

The South Manchester Accident Rescue Team and the earthquake in Iran, June 1990

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On the night of 20 June 1990 an earthquake struck the northwestern provinces of Iran. The huge scale of the disaster was apparent immediately—it was thought to be at least similar to that of Armenia in December 1988.

The South Manchester Accident Rescue Team (SMART) was included as part of the aid package offered by the disaster unit of the Overseas Development Administration on behalf of the United Kingdom. The dispatch of the team and its equipment was delayed when the Red Cross in Geneva stated that foreign medical aid was not required. Clarification was sought by the disaster unit from the British interests section of the Swedish Embassy in Tehran. The response to a telex from the Fontmell Group on Disaster Relief to the head of the United Nations Disaster Relief Organisation (UNDRO), however, was confirmation that the ministry of foreign affairs in Tehran was ready to receive the team. We made our own travel arrangements, and the account was settled by the Overseas Development Administration. Although we had been ready to go 12 hours after the earthquake, we left for Tehran on Tuesday 26 June.

The pooled experience of the team already encompassed the Bradford fire, the Air India disaster, the Manchester Airport fire, the gas explosion at Chelubynsk in the Soviet Union, the Armenian earthquake, and the Lockerbie air disaster.^{1,3} To meet its local responsibilities the team has identified suitable doctors and nurses and trained them in disaster management. Members are well known to each other, and the social cohesiveness of the group is essential to its success. The team selected for Iran included four women, three of whom were nurses. They wore Islamic dress throughout the stay, starting when we boarded the Iran Air flight in London. The medical specialties represented were accident and emergency medicine, general surgery, plastic and reconstructive surgery, anaesthetics, and intensive care.

The experiences of Armenia and Chelubynsk have enabled the team to identify the essential equipment for this work and the quantities required and the whereabouts of the equipment within the South Manchester Health Authority. Requisition numbers have been listed and circulated to relevant departments. One phone call to the duty stores manager activates the mobilisation of our equipment. A similar process secures the personal medical kits and drugs from the pharmacy department. Such a system ensures that our equipment and supplies are part of district supplies and therefore constantly turned over. Products will not expire on the shelf between trips, nor will resources be wasted by lying unused. This is important: there is no budget for this work. If another country asks for help and the foreign office agrees then the cost is refunded in full, but there is no money "up front" for preparation, which must be funded from within existing resources. The same applies to preparing for disasters at home. SMART is a registered charity.

We assume the host country has nothing, not even basic dressings, and that international medical aid will not make it to the front line in time—and not at all

unless accompanied all the way by doctors who can use it.

It was policy at that time for SMART to send a 10 person team to work five days continuously on site, excluding rest and travel, with equipment for treating up to 100 patients. The team is self sufficient in food, water, surgical equipment, dressings, and drugs. The travel to the scene is tiring and the work is stressful. After five days on scene exhaustion, both mental and physical, will be established. This will reduce the effectiveness of the team and increase the risk to the patients who they have come to treat. It is extremely difficult to turn your back on large scale suffering and a strict rule to disengage after five days must be accepted by the team before leaving Britain. After appropriate rest the team is fit to return to its NHS work. A series of teams from across the United Kingdom could extend the period of medical aid to several weeks.

Working in Iran

We arrived in the early hours of Wednesday 27 June and were issued with entry visas at Tehran airport. Our supplies and equipment had been unloaded and stored with all the international relief, in spite of our efforts to prevent this, and locating it took several hours. On arrival we were allocated an interpreter who stayed with us at all times. From the moment of our arrival to the time of our departure we were treated with warmth, courtesy, and profound gratitude.

SMART was asked to start its work in the Iranian air force military hospital in Tehran. The most serious casualties had already been evacuated from the earthquake area into Tehran, largely to the air force hospital. It was clear that there were many patients from the earthquake still awaiting surgery some eight days after the disaster. It was agreed the team would begin operating at once.

The work was divided into three related categories: triage, surgery, and postoperative care. In addition, some teaching took place.

