercial diving operations. This list is designed to provide guidance on equipment to be held at the site where such advice is not available. It is recognised that in certain circumstances similar or greater facilities may be available from other sources which are sufficiently close and reliable.

The list covers equipment and drugs suitable for the treatment of diving related disorders on the surface or in a recompression chamber and for other potential problems (e.g. trauma) which may occur during diving operations. The list takes account of situations where the diving operation may be remote from a vessel or installation sickbay and medical services. It includes equipment for use in an immediate first aid situation, equipment and drugs which may be used by personnel with advanced first aid training as well as equipment which would almost certainly only be used by medical staff. Medical staff who attend a casualty at a dive site may not necessarily be able to bring the appropriate equipment.

Each diving contractor's Diving Medical Officer is responsible for a review of the equipment and drugs, as some of the drugs mentioned in this note may not be available in some geographical areas and in such cases alternative drugs to those identified and 'suggested' should be considered. Compliance with the local laws relating to pharmaceutical products will also have to be considered, as these vary in different countries. It is anticipated that except in emergency situations, equipment other than that in the bell or chamber first aid kits would be for use by or on the direction of medical staff.

There should be an appropriate system for the control and maintenance of this medical kit and responsibility for this kit should be vested in the Diving Superintendent or vessel Medic. The respective responsibilities and authority of the parties involved need to be clearly documented and understood. This kit should be accompanied by a list of contents. This list provides an opportunity for stock control, shelf life control, and the recording of the use of the contents. These measures should be regarded as standard procedure. A specific logbook should be maintained with the equipment, in which these checks and all use of equipment and drugs is recorded.

The diving supervisor needs to have access to this medical kit at all times. Scheduled or controlled drugs should be held in a dedicated and secure double locked container (with the vessel's medical supplies or in the installation sickbay).

The medical kit should be appropriately labelled and then inspected regularly (during each mobilisation and at least every six months) to ensure that all items are in working order (e.g. batteries) and to exchange drugs and other equipment which is nearing the end of its shelf life. These regular inspections should be recorded in the logbook. Consideration should be given to the need for pressure testing mechanical or electrical equipment. Local conditions may require a more frequent inspection regime.

People involved in the provision of care in diving situations should be part of a system of continuous training to help prevent skill fade.

At all times, including during transit to the diving worksite or diving support vessel, this medical kit must be kept dry and clean, locked in an appropriately labelled and dedicated light-resistant container. Care must be also taken to ensure that this equipment is stored within a temperature range of +4° to +25° Celsius.

The kit should be packaged and labelled in a logical manner that allows easy and rapid access to the contents, specifically those contents that are often used at the same time.

This is a guidance document based on current information. This medical kit will not cover all the aspects of medical care in a diving system and should be used in conjunction with the installation or vessel's medical kit.

There should thus always be good communication between the diving team and the vessel medic.

Audits of any DMAC 15 kits should involve 'medical' staff (doctor or ship's Medic) with experience in the field, who understand the limitations of this guidance note, understand the diving project and the potential difficulties of the procurement of certain drugs depending on the county jurisdiction where the diving is taking place. A copy of DMAC 15 should accompany each kit with the final page completed as appropriate.

Equipment to be Held in a Diving Bell, Hyperbaric Welding Habitat or immediately available to be put into a Diving Chamber (to be stored in a watertight bag or container):

- ◆ 1 Arterial tourniquet (e.g. CAT tourniquet)
- ◆ 3 Polythene bags – these can be used to cover burns or as waste bags
- ◆ 1 Resuscitation face mask (preferably with a silicone filled face seal and a non-return valve) or shield, for mouth-to-mouth ventilation (e.g. Laerdal pocket mask or face shield)
- ◆ 2 Oropharyngeal airways size 3 and 4 (e.g. Guedel type)
- ◆ 1 Tuff cut scissors
- ◆ 1 Medium dressing
- ◆ 1 Large dressing
- ◆ 2 Triangular bandages
- ◆ 1 Roll of 1 inch adhesive tape
- ◆ 2 Crepe bandages – 3 inch
- ◆ 1 Hand operated suction pump
- ◆ 1 Suction catheter (preferably Yankeur)
- ◆ 1 Watertight bag
- ◆ 1 Adult adjustable cervical spine collar
- ◆ 2 Pairs of non-sterile gloves (non-latex if possible, appropriately sized)
- ◆ 2 Space blankets

The same equipment should be available for rapid use in each living chamber of a saturation system and in each air diving chamber.

In 'living' chambers a foot or gas powered suction pump may be preferred. The watertight bag is not required within 'dry' living chambers and it is acceptable that this equipment may be stored outside the system ready to be passed in immediately, as required.

