

# REMOTE AREA DIABETES FOR GUIDES AND LEADERS

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## INTRODUCTION (SECTION ONE)

### INTRODUCTION

This set of guidelines is produced in three sections. The first gives an introduction to this medical problem and is designed to be read and understood before dealing with a diabetic client. The second is for use in an emergency in the Australia, New Zealand Alps or other locations where rescue facilities are relatively easily available. The third is for remote area and expedition work such as the Himalaya or Andes. Laminate sections two and three and carry them with you when on the hill. (Note that World Expedition leaders cannot be expected to deal with the kind of complex emergencies that occur in remote or high altitude situations. The client and companion must be fully able to cope with any problem arising from the diabetes).

### DEFINITION

Diabetes is an illness where the body loses its ability to control the level of sugar in the blood (Blood Sugar/BS).

The BS is normally controlled by a hormone called Insulin produced by a gland called the pancreas in the abdomen.

Sugar is vital as a fuel source for the body so too little sugar (Hypoglycaemia) can result in a fairly rapid progression to unconsciousness. Too much sugar (Hyperglycaemia) can act as a poison, mess up the chemical and fluid balance in the body and lead to illness and later unconsciousness.

### TYPES OF DIABETES

There are two main types of Diabetes:

Type One Diabetes occurs when the body ceases to produce its own insulin. This normally occurs in young and often fit people and can only be treated by the administration of artificial Insulin by injection. Patients normally inject themselves under the skin (subcutaneously, s/c) with long acting insulin twice a day although some may be on up to four daily pre-meal injections of short acting Insulin or a continuous s/c pump infusion (more common in the USA) of very short acting Insulin.

Soluble (fast acting) Insulin works quickly but only for a short period and is useful for “fine tuning” BS levels in an emergency. It can be given subcutaneously (s/c) or Intramuscularly (i/m), or intravenously under the guidance of a medical practitioner.

Type Two Diabetes normally occurs in older obese patients (less likely to be our clients). In this case the body cannot produce sufficient Insulin and treatment is by weight loss and tablets that force the body to maximise its own insulin production.

Both types of Diabetes require careful balancing of sugar and food intake as a major part of the treatment.

Under severe physiological stress (unaccustomed exercise levels, altitude, cold, infection, D&V or injury) a Type Two Diabetic may need Insulin treatment. This could be relevant in a very remote area where we have seen a case of undiagnosed diabetes unmasked by expedition physiological stress (rare).

## **PREVENTION OF PROBLEMS**

To prevent the immediate dangers of Diabetes (Hypo or Hyperglycaemia) patients have to balance their diet, exercise and drug intake. Experienced patients are often very skilful at this. It is particularly important that Diabetic clients gradually build up their mountaineering experience and confidence since they not only have to learn the mountain skills but at the same time skills to deal with their diabetic control. They need a good idea of the days route plan and may need slightly longer stops than other clients to enable them to monitor their condition. This becomes especially true in adverse weather when a group shelter can be invaluable.

Personal self care skills and confidence can be built by contact with other active experienced mountaineering diabetics. I would suggest using the website <http://www.mountain-mad.org>.

Simple awareness of a client's diabetic problem should be all that is needed and we encourage all Diabetic Clients to share knowledge of their condition with their leader and their group.

Experienced Diabetics should have had medical advice regarding meals and insulin needs on long haul flights crossing time zones. They should always carry spare food and insulin in their cabin baggage with a doctor's letter for security staff explaining this need.

Alcohol and Hypothermia both lower BS in anybody. This is obviously even more relevant in Diabetic Clients.

Clients who have had diabetes for many years may have long-term damage to the very small blood vessels (capillaries) throughout the body and nerves to the feet (peripheral neuropathy). In the feet and hands this may make them more prone to frostbite and to infection in the event of any tissue injury. In the eyes diabetic retinopathy may be affected by altitude and puts the patient at much higher risk of sudden loss of sight due to retinal haemorrhage so any diabetic going above 4500m should have a retinal check prior to departure.

If a diabetic client becomes ill and stops eating his/her insulin **MUST NOT BE STOPPED**. The body still needs Insulin but the amount may differ and constant monitoring of BS may be needed with dose adjustment.

