Outdoor accidents—primary care

A symposium on *Outdoor Accidents—Primary Care* was held at Aviemore on 12–13 May 1973 by the North Scotland Faculty of the Royal College of General Practitioners and sponsored by Geigy Pharmaceuticals. Over 300 people attended.

Mr Iain Campbell

Mr Iain Campbell, of Belfast Hospital, Fort William, described the extent of this problem: during the last 19 years 115 people died in the mountains of Inverness-shire. In Scotland a statutory responsibility for search and rescue is vested in the police and during this time 229 missing persons were rescued, at a cost of 10,000 hours of police time.

Outdoor accidents will only be avoided when the public as well as rescue teams have been trained in first-aid and accident prevention; these subjects should be taught in schools.

Mr J. K. Hutchinson

Mr J. K. Hutchinson, Chief Executive of the Scottish Sports Council, said that many sports such as canoeing, orienteering and mountaineering are not competitive and there is no need for the individual to join an organisation and subject himself to any regulations.

In 1955, when the first ski tow was established there were about 2,000 skiers in Scotland; now there were between 25,000 and 30,000. There had been an inevitable increase in serious accidents, not only in skiing but also involving winter mountaineering and snow and ice climbing. Most of these could have been avoided with proper training and propaganda.

The mountain code for Scotland

The mountain code for Scotland lays down:

(1) That equipment must be serviceable and appropriate, and one must know how to use it properly,

(2) one must know the weather forecast,

(3) one must not venture far alone,

(4) one must leave a note of one's intentions and time of departure, route, and expected time of return,

(5) one must have some knowledge of simple first-aid, the symptoms of exposure, and the mountain distress signals.

Observance of this code could save lives. The total accident figures as well as the ratio of accidents to participants were now falling. In 1970 there were 70 accidents including 22 deaths, whereas in 1972 there were 44 accidents with 14 deaths.

Dr Neil Macdonald

A local general practitioner, Dr Neil Macdonald gave a fascinating account of his experiences. Skiing injuries in Aviemore are attended first by local practitioners. During the period 1968–1972 there were 1,632 injuries in Aviemore, an incidence of 4·5–5·5 per 1,000 skiers per day; elsewhere in Europe the range lies between four and eight.

Men were more often injured than women (62 per cent to 38 per cent). The least prone to injury were those below the age of 15, and the most prone were aged 16–20.

Falls caused injury in 61 per cent of cases, collision with an object 12 per cent, another person (eight per cent) or an object usually while skiing out of control, trying to evade an accident (eight per cent); an encounter with the ski-lift T-bar (five per cent), running into a mogul caused the downfall of the remaining five per cent.

Ski release-bindings are important. Most ski accidents do not produce any injury, but if in a heavy fall the bindings fail to release the consequences may be severe. Since 73 per cent of torsion injuries of the lower limb occur through faulty bindings, they should be checked.

Of the injured patients, 68 per cent had torsion of the leg, contusions 54 per cent, 12 per cent had lacerations, ten per cent had multiple injuries, other fractures and strains five per cent, strained fingers four per cent, dislocated shoulder two per cent, fractured finger one per cent, concussion one per cent and various others one per cent.

Fewer injuries occur when the skier is under instruction and when he has checked his bindings, but the worst of all occur in accomplished skiers; ' When the expert falls, he *really* falls '.

Dr N. J. Macdonald

His partner, Dr Neil J. Macdonald, said that at the height of the season there may be as many as 18 casualties a day. To get them to safety a Cairngorm ski patrol has been formed.

On average it takes about 30 minutes to get the patient to shelter—including seven minutes to reach him, seven minutes to examine and splint him, and seven to get him down. He is best put in a lightweight, warm, waterproof, windproof, zip-up casualty bag which leaves only the face exposed, and moved in a wooden box with shallow sides which has been designed for the purpose; it can be sledged down, put direct into the ambulance, and on to the hospital trolley; the patient does not have to be disturbed until he is transferred to a bed in the ward.

Dr Macdonald believed that all fractured legs should be straightened and in cases of gross torsion the seam of the ski trousers shows the direction in which it should be untwisted! He prefers padded Kramer wire splints to inflatable splints.

Incidentally as ski boots are designed to extend higher above the ankle, ' boot-top ' fractures tend to be higher too. Reduction of dislocated shoulders, should be attempted on the spot by the Hippocratic manoeuvre. Never disregard the crying child, he is probably very cold and may be on the brink of hypothermia.

