

# MEDICAL SUPPORT AT THE HOTEL NEW WORLD DISASTER

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## SYNOPSIS

The collapse of the Hotel New World on 15 March 1986 presented extraordinary problems and challenges to rescuers. Trapped victims took many hours to extricate; in addition to physical injuries, a significant number of survivors suffered from dehydration, exhaustion, and the psychological trauma of prolonged entrapment. It would be useful to document how these problems were tackled by the medical staff involved in the rescue operations.

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## INTRODUCTION

The morning of 15th March 1986 was like any other morning. Employees and guests of the 6-storey Hotel New World were going about their normal business while on the ground floor, clerks and customers were bustling about the Industrial Commercial Bank trying to complete transactions before closing time when, incredibly, at exactly 11.26 am, the whole building suddenly collapsed, becoming an instant tomb for its most unfortunate occupants.

The rest is now history - how a shaken Singapore kept vigil as men and machinery worked round the clock cutting, drilling, hacking, lifting and tunnelling; how spirits soared when life was detected beneath the tonnes of rubble; and how, miraculously, 17 people were brought out alive in circumstances which had seemed hopeless.

Medical personnel, together with other rescuers, played an important role in sustaining the lives and spirits of trapped victims whose extrication took many hours to accomplish. The extraordinary method of rescue - by burrowing through rubble in order to reach victims - presented unique medical problems and challenges. It would be useful to recount how these were handled, in order that any possible lessons may be learnt.

## INITIAL RESPONSE

The first to respond were passers-by, policemen, and firemen. 7 injured persons were expeditiously evacuated to hospital by the Singapore Fire Service ambulances. Singapore Armed Forces personnel arrived shortly after, with a team of doctors and medical orderlies, a fleet of 10 ambulances and emergency

resuscitative equipment. We were joined by a team of doctors and nurses from the A & E Department of SGH.

Initial attention focused on two immediate survivors, one whose leg was pinned under a concrete slab and another, whose voice was heard through a small opening at the rear of the building. The first victim, a 20 year-old woman, was given intravenous morphine through a normal saline drip for pain relief. Fortunately, there was no need to amputate her leg as she was freed after seven agonising hours. The second victim, a 26 year-old woman was rescued after firemen enlarged the opening sufficiently to pull her out. She had been trapped, in what was left of a bathroom, for eleven hours.

By this time, night had fallen, and few held out hope of finding any more survivors under the rubble. Even if they could be located, the physical obstacles to rescuing them seemed so insurmountable.

Fortunately, among the rescuers was a group of foreigners working with the Mass Rapid Transport Corporation, whose expertise proved invaluable in the planning and digging of intricate tunnels to reach trapped survivors. Burrowing started on day two, using four access points - two along Serangoon Road, a third at Owen Road and another at Rangoon Road. The choice of this method of rescue was to prove pivotal to the success of the subsequent rescue effort in which a further eight survivors were saved. It also had implications for the medical support to be provided.

## MEDICAL SUPPORT AND MANAGEMENT

### Tactical deployment of medical teams

Within minutes of the SAF medical team arriving at the scene, an emergency resuscitation area was established on the pavement across the road from the front of the collapsed building. Two modular tents were erected, one serving as a medical command post and the other, for treatment of casualties. However, it soon became obvious that we could not rely on one medical tent to support the entire rescue operation debris and heavy machinery steadily piled up and began to encroach on the access routes. The decision was taken to strategically site three medical teams (a standard SAF medical team comprises 2 doctors and 10 medical orderlies), one each in Serangoon Road, Owen Road and Rangoon Road respectively. This ensured that medical support was available close to the tunnel entrances from which victims would emerge (Fig 1).

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About 1 hour later, at about 7 pm, there was a minor cave-in, nearly trapping one of the tunnellers. Because of this, work progressed slowly and cautiously as the tunnellers shored up the tunnel with timber to make it safer. It was not until early next morning, at about 7 am that she was finally brought out. But it was too late. She was dead. She had an open fracture of one leg and had apparently bled to death during the night. The colleague whom she was concerned about, however, survived. He was found trapped under the fallen door of a bank-vault, and was given oxygen, intravenous fluids and intravenous morphine while awaiting evacuation.

#### Summary of injuries

A summary of the injuries sustained by the survivors is given in table 1.