## **EQUIPMENT & DRUGS**

All diabetics should have discussed their condition with their leader (but note that the leader cannot be expected to deal with complex diabetic emergencies, the client and companion must be able to deal with this themselves). They should also carry clear identification giving details of their medical condition. It would be sensible for them to demonstrate their equipment to their leader and indicate where it will be carried when on the hill (and where spares will be kept).

Most of our clients will be Type One Diabetics.

On a trip in Australia or Europe they should carry:

- Supplies of their normal insulin(s) with spares.
- Syringe and needles or an automatic injection device or infusion pump (with spare).
- A blood sugar measuring system (with spare batteries and test strips).
- A fast acting form of easily absorbed sugar (e.g. glucose tabs, sweets)
- Glucose gel (e.g. Hypostop).
- Injectable Glucagon kit.
- Reagent urine strips to check for ketones
- Spare "complex carbohydrates" such as cake or butties or museli bars.

A Type Two Diabetic on a trip in Australia or Europe should carry:

- Normal tablet medication with spares.
- A fast acting form of easily absorbed sugar (e.g. glucose tabs or sweets).
- Spare food.
- Glucose Gel.
- Possibly a blood sugar monitoring system.
- Reagent urine testing strips for Ketones.

If on a trek or expedition in a remote area in addition to the above Type One Diabetics should carry:

- Soluble Insulin.
- Additional personal antibiotics.
- On expeditions consider bringing 2-3 litres of IV fluid (0.9% normal saline) with needles and giving set.

If on a trek or expedition in a remote area in addition to the above Type Two Diabetics should carry:

- System to monitor BS levels.
- Some soluble insulin and syringes and needles in case of a worsening in their condition.

### **POINTS TO NOTE ABOUT EQUIPMENT AND DRUGS**

Old-fashioned syringes and needles are versatile and known throughout the world. Some modern western automatic injectors and cartridges are not universally available or understood.

Battery operated BS monitoring systems are battery dependant. Batteries run out and do not work when cold. Consider having a spare system that can be read visually in event of a failure (eg BM sticks).

There are many BS monitoring systems available. One that has been tested to 6500m is the Roche Active System. It has not been tested above 6500m but is likely to still work, although any BS monitoring system should be kept warm. Their operating temperature is often 10 – 40°C.

Insulin storage temperatures are not as critical as originally thought but protect when possible by keeping it close to the body and avoid letting it freeze. Frio bags aid storage ([www.friouk.com](http://www.friouk.com)).

If sugar is needed give it in the form that is easiest to administer. For example if they are able to eat give sweets or soft drinks backed up by longer acting more complex carbohydrates.

Even in a semi conscious person some sugar can be absorbed through the tissues that line the mouth so hypostop, jam or honey smeared onto the gums may help.

Always assume that an ill, semiconscious or unconscious diabetic is Hypoglycaemic and give sugar in some way if at all possible. This could save their life and in the unlikely event of them being Hyperglycaemic it would be like a “drop in the ocean” and do no harm.

Glucagon is a potentially life saving drug for an unconscious diabetic. It is given by im injection but remember absorption of any im/sc injection can be delayed in a cold patient. It kicks the body into mobilising the last reserves of sugar from the liver and may be enough to bring the person round enough so they can eat and drink to complete their recovery. In an exhausted mountaineer it may not work if the Liver reserves are already exhausted which can also happen after a hard day in a non-diabetic. If it is used remember that the person must then eat lots of carbohydrate to restock the body reserves.

All used syringes, needles, finger prickers and blood-testing strips should be regarded as medically contaminated and disposed of appropriately.

Due to complex metabolic effects acetazolamide may enhance Diabetic Keto Acidosis and is not recommended for prevention of AMS in diabetics. Likewise Dexamethasone may increase insulin resistance and is not recommended for prevention of AMS. Both could be used to treat HAPE or HACE during descent but careful diabetic monitoring would be essential.

Metformin, a drug used alone or with insulin in some diabetics may cause a chemical effect known as lactic acidosis in any situation of low oxygen concentration (eg altitude). It should be avoided in high mountains.