The effects of cold

Dr J. S. Berkeley

' A state of hypothermia exists when the body core-temperature falls below 35°C (95°F) ', was the definition given by Dr J. S. Berkeley of Aberdeen. Cases of exposure occurred throughout the year and of a series of 278 casualties seen between 1968 and 1972, 34 were suffering from exposure. Its danger is that with each fall of one degree Celsius in body core-temperature the metabolic rate falls seven per cent.

Between 37 and 33°C there is initial vasoconstriction with shivering, diuresis and increased pulse rate; between 32 and 30°C muscular rigidity sets in, the mental processes slow, the respiration and heart rates fall, with the metabolism, and atrial fibrillation may occur; between 29 and 25°C there will be coma, multiple arterial thromboses, ventricular fibrillation, and death.

The symptoms of accidental hypothermia are sudden shivering, unexpected or unreasonable behaviour, physical and mental lethargy, abnormalities of vision, which are extremely serious, slurring of speech, muscle cramps and falling.

The devastating effect of ' wind chill ' is not generally realised; this is an index of the convective cooling effect of air at a given temperature and velocity on the skin, and is measured in Kcal/m^2/hr. Showing a graph of wind velocity against air temperature, Dr Berkeley showed that the chilling effect of a wind of 50 m.p.h. at 0°C was equivalent to that of still air at –40°C. In addition this effect is much accentuated by wet clothing.

Further heat loss is prevented by placing the patient in a casualty bag. With vigorous young people this alone is often enough; they are soon struggling to get out because they are too hot. If not, they should be re-warmed at 45°C, their dehydration corrected, and if necessary oxygen or positive pressure ventilation given. There may be pulmonary oedema, with risk of infection, so it is wise to give an antibiotic prophylactically. Dr Berkeley believes there is a place for corticosteroids, but Mr Campbell disagreed. When hypothermia has been present 12 hours or more, slow warming is preferable. There is a re-breathing apparatus which generates heat by the action of carbon dioxide on soda lime. Elderly patients may remain susceptible to further hypothermia for two or three years.

Discussion

In discussion, the audience heard that sunburn conjunctivitis (snow blindness) is commonest at the end of February and in March and April, and goggles should always be worn. Often the patient may have weathered exposure to ultraviolet light during the day but the UVL of the après ski venue proves his undoing.

If one has no low-reading thermometer (and a mountainside is no place to use a rectal thermometer anyway) how does one diagnose death from hypothermia? The answer is not to do so and to assume that the patient is alive and get him down the mountain. Exposure is not usually found in isolation and there are often injuries as well.

How, asked Major Macfarlane (Parachute Brigade), does one manage a patient with a fractured femur who has to be moved when no sledge is available? Dr Berkeley replied that it is necessary to improvise; the ski stick makes a good splint, or the good leg can be bound to the bad; skis can be fastened together to act as a sledge.

Sgt Tanner (Royal Air Force Mountain Rescue) announced a new microcellular polythene bivouac which had the advantage that condensation did not occur on it. This would have many applications.

Mr Eric Langmuir (Chairman of the Mountain Rescue Committee of Scotland) pointed out that ' if we succeeded in eliminating risk we should eliminate the adventurous sports '. The Scottish winter is unique—even in July, conditions on Cairn Gorm (4,084 ft) can be sub-arctic. Winds redistribute the snow and make drifts up to ten metres deep. When the snow has no attachment to the polished surface below (ice or smooth rock, give no anchorage), potential avalanches are formed.

Survival depends on depth and time buried, for most deaths are caused by suffocation, so there is no time to lose. First is the search by the victim's party, then an organised search is set up like a military operation with the party armed with probes 290–300 cms (eight to ten feet) long, but since the chances of saving a deeply buried person are poor, usually only the top 180 cms (six feet) of snow are explored. Finally the ground is covered by trenching. Experienced rescuers know where to start looking and this can save much time. Trained dogs, however, are the best means of finding the victim.

Equipping the mountain rescue team

Dr Michael Taylor

Dr Michael Taylor (Peterhead) listed the equipment carried by the mountain rescue team; it includes one stretcher, one leg splint, one inflatable splint, two Kramer splints, one large polythene bag, one casualty bag, one Balaclava helmet, one safety helmet, two rucksacks, two vacuum flasks, one Brook airway, dressings, scissors, self-heating soup or a stove, and other items.