**Table 1**  
Summary of Injuries Sustained by Survivors

S/No	Name	Sex	Age	Injury
1.	PSM	M	60	Laceration left ankle
2.	SAPP	F	17	Concussion
3.	SK	F	53	Bruise left hand
4.	AHBM	M	37	Abrasions left knee
5.	JV	F	25	Contusion hips
6.	JD	F	38	Contusion left upper limb
7.	ST	M	34	Fracture left clavicle and left ribs
8.	HT	F	26	Contusion cervical spine
9.	TOL	F	20	Subluxation of C3 and C4 Fracture right humerus.
10.	LFC	M	42	Abrasions lower limbs
11.	LBS	M	21	Contusion right toes
12.	BMW	M	33	Compartmental Syndrome left forearm
13.	CCG	M	31	Multiple Abrasions
14.	CP	F	20	Head injury
15.	BCC	F	21	Bruises left shoulder
16.	AS	M	36	Abrasions cornea
17.	CKC	F	46	Pressure sore left buttocks

**NB** S/No 8-17 were rescued through the tunnelling method.

#### Injured rescuers

In addition, we treated a total of 97 rescuers, many of whom sustained minor cuts and bruises while carrying out rescue work (see table 2).

**Table 2**  
Summary of Injuries Sustained and Complaints of Rescuers

Injury/Complaint	Number
Cuts and lacerations	28
Headaches	21
Bruises and Abrasions	9
Gastritis	7
URTI	7
Foreign body in eye	4
Burns	3
Gastro-enteritis	3
Others	15
<b>TOTAL:</b>	<b>97</b>

#### The dead

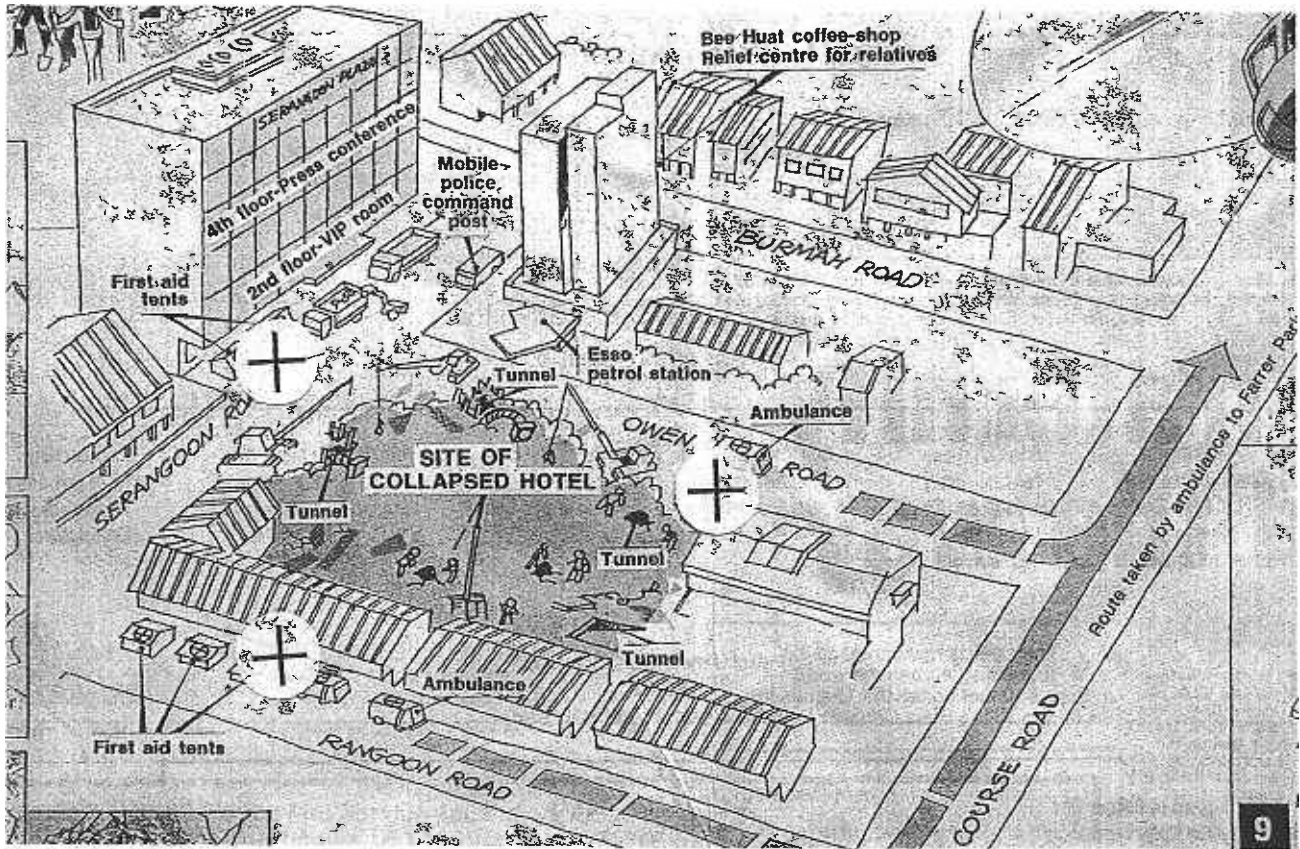
A field mortuary was established at the site from the very first day, with a coroner on duty at all times. A forensic pathologist was present most of the time. 33 bodies were recovered. On day 4, it was necessary to amputate the torso of a dead woman whose body was blocking the passageway leading to a trapped survivor. It was a difficult decision, but the circumstances were such that to abandon the tunnel and attempt another route was quite impossible, and would jeopardise the chances of survival of the live victim. The latter was to be the last of the victims to be brought out alive.