TRIAGE

The accident and emergency doctors attended all the wards to examine and where necessary treat patients from the disaster. Patients requiring surgery were identified and given priority. Each day patients were listed and sent to theatre. When the list was full the accident and emergency doctors assisted the theatre team. Operative intervention was limited to those who might die without surgery. It was withheld from those who would live without surgery and those who would die in spite of surgery, largely patients with crush injuries and established renal failure in whom the outlook is known to be poor.^{4,5} These difficult decisions were always discussed by the whole team.

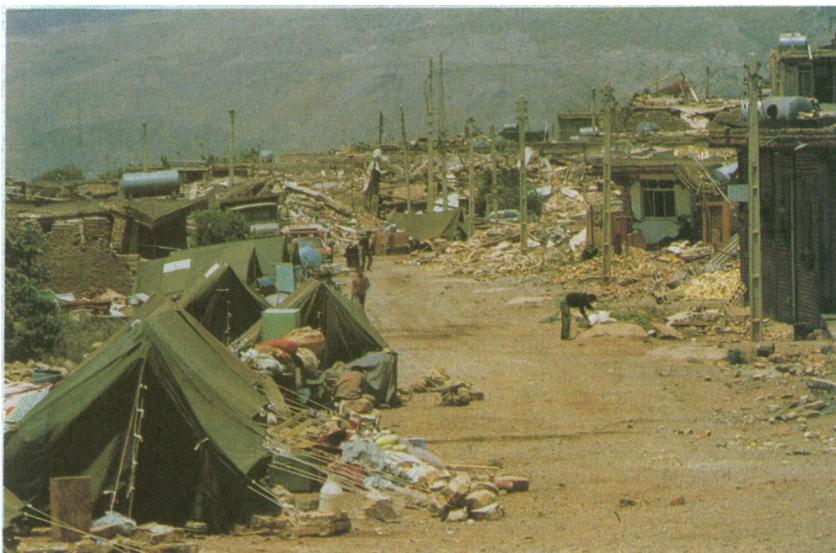
SURGERY

Local medical staff failed to recognise the need for amputation, even in the presence of florid gas gangrene. The temptation to wait just one more day can be too seductive, particularly for those who are closely involved. Social and economic pressure from relatives

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Scale of the Iran earthquake

REX/SPAL JAWAD

can make the decision to amputate difficult, and limb fitting and prostheses are not as advanced as in the West. A foreign team, if suitably experienced, can perform these tasks more easily. It was essential to include a plastic surgeon who had special knowledge of crush injuries.

Radical and repeated wound debridement was the main operative procedure and was followed by reconstruction. We have found that the specialty of plastic and reconstructive surgery is not well developed in the countries we have visited. We are equipped to do large skin grafts, mesh grafts, and, in complex wounds, some of the simpler skin flaps. This was of great interest to the local surgeons.

Surgery for two patients was planned on the understanding that further reconstructive work would be completed in Britain. Masha, a 2 year old girl, incurred a deep facial wound after prolonged compression under the rubble. The wound was surgically debrided several times. The facial nerve had been transected but will be soon reconstructed in a British hospital. Nafisa is a 4 year old girl who was trapped under the rubble for 36 hours. Her left leg was unsalvageable. A through knee amputation was avoided on the understanding that a microvascular flap would be applied to the below knee stump on her transfer to Britain. She also had a crush injury to the forehead, which exposed a large area of her skull. This was covered by a scalp rotation flap, which can be returned and tidied up when the leg stump is resurfaced.

The Iranian surgeons in charge of the cases were consulted each time. Our assistance was always welcomed and led to further consultations, including many unrelated to the earthquake.

The facilities for anaesthesia were poor with no piped gases in the operating theatres. The team must have anaesthetists prepared to work in very different circumstances to those in Britain. Anaesthetic equipment and choice of anaesthetic agents were limited but adequate. Most procedures were performed under halothane anaesthesia (provided locally) using morphine (provided by the team) for analgesia. Facilities for monitoring were limited to one aging portable defibrillator and monitor, but the anaesthetic nurses were experienced and very helpful.