Equipment to be Held in a Hyperbaric Rescue Unit (HRU) Compartment (or within the surface compartment of a self propelled hyperbaric lifeboat):

- ◆ 1 Arterial tourniquet (e.g. CAT tourniquet)
- ◆ 3 Polythene bags
- ◆ 1 Resuscitation face mask (preferably with a silicone filled face seal and a non-return valve) or shield, for mouth-to-mouth ventilation (e.g. Laerdal pocket mask or face shield)
- ◆ 2 Oropharyngeal airways size 3 and 4 (e.g. Guedel type)
- ◆ 1 Tuff cut scissors
- ◆ 1 Medium dressing
- ◆ 1 Large dressing
- ◆ 2 Triangular bandages
- ◆ 1 Roll of 1 inch adhesive tape
- ◆ 2 Crepe bandages – 3 inch
- ◆ 1 Hand operated suction pump
- ◆ 1 Watertight bag
- ◆ 1 Suction catheter (preferably Yankeur)
- ◆ 1 Adult adjustable cervical spine collar
- ◆ 10 pairs of non-sterile gloves (non-latex if possible, appropriately sized)

Sealable vomit and metabolic waste bags must be provided that allow for safe containment and disposal of this waste. Suggested: Absorbeze Maxi Sick Bags. Consideration should be given to the number of occupants and possible time expected before retrieval. A minimum of 15 per occupant is required.

Given the confines of the evacuation unit and the potential for contamination, anti-diarrhoeal preparations such as Imodium should be considered.

Fluid replacement supplies which can be primarily water, to allow approx 100-150mls per man per hour, must be available. Rehydration preparations to maintain electrolytic balance should also be considered as essential to augment the fluid balance of both the dive and surface crew.

In the event of the requirement for hyperbaric evacuation, the following need to be available for immediate passing into the chamber prior to the divers entering the HRU. The surface support crew also need to be given the same medication:

Each team member (both divers and surface support crew) should chew 2 x 300µg tablets of hyoscine hydrobromide and have a Scopolamine patch placed behind one ear prior to evacuation into an HRU. The 2 hyoscine hydrobromide tablets will take effect within 30mins and last approximately 7-8 hours, after which the dermal patches will become effective and last approximately 72 hours.

The number of tablets and patches required depends on the number of people within both the dive team and surface support team, and will need to be calculated prior to each mobilisation.

There should be extra tablets and patches available for the dive and support team in case of failure of the adhesiveness of the dermal patches.

Equipment to be Held at the Dive Site:

Diagnostic Equipment

- ◆ 1 Pencil torch
- ◆ 1 Thermometer (electronic)
- ◆ 1 Low range rectal thermometer – down to 28°C
- ◆ 1 Stethoscope
- ◆ 1 Aneroid sphygmomanometer
- ◆ 1 Reflex hammer
- ◆ 1 Tape measure
- ◆ 2 Tuning forks (128Hz and 256Hz)
- ◆ Pins for testing sensation (e.g. Neurotips)
- ◆ Blood sugar testing equipment
- ◆ Tongue depressors
- ◆ Urine testing strips
- ◆ 1 Otoscope (with spare bulb and batteries and disposable ear pieces)

Thoracocentesis

- ◆ 2 Intercostal drain and drainage kits – preferably those without sharp metal ‘trocar’ introducers (e.g. Portex flexible introducer type)
- ◆ 4 Devices for emergency needle thoracocentesis
- ◆ 2 Heimlich Valves
- ◆ Suitable strapping/fixing to secure the system appropriately

Urinary Catheterisation

- ◆ 2 Urinary catheters (preferably non-latex) sizes 16 and 18 (e.g. Foley type)
- ◆ 2 Urine collection bags
- ◆ 2 Catheter spigots (optional)
- ◆ 2 x 20ml sterile water
- ◆ 2 Urethral anaesthetic gel
- ◆ Suitable strapping/fixing to secure the system appropriately

Dressings

- ◆ 10 Packets gauze squares 10 x 10cm
- ◆ 5 Packets cotton wool balls
- ◆ 4 Triangular bandages
- ◆ 4 Trauma care bandages
- ◆ 12 Safety pins
- ◆ 2 Adhesive bandage 75mm x 3m
- ◆ 2 Adhesive bandage 25mm x 3m
- ◆ 2 Crepe bandages 6 inch
- ◆ 2 Crepe bandages 3 inch
- ◆ 2 Large dressings
- ◆ 2 Medium dressings
- ◆ 40 Adhesive plasters
- ◆ 2 Dressing bowls
- ◆ 4 Eye pads
- ◆ 1 Eye wash kit
- ◆ 5 Soft silicone primary wound dressing (8cm x 10cm) (e.g. Mepitel)

