The Diving Medical Advisory Committee

DMAC, Eighth Floor, 52 Grosvenor Gardens, London SW1W 0AU, UK
Tel: +44 (0) 20 7824 5520

www.dmac-diving.org
info@dmac-diving.org

The Provision of Emergency Medical Care for Divers in Saturation

DMAC 28 Rev. 2 – December 2014

Supersedes DMAC 28 and DMAC 28 Rev. 1, which are now withdrawn
DMAC 28 also superseded DMAC 25 and DMAC 27.

1 Background

DMAC has published guidance over a number of years aimed at providing divers in saturation with a level of medical care which is as similar as possible to the level of medical care available to other personnel who work offshore.

In the early days of the offshore diving industry it was considered desirable to transport (under pressure) an ill or injured diver in saturation from an offshore location to an onshore facility which would provide specialised medical care. As experience was gained however, it became clear that it was much better to retain the casualty at the offshore work site and transport medical equipment and personnel to the casualty. This has now become the accepted method of operation.

In many cases the most practical concept is to stabilise the patient until suitable decompression allows definitive care under atmospheric pressure.

DMAC published Guidance Note 25 in October 1993 and raised this to Revision 1 in March 1996. Guidance Note 27 was published in April 1996. Guidance Note 28, published in November 1997, superseded all three previous notes, and aimed to combine the advice which they contained in to one succinct source which can be applied anywhere in the world. This revision of DMAC 28 updates that advice to reflect current practice and equipment.

Whilst this document gives general guidance, detailed arrangements should exist for each work site, agreed and documented between the diving company and its specialist medical adviser.

2 Geographic Limitations

It is recognised that the location of the diving operation will determine the facilities which are readily available to provide expert medical care. For example, in the North Sea such skilled care will often be available within an hour or two while in other parts of the world specialised doctors may be thousands of miles away from the diving site.

Prior to the commencement of any diving operation the diving company should consult with its medical adviser (possibly also with the client's medical department) and agree what facilities and equipment should be available in relation to the specific location. In remote locations there may be more benefit from ensuring that good communications are available than from the provision of specialised medical equipment on site.

Whilst the advice given in this document is intended to apply anywhere in the world, it is recognised that there will be differences in the ability to implement its recommendations dependent on the exact location and circumstances.

3 Contingency Planning

The equipment that each of the various personnel with a role in providing medical care in an emergency (e.g. diver, diver medic, members of the medical support team) is capable of using should be agreed by the diving company and their medical adviser, and this should be taken into account when developing the contingency plan. Anyone expected to use a certain piece of equipment should be familiar with and trained in use of that equipment.

4 On Site Medical Arrangements

The equipment available at site and the ability of those present to provide adequate first aid and resuscitation within the first few minutes and hours of an incident will ultimately determine the outcome for the patient.

DMAC has published guidance on the equipment which should be held at an offshore worksite (see the latest issue of DMAC 15).

The use of properly trained diver medics is now widespread but the selection and training of suitable personnel from among the divers to provide advanced first aid is crucial to the success of any medical treatment.

The diving company should prepare, in conjunction with its medical adviser, a well documented plan to provide initial first aid to an injured diver while at the same time contacting specialist medical personnel for advice. This plan is intended to stabilise a casualty until such time as a decision is taken as to what further treatment may be needed.

5 Suitability of Medical Teams

The highest level of medical care will be provided by a medical team which is trained and experienced in handling casualties under saturation conditions. This level of specialist knowledge is not widespread throughout the world and is often concentrated in specific locations which may be a significant distance away from the work site.

Medical care involves a very wide range of specialist expertise and no diving medical team will have a complete range of expertise. As a result, medical teams providing support to saturation diving operation need to be able to access a wide range of specialist expertise for guidance and assistance. It is recognised that the need for such specialist expertise occurs very rarely and hence is unlikely to be met by a contractual arrangement.

Effective monitoring of the patient by the onsite diver medic using simple monitoring equipment, coupled with direct communications (e.g. audio, video, photographic links and email) between the specialist doctor ashore will form the basis of care given to the casualty in the first instance.

Since local medical personnel might not possess the specialised medical knowledge to provide the necessary medical support, consideration should be given to involving a specialist medical team from one of the world's recognised centres to support incident management which might include the mobilisation of support personnel to the site of the incident.

6 The Saturation System

Since the diving system may vary from a single chamber on the simplest transportable system to a multi-chamber complex on a large DSV, it is not appropriate to give specific technical specifications. The basic requirement however is to provide a facility where an injured diver can be given medical treatment while still under pressure.