POSTOPERATIVE CARE

All the members of the team shared the responsibility for postoperative care. There were no ventilators on the intensive care ward, which further limited the type of surgery that could be carried out safely. Preoperative and postoperative care of the patients—

particular, postoperative analgesia and fluid therapy—was limited by the availability of trained staff. The team was not allowed to stay in the hospital at night to supervise this aspect of care.

TEACHING

We were asked to teach medical students during our daily ward rounds. There were no problems for men examining women, but some concern was politely expressed about female nurses examining male patients. The theatre staff were particularly keen to increase their knowledge of plastic and reconstructive procedures. Two Iranian theatre nurses will accompany the children when they come to Britain for their surgery.

The earthquake area

A later change of policy allowed us to visit the earthquake area to ensure that all patients requiring surgery had been identified. The area is mountainous and isolated but green and fertile and contains the main reservoirs of water for Tehran. The devastation was complete. Unlike in Armenia, it was the older buildings that had crumbled, but the newer concrete structures had fared better. The older structures were brick built; the cement had not held, and buildings disintegrated into huge piles of bricks. There were no slabs of concrete to allow cavities to form. Furthermore, whole villages had been built tiered into the sides of mountains. When they crumbled they cascaded down on to each other to form endless mounds of bricks and debris.

The relief operation had clearly been very effective. Food was plentiful, tents were in abundance, water was in supply, and a small pharmacy had been established. The military were present in large numbers, unarmed and working closely with the civilian population. The excavation of bodies was still in progress, and the smell of decay was overwhelming.

There were many survivors with moderate injuries to whom we gave treatment. There was clear evidence of medical input into the rescue phase, but no medical facility other than a pharmacy remained. There were wounds to dress, sutures to remove, and fractures to reassess and splint. We worked until the light began to fade then returned to Tehran. It was clear that there was useful work for the team in the stricken area, and this could have occupied the whole of our stay. We decided, however, that our skills would be of more use in saving life if we returned to the work we had started in Tehran.

We worked until the late evening of Monday 2 July. In all, the team completed 30 hours of surgery over four days. One day was spent treating patients in the earthquake area, and the remainder of the time was spent treating patients on the wards. The day started at 6 am and finished at 10 pm.

Conclusions

The immediate need for doctors with specialist knowledge and experience of disaster medicine is not always appreciated by those responsible for the relief and rescue operations. They repeat the mistakes of previous incidents and assume that the local medical staff are sufficient in numbers and experience to cope with this extraordinary event.

The experiences of Armenia and Iran confirm that the efforts of rescuers are too often wasted when survivors die later from easily preventable medical complications. This added tragedy could be reduced considerably if experienced medical help was part of the initial aid package. Our experiences show that specialised medical help is needed throughout all the

phases of rescue, relief, reconstruction, and rehabilitation.

There is no doubt that there are considerable obstacles to be overcome to get appropriate medical aid to the scene of a disaster. It is also a great folly to plan for the next disaster solely on the experience of the last. They are all different. However, some things are constant. Food, water, clothing, and shelter are always threatened. Teams must be self sufficient and trained to work in difficult environments. They must be adaptable, with a wide range of skills and experience. Nevertheless, very specialised skills may be required. We have found that a core team of doctors and nurses drawn largely from accident and emergency and intensive care has a broad enough range of skills to supplement and support the local medical services and is flexible enough to allow the other, more specialised members to function in a hostile environment. The input of expert outside medical help brings the experience of other incidents to the local medical staff. This has proved to be of particular value in assessing the need for early surgery in patients with crush injuries.

As local doctors are used almost entirely for the disaster the normal day to day—but nevertheless important—work of the hospitals might be neglected and the effects of the disaster compounded. The Iranians used outside doctors in this capacity to free the

local doctors to care exclusively for earthquake victims.

The effects of a disaster are felt by the medical services for months and years afterwards. Patients often need several staged reconstructive procedures. Outside specialist help will relieve this ongoing burden and provide skills not always available in the stricken country.

The response of the Iranian air force showed once again the crucial role of the military. Many of the problems inherent in disaster management are solved when the military combine with specialist civilian teams.