Equipment to immobilise fractured/sprained limbs (e.g. a 36 inch Sam splint, which can be cut to size as required)

Sterile Supplies – General

- ◆ 4 Universal containers
- ◆ 2 Drapes 60 x 90cm
- ◆ 10 Alcohol swabs or sachets of skin disinfectant (e.g. Cetrimide solution)
- ◆ 10 Pairs of sterile gloves (selection of sizes, preferably non-latex)
- ◆ 6 Sutures non-resorbable (e.g. nylon) (2/0 and 3/0), preferably with cutting needles attached
- ◆ 1 Medium sized Sharps bin
- ◆ 2 Resorbable sutures (2/0 and 3/0), preferably with needles attached
- ◆ 5 x 20ml syringes
- ◆ 5 x 10ml syringes
- ◆ 5 x 2ml syringes
- ◆ 10 x 18g needles
- ◆ 10 x 21g needles
- ◆ 1 Tube of antiseptic cream (e.g. Betadine)

Sterile Supplies – Specific

A specific sterile dressing pack should be obtained or made up, to lock into the chamber for specific procedures such as urinary catheterisation, thoracocentesis and suturing, for example. To contain the equivalent of:

- ◆ 1 Kidney dish
- ◆ 1 60-100ml bowl (Gallipot)
- ◆ 10 Sachets of skin disinfectant (e.g. Cetrimide solution)
- ◆ 10 x 7.5cm 4-ply non-woven cotton swabs
- ◆ 4 Dressing forceps
- ◆ 2 Tissue backed drapes 60 x 90cm
- ◆ 1 Yellow bag (for disposal of used items)

Sterile Instruments

- ◆ 2 Spencer Wells forceps 5 inch
- ◆ 1 Mosquito forceps
- ◆ 1 Dressing forceps
- ◆ 2 Disposable scalpels
- ◆ 1 Forceps – fine toothed
- ◆ 1 Dressing scissors
- ◆ 1 Scissors – fine pointed
- ◆ 1 Stainless steel ring cutter (for removal of rings and other piercings) – this does not need to be sterile

Intravenous Access

- ◆ 3 Giving sets
 - ◆ 4 IV cannulae 16g
 - ◆ 4 IV cannulae 18g
 - ◆ 4 Butterfly infusion sets 19g (optional)
 - ◆ 2 Magnetic hooks
 - ◆ 4 x 3-way IV taps
 - ◆ Intraosseous (IO) infusion system (a minimum of 2 sets of devices are required)
- It is suggested that manual or spring loaded placement systems are used. If used, the DMTs must be appropriately trained in and up to date with the system chosen and used by each diving company. The use of battery operated placement systems in a hyperbaric chamber environment is contraindicated

Resuscitation

- ♦ Resuscitator to include reservoir and connection for BIBS gas (e.g. Laerdal type)*
- ♦ 3 Resuscitation masks with silicone face seals (varied sizes)
- ♦ 1 Pocket resuscitator with one-way valve (e.g. Laerdal pocket mask with a silicone face seal and non-return valve) or face shield for mouth-to-mouth ventilation
- ♦ 3 Supraglottic airways sized for adult males (e.g. iGel sizes 3, 4 and 5, or Combitube) with catheter mounts and filters – if female divers on board ensure there are correctly sized airways for them
- ♦ (optional) Endotracheal tubes (ET tubes) (e.g. sizes 7, 8 and 9) with catheter mounts and filters**
- ♦ (optional) Laryngoscope and batteries and spare bulbs. The use of Laryngoscopes with fibre optic disposable blades is encouraged. This is required if ET tubes are stored
- ♦ 1 Automated external defibrillator (if this is to be used in the chamber it should either be appropriately tested for such use or it should be hard wired into the chamber)
- ♦ 2 Oropharyngeal airways sizes 3 and 4 (e.g. Guedel type)
- ♦ 1 Foot operated suction device
- ♦ 1 Tourniquet to aid venous access
- ♦ 2 Endotracheal suction catheters
- ♦ 2 Wide bore suckers
- ♦ (optional) 2 Nasopharyngeal airways (e.g. size 6 and 7 with flange)

* Resuscitators may require modification to gas inlet to ensure adequate filling at pressure

** Endotracheal tubes should be provided for use by doctors only

Drugs

Anatomical Therapeutic Chemical (ATC) codes are provided in brackets for guidance

Anaesthesia

Lidocaine injection without adrenaline (N01B B02)