It is recommended that one chamber be identified as the chamber in which any medical treatment will be carried out. This chamber must be accessible by any diver in the system within a reasonable time (30-60 minutes), taking into account any need to change chamber pressure. This chamber should have the following:

- A minimum internal diameter of 1.8 metres (6 feet) but preferably exceeding 2.15 metres (7 feet);
- The ability to remove, or move out of the way, bunks and other equipment normally fitted to the chamber but not needed directly for a medical emergency;
- A bunk for the patient which should:
  - be waist high
  - have access from at least one side and preferably both, from the head end, have a firm base and be able to tilt the patient to 30° both at the foot and head ends
  - be provided with a mattress;
- A tray or working surface for medical instruments;
- A means for suspending IV drips overhead the patient (hooks or similar);
- A convenient medical lock of at least 300mm diameter;

- A good communications system with connections in a suitable location for personnel beside the casualty;
- Suitable extra lighting for the area of the casualty. This may be the normal bunk lights fitted with long leads to reach the treatment area;
- Sufficient additional gas and electrical hull penetrations (in order to ensure that in an emergency appropriate gas and electrical supplies can be rapidly connected) as agreed with the specialist medical adviser (see sections below);
- Sink facilities (with foot or elbow operated taps) to be provided in the vicinity of the patient's bunk.

7 Communications

Good communications are extremely important. Ideally the doctor onshore should be able to speak directly to the patient and person inside the chamber who is treating the patient. Communication links, which enable effective communication between the offshore worksite and medical support onshore, are essential.

It is important to be aware that the arrangement where those inside the chamber communicate with personnel outside (e.g. supervisor/LST/diver medic) who are used to understanding heliox distorted speech, who then relay the information to a doctor onshore, may lead to omission and misinterpretation of critical information.

Electronic transfer of information, data, still and video images and speech using the internet and satellite communications systems should be standard practice. Where available, direct video conference facilities between the chamber and doctor onshore provide the best method of communication.

8 Electrical Equipment

Ideally electrical equipment should not be used inside a chamber unless it has been specifically manufactured for such use. However, the range of items of medical equipment built and tested for use in hyperbaric conditions is very small, restricting the provision of medical care. Where equipment to be used in the chamber has not been specifically manufactured for such use, a risk analysis should be undertaken and its results documented. Where appropriate, local testing of the equipment might be undertaken, and in such cases the results documented.

9 Equipment to be Held at Site

The exact list and detailed specifications of all medical equipment to be held offshore at a saturation site is a matter for assessment and agreement between the diving company and their medical adviser.

This will depend on a number of factors including: communications available, remoteness of location, the first aid competence of personnel on site, ability to maintain and keep secure the equipment, etc. etc.

Included in the items which might be held at site are:

- Necessary gas supplies for a ventilator including patient's breathing gas (likely provided via BIBS pipework system) and any gas supply required to power a ventilator;
- A suction system and equipment. Systems which utilise the suction available from the BIBS dump system in a controlled manner are appropriate;
- A free flow oxygen hood;
- Additional lighting;
- Patient monitoring system (for blood pressure, ECG, pulse, temperature, SAO_2);
- Defibrillator;
- DMAC 15 medical equipment.

10 Equipment to be Taken Offshore by a Medical Support Team

Again the detail of the equipment which will need to be taken offshore by the medical support team in an emergency will be a matter for agreement between the diving company and its specialist medical adviser. Detailed planning will be needed at this preliminary phase to ensure full compatibility of the medical equipment with the services available on site. Such equipment will need to be kept in a state of constant readiness and must be fully maintained and tested at regular intervals.

The medical support team must be fully familiar with all of the equipment and among the items which may be included in this list are:

- Additional drugs to complement those currently held at the worksite e.g. DMAC 15;
- Specialist monitoring equipment for ECG, % O_2 saturation of blood, blood pressure, respiration rate, etc. where appropriate equipment is not already on site;
- Ventilator, suitable for use in a hyperbaric environment, that has appropriate connections for interfacing with the chamber arrangements;
- A simple CO_2 monitor for patient's expired breath analysis;
- Infusion pump/syringe drivers;
- Humidification and gas heating for breathing circuits (especially at deeper depths).

In addition a medical support team may require to access surgical equipment and imaging equipment and should identify a suitable source for obtaining this equipment in the event of an emergency.

11 Future Developments

Advances in technology provide new equipment which may assist in the treatment of an injured or sick diver in saturation and should always be considered by both the diving company and its specialist medical adviser on a regular basis.

The concept of clinical governance requires that those responsible for the provision of medical care ensure that measures are in place to maintain the highest possible standards of care taking into account new developments in health care and equipment.

12 Conclusion

The ability to provide good quality medical treatment to an ill or injured diver in saturation is constantly being increased as new equipment, technology and communications systems become available. The basic requirements however remain the training and abilities of those personnel offshore who will be required to care for a casualty during the early stages of an incident, coupled with the appropriate arrangements to obtain specialist medical advice or treatment quickly.