The sending of specialist medical teams to foreign disasters must be recognised as well targeted, efficient, and effective foreign aid. Such recognition must be accompanied by adequate funding to improve our preparedness and speed our dispatch.

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- 3 Redmond AD. The work of the South Manchester Accident Rescue Team (SMART). *Injury* 1990;21:21-4.
- 4 Bursztein S. Pathophysiology and management of crush injury. In: Vincent JL, ed. *Update in intensive care and emergency medicine*. Vol 1. Berlin: Springer-Verlag, 1986:384.
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ANY QUESTIONS

I am confused over the apparently conflicting information about the clinical importance of apparently high blood cholesterol concentrations, especially in older women. Am I correct in assuming that it is the ratio of total cholesterol to high density lipoprotein cholesterol concentrations that is of vital importance rather than the actual concentration of total cholesterol?

Mean concentrations of high density lipoprotein cholesterol are higher in adult women than men and total cholesterol concentration is higher over the age of 40. Total cholesterol and high density lipoprotein cholesterol concentrations increase to age 65 in women; in men they are almost level from the age of 35. Despite this variation between age and sex groups the total serum cholesterol concentration within each age and sex group correlates highly with the non-high density lipoprotein, or atherogenic, cholesterol concentration, so total cholesterol readings may be used to initiate and monitor dietary management.¹ The importance of high density lipoprotein cholesterol, versus total or low density lipoprotein cholesterol, as an independent risk factor has been the subject of controversy in men; in women fewer studies and fewer coronary events mean less evidence to go on. In the Framingham study high density lipoprotein cholesterol is powerful; the idea of a ratio comes from the study. It does let the higher high density lipoprotein cholesterol concentration in women compensate for higher total cholesterol concentration, but you cannot calculate the ratio without measuring the high density lipoprotein cholesterol.

In favour of measuring high density lipoprotein cholesterol is the fact that in many studies it is a more powerful (in reverse) risk factor than total cholesterol or low density lipoprotein cholesterol and that it helps to define the latter. On the other hand, high density lipoprotein cholesterol is not a primary target for change, is expensive to measure, and is subject to more laboratory error than total cholesterol.² But dry chemistry technology now includes finger prick measurement of high density lipoprotein cholesterol so there is commercial interest in creating mass demand. Perspectives of cash limited public laboratories versus fee for service private laboratories are bound to differ.

Measuring high density lipoprotein cholesterol may be relevant for managing patients with clinical disease and

should certainly precede the use, and may influence the choice, of specific lipid lowering drugs. Whether it should be included in routine opportunistic testing, or at what stage it might be measured once a high total cholesterol concentration is found, remains controversial. The high density lipoprotein cholesterol concentration will be low if the patient is obese, diabetic, or hypertensive, smokes, or takes no exercise; its measurement should not detract from or replace prior consideration of these factors.—
HUGH TUNSTALL-PEDOE, *professor of cardiovascular epidemiology, Dundee*

- 1 Tunstall-Pedoe H, Shewry MC, Smith WCS, Tavendale R. Is total cholesterol an adequate indicator of non-HDL cholesterol levels? *Eur Heart J* 1990;11:188.
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What is the ideal interval between cervical smear tests in a multigravida aged 66 with no symptoms and no previous abnormal findings?

The NHS cervical screening programme is now based on the computerised call and recall of women between the ages of 20 and 64. This is an attempt to find cervical intraepithelial neoplasia, a condition that in some women may be premalignant but is easily treated, so preventing the development of invasive cancer of the cervix and ultimately death from this disease. The incidence of premalignant disease declines from the fourth decade, and we do not consider it necessary to continue screening beyond the age of 64, provided that the woman has had three consecutive negative smears and the most recent one has been no more than three years previously.¹ Addressing this question, the Intercollegiate Working Party on Cervical Cytology Screening advised that there should be no upper age limit for women who have never had a smear test as preinvasive disease may still be prevalent in such women and the incidence of invasive disease is high in this group.²—IAN D DUNCAN, *reader and honorary consultant gynaecologist, Dundee*

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