Suggested: Lidocaine 10mg/ml or 20 mg/ml ampoules 5 x 10ml

Indication: Lidocaine is a useful local anaesthetic in concentrations up to 20%

Analgesia

Soluble aspirin tablets (N02B A01)

Suggested: Soluble aspirin, 20 x 300mg or 20 x 500mg tablets

Indication: Mild to moderate pain, pyrexia, chest pain of suspected cardiac origin

1 to 2 tablets every 4 to 6 hours

Paracetamol tablets (N02B E01)

Suggested: Paracetamol, 25 x 500mg tablets

Indication: Mild to moderate pain, pyrexia (fever)

1 to 2 tablets every 4 to 6 hours to a maximum of 8 tablets in 24 hour period

Codeine or dihydrocodeine tablets (N02A A08 or R05D A04)

Suggested: Codeine or dihydrocodeine, 20 x 25-30mg tablets

Indication: Moderate to severe pain

1 x 25 or 30mg tablet every 4 to 6 hours when necessary

Morphine injection (N02A A01)

Suggested: Morphine, 5 x 10mg ampoules

Indication: Severe and acute pain

Patients should be closely monitored for pain relief as well as for side-effects especially respiratory depression

It may be appropriate to consider the use of an antiemetic after administration of morphine

Naloxone injection (V03A B15)

Suggested: Naloxone, 0.4mg/ml ampoules – 2 x 1ml

Indication: Opioid (morphine) overdose, respiratory depression due to administration of opioid (morphine) analgesia

Respiratory depression is a major concern with opioid analgesics and it may be treated by artificial ventilation or be reversed by naloxone. Naloxone will immediately reverse opioid-induced respiratory depression but the dose may have to be repeated because of the short duration of action of naloxone; however, naloxone will also antagonise the analgesic effect

The following drug is useful and acceptable as analgesia for moderate to severe pain where it is impossible to stock morphine:

Tramadol injection (N02A X02)

Suggested: Tramadol, 5 x 100mg ampoules

Indication: Moderate to severe pain

Resuscitation Drugs (refer to the appropriate resuscitation guidelines)**Adrenaline/Epinephrine injection** (C01C A24)

Suggested: Adrenaline, 10 x 10ml ampoules. 100µg/ml ampoules (1 in 10,000)

Indication: Emergency treatment for cardiopulmonary resuscitation

Important: Intravenous route or intraosseous route to be used in resuscitation, during CPR only

Amiodarone injection (C01B D01)

Suggested: Amiodarone, 6 x 150mg ampoules

Indication: Amiodarone is used for the treatment of arrhythmias particularly during CPR

In some countries Amiodarone is sold as a powder – ensure the correct amount of the appropriate solute is included if this is the case

Important: Intravenous route or IO route to be used in resuscitation during CPR only

Furosemide injection (C03C A01)

Suggested: Furosemide, 5 x 40mg ampoules

Indication: Oedema, pulmonary oedema, resistant hypertension

Nausea and Vomiting**Fentiazin or prochlorperazine injection (preferred) or oral (optional)** (N05A B)

Suggested: Prochlorperazine, 5 x 25mg ampoules or Prochlorperazine, 20 x 5 mg tablets

Indication: Severe nausea, vomiting, vertigo, labyrinthine disorders (not for use in motion sickness)

Where available, prochlorperazine in 3mg buccal tablets (dissolves sublingually) is a good choice as opposed to the tablets as such as there is no need to swallow a tablet; 10 x 3mg tablets

See notes on equipment to be held in diving bell above. These are additional:

Hyoscine hydrobromide (Scopolamine) tablets/dermal patches (A04A D01)

Suggested: Hyoscine, 40 x 300µg tablets (e.g. Kwells)

Indication: Short acting drug for sea sickness and hyperbaric evacuation. These tablets are chewable

Suggested: Scopolamine, 20 x dermal patches (e.g. Scopoderm plasters)

Indication: Long acting slow release drug for sea sickness and for hyperbaric evacuation. One patch to be placed behind one ear

Allergic Reactions

Antihistamine for injection (R06A B)

Suggested: Chlorpheniramine, 2 x 10mg ampoules or dekschlorpheniramine, 2 x 5 mg ampoules

Indication: Symptomatic relief of allergy, urticaria, emergency treatment of anaphylactic reaction

Oral antihistamine (R06A E)

Suggested: Cetirizine, 20 x 10mg tablets

Indication: Symptomatic relief of allergies – non-sedating

There are different types of non-sedating oral antihistamines that can be substituted as needs be

Corticosteroid for injection (H02A B)