## **REMOTE AREA DIABETES (SECTION TWO)**

### **TREATMENT OF DIABETIC EMERGENCIES IN REMOTE PARTS OF AUSTRALIA, ASIA, U.K AND EUROPE.**

- 1) Prevention of problems is the key at all times.
- 2) Always listen to diabetic clients since they normally know their own condition best. Having said that a person becoming hypoglycaemic can become irrational and even aggressive (as if drunk, suffering from hypothermia or HACE).
- 3) Always assume that any unwell diabetic needs sugar and insist that they take sweets glucose or sugary drinks if you are worried about them. They may make a swift recovery and thank you.
- 4) If you ever have to give rapidly absorbed sugar to a diabetic always follow it with other forms of longer acting carbohydrate to prevent a recurrence and cease activity until a full recovery is made.
- 5) Progression to unconsciousness for a hypoglycaemic diabetic (especially if cold) can be fairly rapid. It is like watching somebody become drunk. Initially they may be a bit vague, may have slurred speech and then lose balance and coordination. They may act out of character and become irrational before collapsing and unable to walk, eventually becoming totally unconscious when they will be unable to swallow. They will lose specific, and later, non-specific pain responses. They are now comatose and death will follow.
- 6) Treatment is to get oral sugar into the patient as soon as possible. If they recover self rescue and retreat may then be a priority.
- 7) If they cannot swallow try using Hypostop.
- 8) If they are unconscious you are unlikely to do any harm by giving one ampoule of Glucagon by im injection. It is preferable to give this after checking a BS measurement and confirming Hypoglycaemia (less than 4 mmol/l). In really adverse weather this may not be possible and the injection should still be given.
- 9) Do not forget to treat any unconscious patient in line with basic first aid advice such as nursing in the recovery/coma position, insulating from the cold etc.
- 10) If they recover after glucagon (it may take 20 mins) and then supplementary sugar and carbohydrates an evacuation must be considered.
- 11) If they do not recover consciousness one is dealing with a full emergency. If possible send details of any BS readings with the detailed message for help. It may influence the equipment and expertise brought to the scene.

It is very unlikely that you will have to deal with an unconscious Hyperglycaemic patient. This normally only occurs if there has been a mistake over a missed insulin dose. The onset is normally much slower which should give you time to monitor the BS level and discuss the management with the patient &/or get expert advice or help.

## **REMOTE AREA DIABETES (SECTION THREE)**

### **TREATMENT OF DIABETIC EMERGENCIES ON A REMOTE AREA EXPEDITION AWAY FROM RESCUE FACILITIES**

- 1) All the principles of care in the Australia and Europe still apply for a hypoglycaemic patient but the decision regarding continuation of the trip for the client becomes more complex and requires discussion once they have fully recovered.
- 2) In a remote area the risk of incidental illness such as D&V or other infection is much greater. Have a low threshold for commencing antibiotics for a possible infection in a known diabetic. Malaria would be a major problem.
- 3) If in any doubt about an unwell diabetic try to get the patient to run a high blood sugar e.g. 10-12m mol/l or 180mg/dl. This is safer than a low BS in a remote area.
- 4) In the event of vomiting use standard oral rehydration sachets liberally. Have a low threshold for commencing Ciprofloxacin (see D&V protocol).
- 5) An ill diabetic (e.g. infection or D&V) still needs insulin even if not eating but they may also need to take extra easily absorbed sugary drinks. Monitor their BS and alter their insulin dose as needed but do not stop it.
- 6) The drug of choice for a diabetic whose BS is rising is Soluble insulin and they can normally administer this themselves with careful BS monitoring. This is only likely to occur in the event of intercurrent illness, trauma or if stuck in a tent in bad weather for a prolonged period with no exercise.
- 7) If a patient becomes unconscious due to Hyperglycaemia (high BS) they will suffer from severe dehydration and this is often the factor that kills them. They need Intravenous fluids. I would suggest one litre given over 2 hours then another litre over 3 hours and then any more you have left at the same rate. It could be given faster under medical supervision.

They may well also need soluble insulin by injection. This should only be given if you have 3 high BS readings (over 20m mol) taken over 20minutes. I would recommend 6 units of soluble insulin half hourly and half hourly BS readings. Four Units of insulin half hourly can be given if they start to recover and the BS readings drop. This should be given at the same time as the IV fluid is trickled into the vein.

Remember that non-sterile fluid can be given at a rate of about 1 litre over 12 hours by the rectal route if no sterile IV fluid is available.

Evacuate as urgently as possible to medical help.