Emergencies in the Home

How I would treat hypothermia and exposure

JOHN C FRANKLAND

When asked how I would treat hypothermia and exposure my first thought was—with respect, as old adversaries who can be rather challenging. My second thought was that in the home I would not expect to meet this condition very frequently but, because of a special interest in the Yorkshire Dales, would see roughly 80 cases out-of-doors to one in the home.

Every social worker is now aware of hypothermia in the elderly, but it is still neglected in the training of doctors. I recently asked an audience of keen young general practitioner trainees who were zealous of the adequacy of their emergency equipment how many carried a subnormal thermometer and found that none did. Hypothermia is defined as a core temperature below 35°C. A problem with such terminology is that it implies that everyone with a core temperature marginally above this level is free from risk. In the intensive care unit they may well be, but in a threatening and cold environment, where deterioration may be rapid, this is far from the case. Exposure lacks a precise definition, and perhaps the "exposure-exhaustion syndrome" is more apt. It certainly is more likely.

Any general practitioner near to mountains, beaches, caves, or open water may be called to treat victims of hypothermia. Death may be rapid—for example, within one hour in caves[1]—and there may be several victims, which is unlikely at home. On one day we have had nine exposed fell runners and on another up to 10 exposed cavers. In the home the victims are infants, drunken or suicidally-minded adults, or more commonly the elderly, many of whom will be gravely ill from other causes.

Diagnosing hypothermia

First a degree of suspicion is essential. If your own hand is warm then laying it on the person's forehead will give the first clue. If this feels cold to the touch then place the hand on an area of the trunk that is normally covered. If this also feels cold then you must assume that hypothermia is present until proved otherwise by means of a subnormal thermometer inserted into the rectum and read after three minutes. Any chemist can supply a subnormal thermometer. Buy at least two, because you may be called on to use it in conditions where your own hands are cold and you may break it through fumbling.

Managing patients with hypothermia

The doctor must insulate the patient, warm the room, and then transfer the patient to hospital. As a first wrapping a "space blanket," which may be bought for under £1 in most climbing or outdoor pursuit shops, will minimise radiant heat loss in patients at any age. If you do not have one then aluminium cooking foil from the kitchen is a good substitute. Then wrap the patient with blankets or whatever dry fabric is to hand. Surprisingly, many forget to insulate the head and hands. Outdoors with any wind blowing a heavy duty polyethylene bag will give much more protection than a space blanket.

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Preventing well-meaning neighbours from applying hot water bottles indiscriminately may be difficult, and they should be discouraged from doing this if one has to leave the patient to telephone. In hypothermia a large pool of cooled blood in the body shell is isolated from the circulation owing to peripheral circulatory stasis. Applying heat indiscriminately to the skin may just open up this reservoir and the return of this cooler blood to the core can be disastrous.

The patient should be handled as little as possible, and ambulance colleagues should be requested to keep the patient horizontal if this is feasible. The ambulance heater may have been set just for the comfort of the crew and if so should be moved to maximum output and the doors kept closed until the patient is at the ambulance.

Perhaps all infant hypothermia is due to negligence and most likely if the parents are educationally subnormal or mentally distressed, so you should look for other features of child abuse and consider calling in social workers. Ambulance services will supply a warmed incubator on request.

It is difficult to justify home management for elderly patients when studies done in hospital show death rates of 50%.[2] Obtaining a hospital bed for elderly patients is always a problem for some doctors. Geriatric units may keep open a special bed for hypothermic patients so that admission is facilitated. If such patients are occasionally found to have "warmed up in the ambulance" and are not too profoundly chilled on arrival then maybe the fault is with the system and not with the sentiment of the referring doctor.

DRUGS

The place of early drug treatment for cold patients is controversial and is well reviewed by Maclean and Emslie-Smith.[3] Many elderly patients will have life-threatening disease which must be treated initially, bearing in mind that drug actions may be unpredictable at low temperatures, that oral medication and even parenteral medication injected into cold muscle will be minimally absorbed, and that drugs are best given intravenously in titrated small doses.[4] This advice must be qualified by the fact that finding veins in hypothermic patients may be extremely difficult. It is easy in five minutes to mutilate the few promising sites for later vital intravenous infusions in hospital.