Suggested: Hydrocortisone 5 x 100mg ampoules

Indication: Hypersensitivity reaction e.g. anaphylaxis, angioedema, asthma

Adrenaline/epinephrine autoinjector (C01C A24)

Suggested: Epinephrine autoinjector (EpiPen autoinjector) 0.3mg of 1 in 1000 (1mg/ml) adrenaline (giving 300mcg) 2ml auto-injector

Indication: Emergency treatment of acute anaphylaxis

Drugs Various

Atropine injection (A03B A01)

Suggested: Atropine, 4 x 1ml ampoules (600µg/ml)

Although atropine is no longer recommended in the treatment of asystole or pulseless electrical activity in the European resuscitation guidelines, it may be useful in the treatment of bradycardia

Glucose injection (B05B A03)

Suggested: Glucose 2 x 500mg/ml 50ml

Indication: Hypoglycaemia

Glyceryl trinitrate sublingual tablets (C01D A02)

Suggested: Glyceryl trinitrate sublingual tablets x 10 tablets

Indication: Cardiac chest pain

Intravenous fluids (B05B B01)

Suggested: Crystalloid Infusion – 6 litres

Sodium Chloride Infusion 0.9% and/or Hartmann's or Ringer's lactate.

Company doctor to advise on exact make up

Antipsychotic drug for injection (N05A A)

Suggested: Chlorpromazine, 2 x 50mg ampoules or levomepromazine, 2 x 25 mg ampoules

Indication: For relief of acute symptoms, schizophrenia and other psychoses, mania short-term adjunctive management of severe anxiety, psychomotor agitation, excitement, and violent or dangerously impulsive behaviour

Anxiolytics for injection (N05B A)

Suggested: Diazepam, 5 x 10mg ampoules

Indication: Short-term use in anxiety or insomnia, status epilepticus and for muscle relaxant effect where indicated

Anxiolytics for oral use (N05B A)

Suggested: Diazepam, 10 x 5mg tablets

Indication: Short-term use in anxiety or insomnia, status epilepticus

Anxiolytics for rectal use (N05B A)

Suggested: Diazepam, 10 x 5mg suppositories

Indication: Short-term use in status epilepticus

Treatment of Burns**Sulphonamides for topical use (skin) (D06B A01)**

Suggested: Silver sulphadiazine cream, 1 tube of 1%

Indication: for example prophylaxis and treatment of infection in burn wounds, as an adjunct to short-term treatment of extensive abrasions; for conservative management of finger-tip injuries

Antibiotics**Broad spectrum antibiotics for oral use (J01C A, J01C F, J01C R02 or J01M A02)**

Suggested: Co-amoxiclav, 21 x 625mg tablets (1 tablet 3 times per day for 7 days) or dicloxacilline 30 x 500 mg tablets

Indication: Broad-spectrum antibiotic

If this drug is not available the company doctor may choose to recommend a similar penicillinase resistant antibiotic

Suggested: A quinolone, for example:

- ♦ Ciprofloxacin, 20 x 750mg tablets (1 tablet 2 times per day for 10 days) OR
- ♦ Levofloxacin, 20 x 500mg tablets (1 tablet 2 times per day for 10 days)

Indication: A broad spectrum antibiotic useful in the treatment of Gram negative bacterial infections

Macrolide antibiotic for oral use (J01F A)

Suggested: Clarithromycin 14 x 250mg tablets (1 tablet twice daily for 7 days) or erythromycin 30 x 250 mg tablets (2 tablets twice daily for 7 days)

Indication: Susceptible infections in patients with penicillin hypersensitivity

Antibiotic ear drops with (S03C A) or without (S02A A) corticosteroids

Suggested: Sofradex (framycetin sulphate/dexamethasone/gramicidin) ear drops or hydrocortisone/polymyxine B ear drops one bottle 2–3 drops 3-4 times daily. May be substituted by other ear drops containing combinations of antibiotics (e.g. Polymyxine B, Neomycine a.o.) and corticosteroid (hydrocortisone, dexamethasone a.o.)

Sofradex drops can also be used for eye infections

Ciprofloxacin ear drops (may also be useful in the treatment of ear infections in saturation divers)

An antifungal drug

Suggested: Clotrimazole cream

Indications: For fungal skin infections

The following table is for the company Diving Doctor to note down any variations from the DMAC 15 list, with the reason. This allows for the detailing of any geographical difficulties with drug or equipment supply. Any additional equipment or drugs required by the medical adviser or details of equipment issues should be noted here with the required remedial actions.

Name of DMAC 15 drug	Replacement drug or 'omitted'	Reason for this action	Doctor's Initials
Equipment issues			Doctor's Initials

Name of Company Diving Medical Doctor:

Signature:

Date: