Development Cooperation Agency, Agency for International Development, Office of United States Foreign Disaster Assistance. Five American pharmacists were in the process of categorizing, translating, and labeling the lifesaving material deposited in over a dozen warehouses, when paradoxically on December 21, the entire relief team was recalled to Washington. Two government officials were to remain to dismantle the two American communications satellites and to finish the distribution of relief supplies and plastic sheeting from United States stockpiles. To round off the official United States involvement, an assistant air attache arrived from the United States Embassy in Moscow on December 26 to find at large some reliable local agencies to receive the projected eight United States cargoes in January 1989 of non-specific relief supplies including blankets, eating utensils, etc.

The world response to this catastrophe was undoubtedly facilitated by the political climate. The December 7, 1988 earthquake provided the dramatic climax for the USA - USSR New York summit. It opened the first east-west window of unprecedented cooperation, with all political barriers lifted temporarily. The Yerevan (then truly) International Airport witnessed the unhindered arrival of aircraft of some forty countries, whose private sector rescue and relief teams worked tirelessly, oblivious to the freezing temperatures and curfew imposed by armored military throughout the landlocked, politically troubled Republic.

Even though the most advanced societal systems would have been overwhelmed by the enormity of the destruction, the absence of disaster preparedness and emergency health care concepts on the all-Union (central) level and of a local infrastructure for prompt coordination of rescue and relief activities proved to be tragic, in spite of Prime Minister Ryzhkov's most commendable and lifesaving leadership. The LRCS (League of Red Cross and Red Crescent Societies) contributed wonderfully in the humanitarian mission; WHO and UNDRO quietly left the tragic scene with reports to their headquarters in preparation for the difficult reconstruction - rehabilitation phase.

CONCLUSION

The Armenian Earthquake experience points up the urgent need for establishing a global disaster preparedness and Health Care System. The 24-48-72 hour delay of effective search and rescue efforts contributed to the high toll of fatalities, the local population having done the lion's share with literally bare hands. And, as long as there is no qualified international body or intergovernmental apparatus to coordinate the complete search and rescue efforts, relief and long-range rehabilitation and reconstruction activities, and as long as political expediency takes precedence over humanitarian obligations, it is particularly important that the private concerned sector provide the requisite infrastructure through its educational institutions, professional societies, and progressive enterprises, and interact directly with existing governmental and other agencies.

INTERNATIONAL VOLUNTARY RELIEF FOLLOWING THE EARTHQUAKE IN ARMENIA (DECEMBER 1988)[18]

Andrei K Kisselev, MD
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An earthquake with destructive magnitude of 6.9 on the Richter scale struck Armenia on Wednesday, December 7, 1988 at 11:42am local time. It hit an area of 80 kms in diameter comprising the towns of Leninakan, Spitak, Stepanovan and Kirovakan in the northern part of the Armenian SSR killing some 25,000 persons. Immediately afterwards was launched one of the most impressive media campaigns of the last few years. The response, both from governments and the public in general was outstandingly generous and difficult to manage. The unprecedented measures taken by Soviet authorities combined with the particular characteristics of the Armenian nation, also concurred to magnify the scope of this exceptional relief operation.

Armenia had been the focus of international attention for 8 months before the earthquake, due to the on-going conflict between Armenians and Azerbaijanis, which had resulted in social unrest and many displaced persons. It is well known that many Armenians live abroad, and many of them occupy prominent positions, in politics, science, medicine, business, the arts, etc. These personalities reacted spontaneously and helped to mobilize generous response both from the Armenian communities and from the public in general.

A number of "first times" also contributed to the international impact of this disaster. For the first time since 1923, the Soviet authorities accepted international relief assistance. The Soviet Government lifted most of the formalities applying to foreigners and foreign products, and relief teams from many countries flew freely to Armenia and were given clearance without exception.

The time of year itself had an influence on the magnitude of the response. The earthquake took place before Christmas, when humanitarian organizations such as the Red Cross traditionally receive substantial contributions for their disaster relief and development operations. International voluntary aid to Armenia brought about an unprecedented solidarity from almost 70 countries and outstanding cooperation and openness from the Soviet authorities. The total amount of contributions exceeded US$ 150 million, excluding contributions in kind and services for which no value was indicated.

During the period following the earthquake, the number of victims was subject to speculations by the media, eager for sensationalism. 100,000 dead was first mentioned then the number went down to 45,000 and later to a more realistic, if not less tragic, 25,000 dead. The overall situation in Armenia was aggravated by the presence of around 180,000 Armenian displaced persons from Azerbaijan, who were difficult to trace.

Foreign rescue teams started to arrive soon after the disaster and at the peak of the operation, 7 to 8 days after the event, more than 2,000 expatriates were active in Armenia. Nevertheless, it is worth mentioning that international aid represented only 7 to 10% of total relief assistance, the remaining 90% coming from Armenia itself and from other parts of the Soviet Union.

Following the initial assessment, reports on the impact of the disaster were sent to National Red Cross Societies through the League headquarters in Geneva. National Red Cross Societies then started a wide scale fundraising campaign for the victims of the earthquake. The majority of international relief was channelled through National Red Cross Societies, using international Red Cross mechanisms for coping with a disaster of that magnitude. This was partly due to the fact that the league of Red Cross and Red Crescent Societies has internationally recognized rules and principles for disaster relief. Nevertheless, the league faced the problem of having to deal with a two-level administration: Central (Moscow) and regional (Yerevan).

STATISTICS

1. Statistics provided by the Armenian Ministry of Health on 31st December 1988:

   - Confirmed dead 24,888 (including 74 doctors and 250 nurses/paramedics);
   - Rescued alive 14,850;
   - People who received medical assistance in hospitals 31,279;
   - Taken to hospitals 11,931 (in Armenia 9,743);
   - Still in hospitals 2,642 (in Armenia 2,175);
   - Died in hospitals 2;
   - Evacuated 113,931 (of these 74,393 outside Armenia, 69,992 of them in Spas and health resorts);
   - Hospitals destroyed or seriously damaged 25; and
   - Health posts and other medical facilities destroyed or seriously damaged 225;

2. Statistics provided by the Armenian Ministry of Social Welfare:

   - Amputees 512; and
   - Patients with spinal injures 209;

3. Statistics provided by the Armenian Ministry of Civil Aviation on 15/01/1989:

   - Flights which arrived with relief items 1,380:
     - From abroad 327; and
     - With Red Cross relief items 227;

4. Statistics provided by Armenian Ministry of Transportation on 15/01/1989:

   - Railcars offloaded 37,500.

RED CROSS RESPONSE

The first plane with relief goods was sent by the Soviet Red Cross from Moscow on December 7 at 10pm, whereas on the second day after the disaster, a representative of the League Secretariat was sent to Armenia. The Soviet Red Cross and the League delegation worked in close contact and cooperation with the Armenian and Soviet health authorities, as well as with the military and the civil defense. The Soviet Red Cross received statistics directly from the Ministry of Health of Armenia on a daily basis. This information was immediately shared with the League representative in Armenia and then transmitted to the League Secretariat in Geneva. The League representative, together with the Soviet Red Cross, were also members of the National Relief Commission - the decision-making body in Yerevan - chaired by USSR Minister, Mr. Nicolai Ryzhkov.

Several National Societies sent rescue teams with dogs specially trained to search for human victims underneath the ruins, which proved very effective in the circumstances. The Red Cross also established a computerized tracing service which was operational three days after the earthquake. On the 4th day, however belated, a direct communication line was established between Yerevan and Geneva. From then on regular situation reports were issued by the League delegation and served as a basis for the planning of relief supplies in Geneva. On the fourth day the messages sent out worldwide by the Red Cross were:

- No more need for medicaments or medical equipment;
- No more need for blood products;
- No more need for sending medical teams (there were in fact sufficient numbers of doctors from the Soviet Union and from Armenia); and
- No more need for food and clothing.

Requests were still made for kidney dialysis machines, due to the many victims with crush syndrome, and for winter tents - the low temperatures registered in Armenia at the time made light tents sent by some donors of no use.

A number of common myths disseminated again and again in times of disaster were not confirmed by reality:

- The myth according to which disasters bring out the worst in human behavior;
  - On the contrary, there was a wide sense of solidarity among Armenians and many nationals present in Armenia, and mutual assistance prevailed under very difficult situations;

- The myth that epidemics are inevitable after most disasters;
  - This was not the case as the military were commissioned to organize the water supply system through water pipelines, and sewage disposal facilities were available to ensure adequate sanitary conditions for the population. No vaccinations were needed;

- The myth that famine is inevitable after disaster;
  - Not so, food supplies were no problem.

During the first 10 to 12 days, all kinds of temporary shelter were not popular, as the population was reluctant to stay in the area of the earthquake during the night, fearing that another quake might occur. Gradually people agreed to live in the provided tents.

The expatriate medical teams proved to be effective, mainly those providing kidney dialysis machines and treatment during the emergency phase.

However, the first who arrived on the spot to provide health services to the people still under shock, were Armenian health professionals. These were joined on the second and third day, by health personnel from other republics or regions of the Soviet Union. It is worth mentioning that many Armenian nurses and doctors also died during the earthquake and most of the hospitals and clinics in the disaster area were destroyed.

PARTICULAR FEATURES OF THE OPERATION AND PROBLEMS FACED

- There was an excess supply of blood products and there was no need to launch a national appeal for blood donation.

- Due to the massive arrival of relief supplies, unloading, storage and distribution of the goods caused many problems. (At times only 14 minutes were given to unload 40 tons of relief from planes landing relentlessly at Zvartnots airport in Yerevan).

- There was inadequate labelling on the packages and sorting of contents was impossible. Bottlenecks could not be avoided. It took time to establish an adequate distribution mechanism.

- Sorting of medicaments started almost immediately, but there were problems regarding unsolicited drugs (not part of the WHO/UNHCR/League lists of standard drugs for emergencies).

- At first, attention was focused on the destroyed cities. Only on the 5th day did relief start to arrive in the 48 mountain villages also badly hit.

- The influx of private cars into disaster stricken cities and towns had to be stopped by military roadblocks on the 7th day. Cars were filled with relatives and friends who were coming to assist in rescue and relief operations.

- Construction of latrines in the disaster stricken area by the local population started somewhat late, on the 7th day.

- On the 8th day, people were extremely tired and needed to rest. This was provided by bringing in some entertainment, televisions, and newspapers.

- On the 9th day, when the chances to find survivors in the ruins were gone, the need to organize work for the adults and school for the children developed. Social and psychological problems began to emerge and the need for social work was greatly felt.

- The media, although informative, was eager for sensationalism. This resulted in many rumors concerning the number of victims - first 100,000, then 45,000, and finally 25,000. These greatly varying mortality estimates were a cause of despair among the population.

- It was evident that there was a lack of practical knowledge regarding disaster response at the local level. Overall management of the rescue and relief operations was taken over by the Central Government and a number of NGOs.

- Foreign VIP visitors came to the disaster area and attracted attention and resources, some requiring protocol escort services very difficult to provide under the circumstances.

LESSONS LEARNED

Some of the points below have been stressed again and again, however it seems necessary to call the attention of disaster managers and all parties involved in international disaster relief to some lessons which could be learned for the future.

- The importance of disaster preparedness and training at all levels is vital;

- There should be a National Disaster Plan, with responsibilities and lines of communication formally established and rehearsed;
- The needs of the victim come first, not the needs of the donor. Disaster relief should be "demand led" and not "supply led";
- UNDRO and the League should improve coordination of international aid efforts in order to avoid duplication of work and unsolicited supplies;
- Good communications are the key to disaster management. Further studies should be made on the use of walkie-talkies at the local level, radio at the regional level, and satellite telecommunication at international levels;
- If there has to be an appeal for clothing, it should specify that only clothes which are clean, presorted and clearly marked will be accepted;
- All donations should be color-banded to speed delivery and sorting: green for medicines, red for foodstuffs, blue for tents, clothing and other relief materials;
- All vehicles should have spare wheels, bulbs, fuses, fanbelts, and gerrycans and should be serviceable in the country of operation;
- All tinned goods should be accompanied by opening devices;
- Packaging should be waterproof, and reusable as storage bins; and
- Housing should be built to standards which will meet anticipated risk.

THE ARMENIAN EARTHQUAKE OF DECEMBER 7, 1988

Dr. Alexander Michalov
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INTRODUCTION

It is with great pleasure that I have come here today to address this prestigious audience.

In the spirit of Glasnost and with a continuing interest in humanitarian causes, our government and members of the Institute for General Reanimatology are pleased to participate in this joint effort to improve medical response to disasters worldwide. We hope that our efforts will serve as an example to other nations in establishing peaceful links for the benefit of mankind.

From a review of the interview data, it was clear that relief efforts were a dynamic and continuing process and therefore, needed to be analyzed in several phases.

- The first 24 hours;
- Days 2-5;
- Days 6-12; and
- Days 13 and later.

This pattern will be followed as it helps to elucidate the resuscitation potentials.

First 24 hours

As you know, the earthquake occurred on December 7, 1988 at 11:41am. The initial population in the earthquake affected area was 590,000 people (other data indicate about 1,000,000 people). It is estimated that about 500,000 inhabitants became homeless.

Sixty-seven percent of the cities of Leninakan, Kirovakan, Spitak (the epicenter) and Stepanovan were destroyed. The medical infrastructure was severely damaged. More than 250 medical workers died as a result of the earthquake. Thirty-two hospitals, 14 out-patient polyclinic facilities and 139 health stations were ruined. If we take into consideration all medical facilities which were partially ruined, then a total of 6693 beds were lost. The fact was that all medical workers survived also had family members and/or friends under the ruins. Therefore, many medical workers did not provide medical aid but attempted search and rescue of family members. This was a natural response, particularly in Armenia where close kinship ties exist. Uninjured inhabitants began search and rescue efforts immediately. They used their bare hands or whatever hand tools were available. The local survivors knew the location of their families and friends buried in the earthquake rubble. They served an important role in the initial search process. Students and volunteers started to arrive at about 9pm from Yerevan, and together with local fire fighters and police they immediately began search and rescue operations. Unfortunately, the students had little or no rescue or first aid training, and police were overwhelmed by the extent of the damage and emotional stress. In addition to the quantitative lack of equipment, the absence of small, effective technical devices that can be employed early in the rescue operation, severely hampered the efforts.

Nevertheless, during day one, 11% of the total number of victims were extricated, and 32% of those were alive. That number does not include many of the lightly injured who were saved by family members and taken directly to medical stations.

Days 2-5

The second phase occurred when heavy equipment started to arrive. At the same time, the military started to use bulldozers and even tanks to clear roads of ruins. By the second day, the rescue teams had gained enough experience to be able to function more effectively. They quickly learned that use of cranes to lift concrete panels was a mistake. The panels simply fractured in mid-air,

causing additional damage, injuries and fatalities. At this point, the rescue teams decided that "jaws-of-life" type equipment would be more suitable for extricating survivors in the cave-type structures formed by the rubble.

On day 2, the largest number of victims were extricated - 24% of the total. Of those, only 17% were alive, as compared to 32% of those extricated on day 1. On day 3 and 4, coinciding with significant increase in equipment arrival, the largest number of persons were extricated alive, namely 59% and 88% respectively. From that time on, the number of live extrications declined significantly. By day 5, 80% of the victims had been extricated, 37% alive and 63% dead.

Days 6-12

The third phase involved the long-term search for the dead. In this week, a large number of victims, 20% of the total, were removed from ruins, but only 1.8% of them were alive. By day 12, extrication was 99%. Of those extricated alive, the majority did not have access to water.

Day 13 and Later

This phase involved removal of ruins, with only a small number of bodies recovered and only one victim found alive. At the culmination of the extrication procedures, 39,795 had been rescued, 15,254 (38%) alive and 24,541 (62%) dead. A total number of 11,000 were hospitalized. One month after the earthquake, despite active treatment, 50% of victims were critical, about 30% serious and only 16.4% in fair condition.

More than 50% were patients with upper and lower extremity fractures of spine, central and peripheral nervous system traumatic injures, and crushed tissues. More than 400 patients had upper and lower extremities amputations.

Severity of acquired injuries and their complications, as osteomyelitis, trophic disturbances led us to prognose that about 2,000 people would lose capability for work and would require permanent disability support.

RESULTS

Bystanders

1. First aid by uninjured bystanders was minimal. Most of them had little experience in providing first aid. Although the population had some visual first aid training from television, the Armenian experience suggests that this was not sufficient.

2. First aid was limited to attempts to control external hemorrhage and to immobilize fractures.

3. The majority of interviewed bystanders believe that the life-saving potential of such life saving first aid of uninjured covictims is high.

Rescuers

1. There was a lack of training in search and rescue of the first and second waves of rescuers.

2. The work of rescue teams was not well coordinated. The quantity of equipment initially available was insufficient. Teams suffered from lack of extrication equipment, mostly in the category of small mechanical, hydraulic and pneumatic systems.

3. International assistance, which at best can be mobilized by day 3, can play an important role in rescuing uninjured and lightly injured victims, but not in resuscitating the critically injured, slowly dying victims.

4. International teams must include at least one interpreter.

Medical Providers

1. The medical teams arrived after:

   - 3-4 hours at Leninakan, Spitak; and
   - 7-8 hours at Kirovakan and Stepanovan.

   Medical help did not arrive in rural areas until day 3 or 4.

2. Medical providers generally noted that initially there were some life-support supplies. However, they quickly were exhausted and particularly IV fluids and narcotics. Quantities of additional supplies did not begin to arrive until day 3.

3. There were poor communications between rescue and medical teams, especially on day 1.

4. The initial congestion of roads by persons seeking family and friends made land conveyance of the victims very difficult. It proved necessary to identify physicians and other health providers and their cars to promote rapid recognition and minimize delays.

5. The major causes of death as reported by medical providers were: 1) crush syndrome; 2) hypovolemic shock and exsanguination; 3) cranial trauma; and 4) multiple injuries.

6. The majority of medical providers reported that before medical care was provided by professionals, little was done other than bandaging and improvising splinting.

THE ARMENIAN EARTHQUAKE - THE DIFFERENCE WAS ONLY IN THE SCALE

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INTRODUCTION

It is a mistake to think that far-away disaster are in some way different to those to which we ourselves are prone. Every disaster brings it's own specific problems, otherwise it wouldn't be a disaster. However, the basic problems of disaster as delineated by the American College of Surgeons are common, to a greater or lesser extent, as are the basic difficulties in coping in unusual circumstances, in particular, the problem of COMMUNICATION. One does not have to look behind the Iron Curtain to find communication problems. It is not simply a function of language and has a myriad of facets. The Armenian earthquake differed form most other disasters in magnitude only, and though Armenia may not be the most affluent of countries, the magnitude of the disaster was enough to humble many more sophisticated geographical areas.

I would like to update the "all-disaster" medical response using medical teams who are simply available but who have had no prior thoughts of disaster. UK disasters have been sufficiently common recently for us to be concerned about our standards of response, rather than simply a "standard response". The experiences of SMART UK (South Manchester Accident Rescue Team) have led us to believe that, while upgrading local disaster responses is desirable, we need in the UK a National Disaster Response Team. This team would respond to international disasters, but by having as an integral part a database of potential disaster responders, a certain level of response could be guaranteed to problems within the UK, eg. to remote areas. We are slowly moving through the politics, finances, etc. of coordinating same. I would like to use the Armenian Earthquake to reaffirm that the core problems in disaster are basically the same, and to use my exposure to disaster to turn my thoughts to future responses to the ever increasing (or so it seems!) problem of disaster.

THE ARMENIAN EARTHQUAKE - THE DIFFERENCE WAS ONLY IN SCALE

As a member of a team of doctors from Manchester UK known as SMART (South Manchester Accident Rescue Team), I worked in Armenia following the earthquake in December 1988. Since then I have been asked to talk of my experiences on a number of occasions. After a number of these talks, I began to wonder if people simply regarded our experiences as an interesting story, of no particular relevance to themselves. It is all too easy to dismiss far-away disasters, feeling that they were possibly dealt with in a sub-standard way, while of course, disasters closer to home are always managed perfectly. Having seen the scale of the problem in Armenia, and having personally been involved in responses to both the Air India (1985) and Pan Am (1988) jumbo jet incidents, and having heard honest accounts of activities at some of our more recent disasters, I am convinced that the only difference between the earthquake and the other disasters in terms of problems to be dealt with, was one of scale. It is true that every disaster is unique, regardless of superficial similarity, but the basic problems are common to all. It is acknowledgement of this concept which I feel is the key to planning for the future. I am certain I am not the first to feel this, but, having taken an interest in the world disaster literature since 1985, it is notable that the wheel has been reinvented on quite a number of occasions. The most common link between disasters is that we appear to be quite slow to learn from them. This is in part because some people feel that there is little cross-learning possible between different disaster types. This is not so. We must also avoid becoming "instant experts" following a single exposure to disaster. This is counterproductive as it is difficult for an expert to continue learning, and it is unrealistic as on first exposure we are probably victims as well as rescuers. I like to think of an expert as someone who does not make the same mistake twice. Hence, the real test is the next time around, which hopefully will never happen.

> "At each disaster, there will probably be a majority of professional helpers present who, whatever their prior experience, will never before have encountered death, suffering, and devastation on such a large scale."
>
> H Duckworth: Disaster Management. 1988; 1(2)

The above quote describes the average disaster quite well, and of course, implies that, in order to deal with a disaster, the "new" helper will have to find out what the problems are before he/she can deal with them. The usual definitions of disaster qualify a disaster in terms of numbers of dead/injured only, and this is only part of the problem. I prefer the American College of Surgeons

definition of disaster, which is "a sudden event with a variable mixture of 4 factors:

1. Injury to human beings;
2. Destruction of property;
3. Overwhelming of local response resources; and
4. Disruption of organized societal mechanisms.

I think that we would all agree that 1 and 2 in large measure constitute a disaster, but 3 and 4, which seem less relevant and certainly not as exciting, profoundly affect our ability to manage the former adequately. When we think of disaster, we mentally imagine ourselves functioning at our best, never considering that an integral part of disaster is some undermining to the perfect response. In Armenia, we got a graphic illustration of each of the points of the definition, as the scale of destruction was so vast. However, experience has taught me that there is an element of each of these in every disaster, to a greater or lesser extent. The problems of the earthquake seemed worse because of the scale, and because we were working so far from home, but each and every one has a parallel with the types of disaster we are most used to. I would now like to discuss some of the common problems, with the emphasis on planning for the future.

> "Programmes to prepare people for uncertain disaster must compete with immediate and pressing human concerns..."
>
> C Fritz: "Disaster" in Contemporary Social Problems.
>
> "Even the most outstanding plan will be deficient in a particular disaster event, since it's requirement of flexibility does not allow it to dictate the minutiae of reaction."
>
> Howard Champion, MD, FRCS(Ed), FRCS

The common problems of disaster response begin at the planning stage. Most medical centers are committed to an "all-disaster" plan, because it would be impractical to attempt to plan for each and every disaster. This, in theory, works well, but requires a large measure of flexible thinking when a specific problem occurs. Yet, remembering that most of those involved are on their first disaster, flexible thinking may be difficult. This is aggravated by the common frequent movement of hospital staff for training purposes. It is therefore important that the most senior, and therefore relatively permanent staff be involved at the planning stage. This was possibly difficult in the past, when disasters appeared to be rarer than they are now, but events of late in the UK have prompted a more global interest in the problems of disaster.

I feel that developments in medical disaster planning have been slow because a) many feel their plan is "fine"; and b) because many doctors feel that disaster medicine is simply the medicine they practice every day except it's in the outdoors. This is absolutely untrue, as disaster medicine needs special interest, training, and equipment. The "gold-standards" of disaster planning are 1) joint planning; 2) interservice liaison; and 3) joint practice, and unfortunately there is no short-cut around these. A doctor feeling he is capable of solo life-saving is useless and may be dangerous. Even in areas where the plan is deemed to be "fine", many will never read it until the alert goes out. I feel that, at least from the UK viewpoint, major accident planning should be in the hands of those who have an interest in, and experience of life's smaller disasters, eg. the emergency medicine specialty, as such people have the contacts and basic skills which may be of value. However, speaking as an emergency physician, this cannot be undertaken without some additional training and experience. From the point of view of our team trip to Armenia, the only advantage we had was having worked closely together in the past. Apart from this, it was a journey into the relative unknown.

While waiting to go to Armenia, we had a delay of several days, as the diplomacy of the situation was sorted out. This was compounded in part by our lack of dedicated transport. It appeared there were some difficulties acquiring an air-force transport aircraft. During this period, the press were critical of the British Government, the Soviet Government, and just about everybody else. I feel that if the various British teams were better coordinated, much of this delay could have been reduced. However, problems with plan activation are common in disaster. To activate even the best plan, someone must be aware of the incident, and must convey this awareness to the appropriate authority. The authority, assuming it is unaffected by the disaster, may be reluctant to set the wheels of an involved and all-encompassing plan in motion, for fear of reprisal. If the plan is set in motion, it should ideally be pretrained and flexible to meet the circumstances. There are many examples of how some facet in this cascade has failed in the past. I feel we need low thresholds of response, using a practiced system. False alarms give experience and should not be a deterrent.

Once we arrived in Armenia, it was difficult to appreciate the overall command and control structure. We strove to avoid being separated from the others of an impromptu international team, which had formed out of need on the flight from Moscow to Yerevan. Once on the rubble, we observed enthusiastic, sophisticated, though relatively uncoordinated rescue work in progress. Command and control is always a problem where people of differing backgrounds meet. I feel the person in control needs to vary depending on the prevailing

circumstances, eg. military during conflict, doctors during patient-care, etc. This can only be achieved where pretraining has shown each specialist the others skills, expectations, and limitations. This is the aim of interservice liaison.

"MY KINGDOM FOR A HORSE"

SMART travelled to Armenia on an Aeroflot scheduled flight, leaving no dedicated transport on site. All subsequent transportation was by negotiation. Locally, transport was upset also with some of the roads damaged, and some of the emergency vehicles, eg. fire engines destroyed by falling buildings. Any survivors had to make a long road trip to the hospitals of Yerevan, as those of Leninakan where we worked, were destroyed. This is a demonstration of undermining of local resources by the disaster. A similar event occurred at the Ramstein air-show disaster, where the helicopter nominated for medevac was struck by a falling plane. At the accident involving the aircraft and the River Potomac, transportation was available, but superhuman efforts were needed to make it function. Thus, there will always be problems getting help to victims, and getting them home.

When I spoke of having had communications problems in Armenia, I received the standard response: "Of course, you can't speak Armenian." Apart from a few phrases, this is true, but it was the least of our communications problems. We had the far more common problems of incompatible hardware, differing technical language from our fellow rescuers, differing definitions and basic concepts about the conditions we were there to treat, and even differing whistle codes. I would suggest that we do not need to travel half way round the world to encounter these communications difficulties, we probably see daily evidence of them. That being the case, then they must be remediable. On a larger scale of communication, any vacuum created by failure to communicate will be filled by rumor. Rumor abounded in Armenia, as it did at Lockerbie and elsewhere, both locally and in the press.

Rescuer survival was of some importance in Armenia, food and water being relatively scarce, and the temperature, especially at night, was quite low. We had been told by our own Government that we would be kitted out on arrival in the Soviet Union. Thankfully, we ignored this, and acquired appropriate clothing the night before we left, for which we were later reimbursed. We were relatively short of food, but reluctantly allowed ourselves to be aided by the locals. We realized, of course, that this was not an ideal situation to be in, but in fact, it worked extremely well as a link between our team and the locals. In disasters closer to home, the sight on TV of an inappropriately dressed doctor, eg. in a hospital coat, walking about on aircraft wreckage are hopefully becoming rarer. Such activity is dangerous, and must be stopped. Food and water shortage may not constitute a problem at most disasters, but the team leaders must ensure that their workers have adequate breaks for meals, and sleep if the response is to be a long one. This may need to be enforced, as the shocked, hard-working rescuer may not suffer the normal pangs of hunger.

From the point of view of equipment, we took with us a large quantity of IV fluids, instruments, IV sets, etc. Each team member carried medical supplies in his rucksacks, as well as a larger consignment in bulk. Some of this was misappropriated by other rescue teams before we left London, and had to be sent on later. This was all acquired specifically for the trip, as there is no "national stockpile". It is difficult under normal circumstances to store quantities of perishable material for only a possible need. The difficulty is more financial and organizational rather than technical. Hospitals must look to their stores of major incident equipment, to make sure it is practical and in adequate supply. It will need to be portable, and guarded on the site of a disaster.

For international disaster, the supplies brought should be relevant to the recipient country's needs. These can be difficult to ascertain, as the victims may be unsure of their needs, and rumors as to their needs may be more provocative than the reality. It must be possible to predict what a given country's needs will be before a problem develops.

What of the personnel of disaster response? The SMART team normally consists of senior personnel form both the emergency department and critical care units of our hospital, who train for and provide voluntarily an out-of-hospital service for accidents, acute critical inter-hospital transfers, and an early response for local major incidents. A number of surgeons were added specifically for the occasion, though our emergency physicians have a good deal of surgical training. I feel that the emergency physicians, who deal with the unusual normally, and who were functioning members of SMART in normal circumstances, coped better. Obviously, in a disaster, people do best that which they do normally, or approximates to what they have trained for. This is not accounted for in most plans, which simply use named posts, rather than people to do given tasks. I agree we should not name individuals in our plans, but given that disaster is outside most of our experiences, we cannot expect all the helpers involved to cope adequately. The higher the profile of disaster, and the more pretraining we do, the bigger the pool of appropriate responders.

We must also accept that if our local disaster is of major proportion, our ability to respond may be very limited, and we may be totally dependent on outside help. Therefore, we must all have in our plans, a plug-in point for outside aid.

On a personal note, the emotion that I felt was common in the disasters I have been involved in, is frustration. Obviously, horror is high on the list, but, having decided to function as a rescuer, producing work

of the quality that one would like is difficult, in large part due to the difficulties mentioned so far. I have felt this consistently enough to be suspicious of anyone who feels their response to a disaster has been perfect. Can it be that they have not seen the problems? I would not criticize any worker's efforts at a disaster, but we must audit to improve.

How can we use the lessons of Armenia and other disasters to plan for the future?

1. We must embrace a sensible definition of disaster.
2. We must embrace the gold-standards of planning.
3. We must share and recognize the common problems of disaster.
4. We must train "minor-disaster" personnel to deal with major disaster.
5. We must recognize the need and plan for outside help.

Two days after returning form Armenia, I was at the site of the Pan Am jumbo-jet incident in Scotland. Many of our problems were the same. Since our exposure to these incidents, we have been lobbying for a National Disaster Team. This team would provide a rapid, pretrained, and self-sufficient response to international disasters, akin to the response of the French team. It would need a database of appropriate personnel, a stockpile of equipment, an aircraft, and an international understanding as to its activity. Many feel that the military should do this. I feel a civilian/military combination is better. A pure military response is not always welcome. The military have a lot of expertise in certain areas, eg. command and control, but there are areas, eg. trauma care, where civilian systems are well-practiced. In civilian disasters, civilian systems will need to be used, requiring personnel trained within that system.

I see no reason why a module of such a team could not be available for national disasters, in an attempt to guarantee a certain level of response to a disaster, regardless of it's site or level of local disaster-induced disability. The US has already standardized emergency care in the shape of the ACLS and ATLS courses. Will we be seeing Advanced Disaster Life Support? I note the development of the National Disaster Medical System. I am not sure how far this has developed, since it takes time to organize something of this scale. While we can all support a national system when given the opportunity, there is nothing to prevent interim upgradings of our local plans.

Finally, many helpers worked hard in Armenia. I'd like to think our efforts made some difference. The problems we encountered had a certain geographical intrigue, but, when examined individually, they paralleled those found at any other disaster, the only difference being in the scale.

UNE EXPERIENCE VECUE:L'AIDE MEDICALE D'URGENCE LORS DU SEISME D'ARMENIE

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Le 7 décembre 1988 l'Arménie a été ébranlée par un tremblement de terre dont l'ampleur et la puissance destructive tant sur le plan physique que moral dépasse toute estimation. A nouveau déchirée, terriblement meurtrie l'Arménie habituée au silence des nations devant les drames qui l'ont secouée et endeuillée tout au long de son histoire, a été pour la première fois dans l'histoire de l'humanité le théâtre improvisé de milliers de gestes et d'une solidarité á l'échelle planétaire. Des secours ont afflué en abondance de près d'une centaine de pays et au delà du réconfort matériel du secours d'urgence ou à plus long terme, c'est aussi un secours moral d'une valeur inestimable qui est parvenu dans notre toute petite république.

Tout cela permettra incontestablement à l'Armenie à l'histoire trois fois millénaire de retrouver ses forces, son énergie, son génie afin que ses générations futures puissent s'élever à nouveau et revivre dans le calme et dans une ambiance de dignité et d'esprit de création.

Dès les premières heures suivant le séisme des équipes constituées de médecins spécialisés et d'infirmières recrutées dans divers hôpitaux d'Erévan ont été déployées d'urgence par hélicoptère et ambulances vers la zone sinistrée.

Amenées sur les lieux du sinistre dont la grandeur réelle était encore ignorée, ces équipes avaient pour objectif d'apporter un secours médical d'urgence consistant à lutter contre les chocs traumatiques, hémorragies et procéder aux réanimations cardiaques et respiratoires.

Les principales difficultés rencontrées sur place lors des soins prodigués d'urgence résidaient en un problème incroyablement important de blessés portant des lésions et des blessures de caractère et localisation divers ainsi que par une absence totale de conditions de travail. Les cliniques et hôpitaux étaient entièrement détruits, une grande partie du personnel medical hors d'état d'oeuvrer. Durant les premières heures suivant la catastrophe un chaos épouvantable régnait en tous lieux. Partout il n'y avait que des ruines et des amas de décombres fumants. Les gens portaient secours tel qu'ils le pouvaient. Dans quelques heures on s'orienta et l'acheminement des blessés vers les villages et cités environnants s'organisa. Délivrés des décombres, les premiers soins d'extrême urgence prodigués: arrêt d'hémorragie, immobilisation d'extrémités, injections d'analgésiques, narcotiques, tranquillisants, les blessés étaient ensuite transportés d'urgence dans les villages et cités proches, ce transfert durant 15 à 20 minutes. Là,

dans des hôpitaux improvisés eurent lieu les premières interventions chirurgicales telles que les amputations de membres fracassées, traitement de plaies d'écrasement, ponctions et drainage de la cavité pleurale. Il convient de noter que le repérage de fractures de côtes, des lésions de poumons ainsi que le diagnostic des pneumothorax et hémothorax reposait uniquement sur un ensemble de signes d'ordre clinique, l'examen radiologique de la cage thoracique étant impossible

L'expérience montra que même en présence d'un pneumothorax restreint il est préférable de procéder immédiatement au drainage de la cavité pleurale avant le transfert du traumatisé dans une clinique spécialisée. Il est fréquent qu'un pneumothorax minime évolue en pneumotorax tendu, le drainage aspiratif pleural évite alors de graves complications.

Le transport des blessés à Evéran fut organisé par ambulances et voie aérienne. Les jours suivants des hôpitaux improvisés furent à nouveau organisés sur les lieux du séisme par des équipes médicales venues d'autres républiques et pays du monde.

Vers le soir du 7 décembre tous les hôpitaux d'Evéran admettaient les blessés venant de la ville en détresse. Ce même jour l'hôpital d'urgence d'Erévan hospitalisa 210 blessés. En tout durant les quelques premiers jours on amena de Leninakan, Spitak et Kirovakan 743 sinistrés dont 713 furent admis. 30 personnes portant de légères lésions telles que des contusions, égratignures furent hébergées par des parents demeurant à Erevan après avoir subi un examen médical et reçu les soins nécessaires. Caractéristiques des blessés hospitalisés:

- Traumatismes thoraciques - 132;
- Blessés neurochirurgiques - 203;
- Blessés polytraumatisés - 226, et
- Blessés à lésions combinées -152.

121 blésssés en tout ont été operés dont 16 amputations de membres, 18 laminectomies, 5 trépanations et 2 spiénectomies. On procéda en outre à d'autres interventions chirurgicales: 15 pour le drainage de la cavité pleurale, 1 médiastinotomie et 64 traitements chirurgicaux du crâne et des extrémités. La section de chirurgie thoracique hospitalisa 54 femmes et 78 hommes:

- 41 contusions de la cage thoracique;
- 59 fractures de côtes;
- 30 fractures de côtes avec hémopneumothorax; et
- 2 écrasements de la cage thoracique avec éclatement de la rate.

Il convient ici de noter que lors d'admission en masse de blésssés à lésions isolées ou combinées dans un état de stupeur ou de choc psychologique, l'organisation du travail s'impose impérativement pour assurer la coordination des activités et des tâches du personnel de l'hôpital et de ses sections. Le personnel dût procéder aux examens radiographiques du thorax, d'autres membres ainsi qu'à toutes sortes d'analyses cliniques. Le diagnostic clinique fixé, les traitements adéquats furent prescrits: ponctions et drainage de la cavité pleurale, anesthésie de fractures de côtes, compensation de diverses perturbations homéostasiques.

Nous avons constaté qu'en cas de fractures pluricostales réalisant un volet thoracique avec pneumothorax grave, la fixation du volet, le drainage avec aspiration active de l'air donne de bons résultats en vue d'une réexpansion pulmonaire rapide.

Au troisième et quatrième jour après l'hospitalisation des blessés, les douleurs apaisées, le choc traumatique surmonté, on depista encore d'autres lésions d'organes: de la colonne vertébrale, du bassin ainsi que des hémorragies internes latentes. Au quatrième jour chez un homme de 57 ans de Spitak souffrant d'un écrasement de la cage thoracique, on constata une hémorragie intra-abdominale suscitée par l'éclatement d'un gros hématome subcapsulaire de la rate. La laparotomie et la splénectomie furent immédiatement pratiquées. L'état du malade s'améliora. Les jours suivants trois fractures du bassin et deux de la colonne vertébrale furent à nouveau repérées chez d'autres malades. Des blessés polytraumatisés hospitalisés par d'autres hôpitaux ont été transférés dans notre clinique, ceux-ci souffraient de lésions thoraciques fermées: cavité pleurale résiduelle, empyème pleurale, atélectasie pulmonaire, pleurites post-traumatiques et autres.Cinq des blessés hospitalisés dans notre section sont décédés. Ce sont des malades polytraumatisés portant des lésions multiples bilatérales de côtes et du poumon, souffrant d'insuffisance cardio-pulmonaire chronique, diabete sucré, complications dues aux plaies purulantes, septicémie, psychoses aiguës, etc.

Notre expérience nous permet de faire des propositions concernant la mise en place d'un plan d'intervention pour une efficacité optimale:

1. Organiser sur place une première aide médicale et le transfert d'urgence des blessés dans les hôpitaux specialisés les plus proches.
2. Munir les équipes médicales de drains, particulièrement à soupape pour le drainage de la cavité pleurale des blessés thoraciques graves avec pneumothorax avant leur transfert.
3. Concentrer les blessés evacués dans les cliniques specialisées, faute de quoi organiser des consultations de chirurgiens thoraciques durant la première semaine.

4. Procéder pendant les premiers 5-6 jours à l'examen de tous les organes et systèmes des blessés (radiographie, sonographie, etc.).
5. Former dans toute région susceptible de devenir le théâtre de catastrophes naturelles, des équipes médicales d'intervention urgente pourvues d'un équipement et matériel nécessaires.