The once routine use of parenteral hydrocortisone for elderly hypothermic patients is now not advised[5] except perhaps as a last resort, but because many subsequently develop respiratory infection, it is worth while giving parenteral penicillin.[3] Intravenous glucose has been advocated,[6] but the brutal Dachau experiments showed that hyperglycaemia develops in direct proportion to the degree of hypothermia[5] so that primary care would not seem to demand intravenous dextrose. My last hypothermic patient in the home, however, was also a diabetic, and only with intravenous dextrose did she regain consciousness, start to shiver, and confess to missing her meal the previous evening.

Treating exposure

For victims of hypothermia in remote spots the basis of treatment is still insulation and evacuation. With a core temperature below 35°C—that is, hypothermia as defined—forcing them to exert themselves will cause a net heat loss by opening up the peripheral circulation and thus accelerate deterioration.[4] Patients must be carried. Traditionally removing wet clothing and replacing it with dry insulating clothing

is taught,[7] but in practice most rescue teams will minimise further chilling by just removing outer wet clothing and putting their dry insulation round the inner wet clothing, which will be at skin temperature. The type of fabric used varies, but Keighley[8] has shown that a synthetic fibre pile "Eskimo" sleeping bag is the most efficient, which as a bonus retains high insulating qualities when wet. In cave rescue a thick Neoprene exposure bag is almost routinely used because further immersion during rescue is likely.[9] Since the "wind chill factor" can be more cooling than the air temperature[10] it is mandatory that whatever fabric is used must have a totally windproof outer layer.

In English mountains many rescue teams now consider delaying evacuation to allow a short period of stabilisation on site. With a large survival bag tent (Karrimore*) round both the victim and rescue team, wind chill is prevented, the air temperature is raised, injuries can be tended to, and adequate insulation is supplied to the victim. Evacuation by helicopter is justified if weather conditions permit.

In 1972 Lloyd[11] described airway rewarming as the first on-site method of treating hypothermia, and in 1974 a report appeared of its successful use in the field.[12] Since then the method has aroused controversy. In 1975 a portable device (the Reviva†) was marketed and recommended as the method of choice for on-site treatment of acute onset hypothermia.[13] Since then Auld[14] has studied the technique in dogs, claiming negligible benefit, and Collis *et al*[15] reported a significant advantage in reducing temperature "afterdrop" in man, making it the preferred first-aid technique. In the world of mountain and cave rescue many anecdotal stories attribute survival to this technique, and American rescue teams are rapidly acquiring such equipment. The heat supplied is only of the order of 5·0 kJ·m⁴ an hour but it can also prevent the normal respiratory heat loss of around 35 kJ·m⁴ an hour,[16] which probably the largest source of further heat loss in those with peripheral circulatory stasis and profound skin cooling. Preventing this loss and giving some added heat as a bonus is all that can be done for the victim on site apart from insulation, to which they are adjuncts and not substitutes. Perhaps "airway insulation" should be used instead of airway rewarming.

Other available rewarming techniques are chemical heat packs, used by the US militia and European rescue teams, but these are not supported with precise details of effectiveness, and the Thermal Sarong,‡ whereby heated ethylene glycol circulates through tubing in a sleeping bag. Both of these carry the hazard of dropping core temperature by opening up the flow of cold, pooled blood in the periphery if used indiscriminately.

I have just been given but not yet used a simple piece of equipment for airway insulation during evacuation. A light-weight face mask has a 6 in length of anaesthetic tubing with a cardboard air filter attached. The tubing is placed inside the victim's anorak or sleeping bag. He then breathes the air slightly warmed by his own body and with high humidity retained by the filter (ELI Lloyd, personal communication). Reducing respiratory heat loss is the sole aim.

A long rescue lasting several hours through hostile conditions may be inevitable for victims of exposure on mountains or down caves where the victim cannot expect optimal hospital care. Most will have detectable ketones on the breath. We feed and offer warm drinks to our victims but the apathy that accompanies the exposure-exhaustion syndrome makes most of them reluctant to take sustenance.

A practical difficulty during prolonged rescue is in monitoring body temperature. Although academics would claim that only rectal or oesophageal temperatures are relevant, I know of no one who has found this practical on cold mountains or down caves. An effective cocoon of insulation round the whole body is necessary to allow spontaneous rewarming and disturbing this to measure rectal temperatures would be detrimental, not to mention difficult, with the victim splinted and strapped in a stretcher. A subnormal thermometer kept under the tongue for three minutes will give a temperature several degrees below core temperature but by measuring *changes* in this level in practice one can ascertain if the patient is rewarming or cooling. Such a measurement should not be done within half an hour of giving a warm drink.

I have not personally seen a victim in the state described as "warm euphoria" where cerebration and judgment are impaired by cold so that clothing is discarded. Often those collapsed have been carrying but have not donned insulating clothing or have ignored a nearby source of shelter. Scottish teams have described following a trail of cast off clothing to a dead victim.[17]

A difficult decision with hypothermic victims is in determining whether life still exists. Niazi and Lewis[18] described recovery after one hour of cardiac arrest, Golden[19] has pointed out that many found apparently drowned wearing lifejackets are hypothermic and savable, and children submerged in cold water for up to 45 minutes have recovered without cerebral impairment.[20] Within the constraints of commonsense the diagnosis of death from hypothermia can only be that of failure to resuscitate.

In severe exposure hypothermia of young and fit people who were rapidly chilled and profound particularly who are deteriorating clinically, active rewarming as soon as is practical is desirable and lifesaving.[21] If helicopter evacuation is not feasible then immersion in a warm bath at the nearest house may be necessary and facilities for this should be organised during, not after, rescue. Place the trunk but not the arms and legs in a bath of water at 41 C or as hot as your elbow can stand if no thermometer is available. A cold victim will rapidly cool the surrounding water which must be constantly stirred and its temperature maintained by "topping up" so that around 40 gallons of water are necessary. Many victims show aggressive, uncontrollable movements after immersion so that the head must be kept as low as is safe and be firmly supported. Medical supervision is desirable during this treatment as hypotension, cardiac arrhythmias or arrest, and hypoglycaemia are theoretically possible.[4] The shortening of the "after drop" in core temperature is the immediate aim.* General practitioners in mountainous and marine areas should be aware of the benefits of this technique.

Fortunately many of our victims out of doors are young and resilient, with a better prognosis than the cold elderly.

I thank Dr Evan L Lloyd, South Lothian Health District, Edinburgh, for his helpful comments on this article

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* Mountain Instructors Survival Bag from Karrimore Products, Avenue Parade, Accrington, Lancs.

† Made by Peter Bell Engineering, The Slack, Ambleside, Cumbria. Similar equipment is marketed as EMS O_2 Thermogen, made by Electro Med & Vari Tech Service, 932 Esquimalt Road, Victoria BC, Canada and as "The Little Dragon" made by M F Mitchell, Cappleragg, Kentmere, Kendal, Cumbria.

‡ Manufactured as Warm-RITE by Energy Systems Corp, 1 Pine Street, Nashua, New Hampshire 03060 USA at about $1800.

Pitfalls in Practice

Finding a practice

II: The interview

JOHN OLDROYD

This article is based on an audiovisual presentation made for vocational trainees in general practice by the MSD Foundation.

Last week Dr Ian Keen, young and newly married, searched the advertisements in the *BMJ* for a place on a family practitioner committee list. He decided to apply for this one:

> THIRD PARTNER to join two established principals in Elysium on Thames. The practice is conducted from owned premises in this market town which has excellent ranges of housing and good schools. Ancillary staff employed, attached health visitor and district nurse. Salary £8000 at start with review. Curriculum vitae please to Drs Sharp & Idle, Regency House, The Market Cross, Elysium on Thames.

Ian's curriculum vitae was one of many to arrive at Regency House, and Dr Jack Sharpe and Dr Alfred Idle considered that on paper he showed promise. The fact that Jack Sharpe, like Ian, was also an old boy of Workhouse and St Enoch's Hospital and thought Keen would be the right type for Elysium was, of course, an undeniable factor. And so far as Idle was concerned, any doctor with a young and newly acquired wife was well worth meeting.

Dr and Mrs Keen were given a date and time to visit the practice. The interview progressed well, though Idle—Illthwaite Grammar and Redbrick—was decidedly cynical about the frequent references to the Master's house and the hospital fifteen. Nevertheless Dr Idle assessed Keen as full of energy and enthusiasm for work and gave Sharpe the nod during the interview which gave him the go-ahead to offer to Keen the post of junior partner.

SHARPE Well look here, Ian—I'm sure you don't mind me calling you Ian—you're just the chap we are looking for. I think both Alfred and I agree we'd like to invite you to join us as a partner.

KEEN Thank you very much, Dr Sharpe. I am sure it's what I am looking for. You have been very clear with your description of the practice.

IDLE Well, you've certainly asked a lot of searching questions, and I am pleased you like the way we have it organised. One thing we have to talk about is money. Jack and I have built up a practice we are proud of and as senior partners we are glad to have an enthusiast like you joining us. But, of course, with your abilities you will quickly be in a good financial position.

SHARPE Yes, of course, we think our offer is fair. We want you to be a salaried partner, though I believe the fashionable term is "a partner receiving a guaranteed share." Then you'll know just where you are—I wish I had known when I was setting up—so you won't have to worry about your income being dependent on profit or losses. We'll offer you £8000 a year for starters and, if all goes well, increase this by £500 a year to £9500. In addition to this we'll go further and promise that in any year that your salary doesn't come up to a third of Alfred's and my share we'll bring it up to that point.

KEEN That sounds about what is on offer in the *BMJ*, but some of the ads carried higher rates.

IDLE Ah, but did they say whether that included the expenses? We shall be paying all the practice expenses and, anyway, I bet some of them were in pretty grotty places.

KEEN Yes, that's true, but is there to be any increase to parity subsequently?

SHARPE Ian, none of us knows what things will be like in practice in three years. We'll all have to get together and think about that again. We shall give you three weeks' holiday a year and, if you want it, some study leave as well. You'll get a half-day a week, and there'll be some weekends off as well. We'll work out a rota, anyway. Of course, we don't want to use these deputising services—our patients deserve better than that.

KEEN Well, that sounds reasonable.

SHARPE Good. Then this is splendid. We can shake hands and you're starting on the first of the month after next, then? I must say the amiable way we've settled this is a good omen for the future. The word of an old Workhouse chum is good enough for me and even Alfred won't object even though. . . .

During this "all good fellows together" discussion, Ian Keen's mind, which doesn't often turn to legal matters, remembers he has received a few golden rules on his vocational day-release course about partnership agreements. One pops into his head now:

All potential future partners are not necessarily gentlemen and honourable

While discussions are going on all appear to be so, but it may take some months for their true natures to emerge. Acrimony creeps into many partnerships; if the partnership is merely one of will it offers no security to anyone. Where the conditions of the agreement are written down in an agreement, then, when disputes occur, at least there is a definite basis on which to resolve them. Dr Keen should therefore insist on the partnership being based on a drawn-up partnership agreement so that he can study the details.

KEEN Yes, but I'm sure you must feel as I do that it's wise for us to have a partnership agreement in writing so we can get down on paper details about my income and my duties in the practice and something spelling out all our responsibilities.

While saying this in a somewhat embarrassed fashion—after all Sharpe and Idle, who seem decent fellows, are looking rather pained—Ian also recalls:

A medical partnership is not only an association between professional colleagues

. . . it is also a business arrangement. What's more, whether or not there is a written agreement, if the conduct of the parties makes it

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appear that they are acting in partnership the law states that they are partners to the outside world. Partnership is in itself a subject of much law—for instance, partners are responsible for each other's debts. Dr Keen should evaluate the financial probity of his future partners.

Prompted by Keen's wish to get things down in writing, Idle gives Sharpe what is obviously an old-fashioned look. But the urbanity of Jack Sharpe, learnt as chairman of all those committees, doesn't desert him at this stage.

SHARPE Quite right, Ian. If you feel it necessary, you say so. Alfred and I can, I am sure, rely on you; but if you feel happier we can go along with you. Let's write it out here and now. You can spare another 20 minutes, I suppose—no train to catch when you have your car outside. I suppose you'll have that to do your rounds in, eh?

Sharpe glances out of the window at Ian's beloved, but now aging, Capri. An amalgam of his 21st birthday presents and life savings. However, Ian has also heard that:

Doctors are rotten businessmen and abysmally ignorant of partnership law

. . . consequently it's worth paying a small fee to draw up an agreement now rather than pay the "princes" of the legal profession enormous fees when disputes occur later.

KEEN Don't you think it would be better if perhaps we had a solicitor draw it up? I am a bit of a novice when it comes to legal matters.

Idle is looking singularly uncomfortable and is clearly beginning to regret his previous compliance, but Jack is on familiar ground.

SHARPE We seem to have got ourselves a wise young man as well as a good doctor, Alfred. Look Ian, I think you're right. I'll be seeing Peter Bonamie tomorrow. He's our local legal "eagle," and I'll get him to draft it out and send it in the post. That should suit you, eh? I am sure there won't be any problems. As soon as it is all signed, sealed, and delivered. . . .