He recommended that in an accident, contact should be made with one of the 31 rescue posts or the police, who will arrange the rescue. In Scotland there are four track-laying ' Snow-trac ' vehicles for rescue purposes but often it is just a hard slog on foot under horrible conditions, perhaps for a false alarm.

In Scotland there are no charges for rescues, but in some countries the victim is required to pay the bill and in Switzerland it may cost £2,000–£3,000.

Dr Macdonald said the first move to take with an avalanche victim is to clear his airway, which may be obstructed by wet snow or powder snow which becomes compacted into ice blocks in the air passages. There was once a case of pneumothorax from ice crystals in the lungs.

Helmets have helped enormously to reduce the severity of head injuries and the number of deaths. In rock-climbing they should be mandatory, but there should be a balance of strength and weakness in their design—too strong a chinstrap and the neck may be broken. To avoid the possibility of strangulation Dr Donald Campbell recommended the chin cup rather than the strap.

Mr Ian Campbell said it was the hillwalkers and not the mountaineers who increased the outpatient and inpatient figures. We must not stifle adventure, children and their teachers must be educated, for those most at risk are the young, whom we can least afford to lose. Nor must

we see the problem out of perspective, as the number injured in climbing accidents is much fewer than in road accidents.

Road accident services

Dr Kenneth Easton

In 1966 there were 392,454 people hurt in road accidents in Britain, of whom 100,000 were seriously injured and 8,000 killed. In the absence of a government initiative a road accident after-care scheme was founded in 1967 in the West Riding of Yorkshire as a charitable organisation operated voluntarily by local general practitioners, now numbering 34. There are now 36 such schemes operating in Britain and the doyen of this enterprise, Dr Kenneth Easton (Catterick), said that the general practitioner's main consideration should be to help the seriously injured and not to save lives—that is incidental. He must therefore:

(1) attend to the airway and ensure oxygenation to prevent brain damage (the so-called ' lame brain '),

(2) conserve or restore the blood volume,

(3) ensure that injured persons are carefully extricated from the crash, especially where there may be spinal injury.

It is important to prevent the public *bundling* the victim out of the car, as this may well make his injury far worse; to prevent secondary trauma he should be secured against a spinal board fitted with ' Britax ' straps but, if special equipment is lacking, the neck at least can be safeguarded, as an effective collar can be made out of folded newspaper. This also serves to hold the chin up and stop it falling and distorting the airway.

There is no point in wafting oxygen over the patient if his airway is blocked. One must ensure that the passage is patent, and without a laryngoscope it is possible to intubate the patient blind, using two fingers to guide the tube down, but among their equipment doctors in the scheme *do* carry laryngoscopes, endotracheal tubes for adults and children, *and* Brook airways, *and* a ' space blanket ', i.e. a rescue blanket to prevent hypothermia, as well as inflatable long arm and long leg splints. These can be used to give autotransfusion, as they force blood from the limb back into the trunk.

It is also important for the doctor on the spot to let the local hospital know what to expect when the casualties arrive, for resuscitation equipment must be ready in hospital. He also talks to the crash victim, knowing that reassurance is one of the best analgesics there is. Although the hysteric does not always rate much sympathy at a time like this, she too has a need and she should be entrusted to the care of a bystander.

Since the road accident after-care scheme was started in the 1,000 square miles of the West Riding there have been 2,000 accidents and 1,000 calls for the general practitioner. There have been only seven deaths partly because of the skill and also because of the speed with which the doctors arrive. On average they take only nine minutes to reach an accident.

The whole operation was however a co-operative venture, and Dr Easton paid warm tribute to the police who, in addition to their prime duty to protect the scene from secondary accidents, perform an invaluable service of co-ordination and communication.

Difficult and hazardous extrications are carried out by the fire brigade, who cannot be overpraised for their skill, courage and efficiency, while the ambulance crews (who deserve better ambulances, with the stretcher placed centrally for easier access) accomplish their exacting task excellently. The success of the whole road accident after-care scheme depends on teamwork.

Hospital Flying Squad

Mr John Collins

Derby has an alternative arrangement more suitable for an urban area—a hospital flying squad—described by Mr John Collins (Derbyshire Royal Infirmary). It is equipped for all emergencies except cardiac and obstetric and there is always one team on call; if it is called out, a second, similarly equipped team is available for any further call. The equipment includes a Thomas's splint which is collapsible for neat storage and reassembles on the same principle as a blind person's stick.

Dr Keith Little

For people who die within five minutes of injury there is little that could have been done anyway, but for those dying within 30 minutes there might well have been a chance if they had been given prompt attention. " Speed is therefore essential ", said Dr Keith Little (Derbyshire Royal Infirmary). It is, however, not possible to say how many patients one actually *saves*, though one certainly *helps* a high proportion of them.

The circulation of the young and fit cannot be overloaded with intravenous fluid, so one should give up to double the estimated requirement. He wondered if we ventilate often enough.

One must be wary of extricating a patient trapped in his vehicle: pressure on his abdomen may be controlling haemorrhage and when he is released he may collapse.

Morphine is a respiratory depressant, and pentazocine (up to 60 mg intravenously) usually gives satisfactory analgesia for half to three quarters of an hour.

The semi-prone position

Dr Alan Booth

Dr Alan Booth (Inverness Hospital Group) declared that *any* drug we give may depress function; a patient may lapse into a coma on account of drugs just given or drugs taken some time before, as well as through head injury or continuing blood loss. Vomiting is common enough at the accident site anyway, but " morphia plus motion equals emesis ", and if he is supine he may be too weak to clear his own airway of vomit, blood and secretions. Even slight blunting of the pharyngeal reflex can lead to blood being swallowed from his nose. Other causes of airway obstruction are the tongue, and orofacial damage. It is not enough to watch the chest wall—it may go in and out even though obstruction is present, and the effort only increases the respiratory work. Dr Booth therefore emphasised " *the utter life-saving efficacy of the semi-prone position* "; putting the patient in this position is nearly always feasible (exceptions include spinal injury) and is easy to do.

Endotracheal intubation is sometimes desirable, but the period of attempting intubation is a period of hazard, in which the patient may vomit. The tube itself may cause an obstruction: it may be too narrow, it may kink or accumulate foreign matter in the lumen; the patient may bite it. If it is too long it may enter a bronchus and cause one-lung respiration, which is dangerous. Some patients cannot be intubated because of some anatomical peculiarity or injury.

One should learn technique by practice on simulators, not forgetting the essential preliminary head tilt manoeuvre. Since the object of intubation is to ensure a free air passage *and* to prevent the entry of foreign material into the trachea, a cuffed tube should be used. When the time comes to remove it, the patient should be on his side in case it makes him vomit, and pharyngeal toilet should be carried out, in Dr Booth's hospitals the ' Ambu ' sucker is used.

Helicopters

Mr Andrew McClure

Evacuation of the injured is sometimes very difficult, especially in Scotland, where trunk roads may be only about seven metres (22–24 feet) wide. Juggernauts are themselves four metres (14 feet) wide and so when they jack-knife they seal off the road and prevent access to an accident beyond.

Mr Andrew McClure (Chief Constable, Inverness Constabulary) stated that plainly the only way to reach these inaccessible road accidents with medical aid, and evacuate the injured, is by helicopter, but they are costly: the five-seater costs £70 an hour. The ideal aircraft, in service in Germany, lifts off with medical team and equipment, and can lift two stretchers from the roadside. The cost of three of these aircraft, with money left over to run them, is less than half the cost of half a mile of motorway. The objections that helicopters could not fly at night, or blind, or against a strong headwind, have been overcome by the production of a new two-engined model which can fly by instruments.

In general, the best procedure for requesting a helicopter is to telephone the ambulance control, stating that one is a doctor, and giving details of the situation, including the height of cloud.

A communal responsibility

Dr E. V. Kuenssberg

The meeting was summed up by Dr E. V. Kuenssberg, Chairman of Council of the Royal College of General Practitioners. He put forward the term 'accident-ripe' in preference to 'accident-prone', and emphasised the need to involve the whole community, making the public responsive to and responsible for accidents. Onlookers are nothing but a nuisance. He noted that in one European country, driving culprits are made to work in casualty departments at weekends.

Finally, all those who had contributed to the symposium were given an enthusiastic vote of thanks and Dr J. D. Macdonald, Honorary Secretary of the Faculty, was particularly warmly applauded for his part in the organisation.

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