There are smiles all round. Sharpe and Idle can rely on Bonamie, their long-standing friend and associate, to produce what they want. Ian is happy. He hasn't ruined his chances by being punctilious, but he has forgotten another golden rule:

The lawyer drawing up an agreement will not necessarily look after the interests of all parties

He will do his best, but the basis of the agreement is what the parties instruct him to put in under the various headings he knows are necessary. Also, because few lawyers understand the way in which GPs are remunerated, it's as well to ask around for firms who have experience in this work. But each of the partners should ask his own and separate adviser to scan this legally. Ian should obtain an independent opinion on the legalities and also ask a colleague with experience, perhaps the secretary of the local medical committee, to advise on the contract for him personally and an accountant to advise on the financial and tax implications.

They part amicably with hand shakes and congratulations all round.

This is the second of four articles on finding a practice.

Clinical Curios

We have used ultrasound to treat nine patients for pain in the early and late stages of herpes zoster and have achieved sufficiently dramatic results to report on this. We know of others who have had success with this technique, but know of no published report.

We apply ultrasound over the painful area and not necessarily over the nerve root in a dose of two minutes of 1 MHz of 0·25 W/cm² for each 12 cm² (2 square inches) using liquid paraffin as a couplant. For a large area we have used the same dose per area. Treatment has been given daily except at weekends. There has been only one side effect when a second treatment was given only 17 hours after the previous treatment—a "drawing feeling," which disappeared within a day. Twelve treatments are the most we have used.

A 58-year-old woman with herpes zoster of the right infraorbital nerve needed analgesics day and night. After the first treatment with ultrasound she had her first natural sleep for six weeks. After nine treatments she was free of pain and has remained so.

A 72-year-old man had herpes zoster of the right upper neck spreading in to his hair, and he needed analgesics night and day for two months. He held his neck rigid to minimise the pain. He improved after the first treatment. After nine treatments he was free of pain. He reports that particularly on cold days he has discomfort and needs some analgesics.

A 56-year-old woman became depressed and unable to face doing housework four weeks after pain from herpes zoster had started despite the pain being dulled by analgesics. After the first ultrasound treatment she was free of pain for the first time. Soon she was doing housework, and after 12 treatments she was completely free of pain.

An 87-year-old woman had had pain for two years after an infection with herpes zoster. She had not had one night's rest without drugs. After the first treatment with ultrasound she improved greatly, and after six treatments she was so relieved that she now needs only one-quarter of the amount of analgesics to relieve the residual discomfort.

A 90-year-old woman with a large area of buttock and groin affected by herpes zoster started to develop pain three days after onset of the infection. Ultrasound treatment was given at the active blistering stage and the pain stopped. After three treatments she said she did not need any more and does not need analgesics.

A 45-year-old man had a small area of herpes zoster growing near his eye. When the pain started he was given analgesics, but after the first and only treatment with ultrasound they were not needed. The vesicles continued to increase as expected, but the pain has been minimal.

In every case there was immediate relief after the first treatment. Some pain usually recurred after a few hours but progressively lessened with further treatment. Idoxuridine 5% (Herpid) had been used in all cases before the pain started but had not prevented pain.

We think that ultrasound should be further studied for treating patients with herpes zoster, and we have the impression after treating four early cases, two of which are included here, that it is even more effective for the early cases than the late cases.—ARTHUR GARRETT, general practitioner, MARY GARRETT, physiotherapist, Reepham, Norfolk.

A man of 65, who seldom complained of anything, came to my surgery one summer saying that he had a boil. It was much bigger than any boil he had had before and was giving him a lot of pain and disturbing his sleep. He did, indeed, have what looked like a large boil on the right lower part of his anterior abdominal wall. A course of antibiotics and kaoline poultices seemed to produce some localisation and the discharge of some pus, but the lesion persisted. As there didn't appear to be a very active tissue reaction round the "boil," only the local treatment was maintained, and the lesion discharged pus intermittently but did not resolve.

This lack of progress led me to reconsider the diagnosis, but there was no history of any injury, either internal or external, and all his other bodily systems appeared to be behaving normally. I therefore referred him to a friendly surgeon, who found in addition to a large quantity of pus a fishbone some 4 cm in length. The abscess then healed promptly without any trace of a fistula from the bowel developing and the patient swore that he hardly ever ate fish.—MIKE COURTENAY, general practitioner, Battersea.

We will be pleased to consider for publication other interesting clinical observations made in general practice.—ED, *BMJ*.

Correction

Beyond the Surgery: General practitioner as coroner

In this article by Sir Montague B Levine (17 January, p 196) the final sentence in the third paragraph should have read: "It is an excellent course and Britain is unique in providing this special qualification."