#### PSYCHOLOGICAL SUPPORT

An important lesson which surfaced, and which in retrospect we should have better anticipated and made preparations for, was the severe psychological effects on the victims.

#### Reactions of Victims

Of the 17 survivors, 9 victims were completely entrapped in very confined spaces, their movements severely restricted. The air was stale and contaminated by petrol fumes from damaged petrol tanks of cars in the basement carpark. One man had a dead body lying across him. All of them were in complete darkness, and could only tell day from night by temperature changes of their surroundings. The sounds they heard were limited to the drilling and hammering of the rescue operations. For the few who happened to be trapped close to one another, their conversations deteriorated into confused ramblings.



### Non mass-casualty situation

Because the casualties were extricated one at a time, we had the advantage of preparing in advance for their reception. Doctors and medical orderlies established a close working relationship with the tunnelers, giving medical advice when necessary. Once the casualty was out, he would be rushed to the nearest medical tent where the medical team would do a quick assessment, stabilise the patient if necessary, and prepare him for aeromedical evacuation. The patient would be transferred by ambulance to a waiting helicopter at a nearby football field. A doctor would accompany the flight to hospital (Fig 2).

### Management in the tunnels

All the victims rescued in this way were invariably dehydrated, anxious and in some cases, in pain. Because trapped victims took a long time to be freed even after being physically reached, medical personnel crawled into the tunnels to assess their conditions and to initiate medical management in-situ. This consisted of:

- a. noting the pulse, respiration, mental state, degree of dehydration, and extent of injuries.
- b. reassurance
- c. 5% dextrose orally, sucked through one end of cut IV line
- d. 5% dextrose or normal saline intravenously where possible or necessary
- e. oxygen administered via a face mask connected to external supply by a long, improvised tubing
- f. relief of pain — morphine was given intravenously or intramuscularly.

**“...to relieve often, to comfort always”**

Perhaps the most significant contribution made by medical personnel was that of comforting the cas-

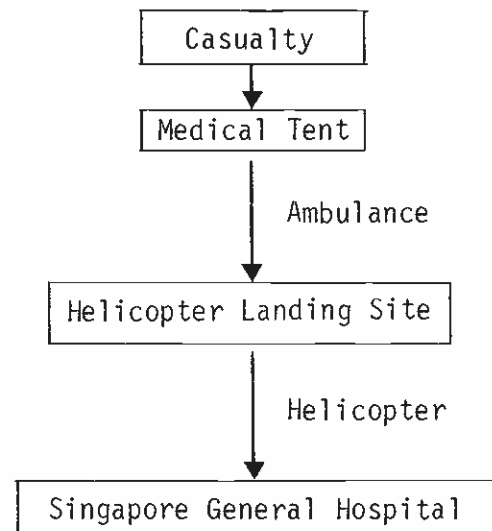
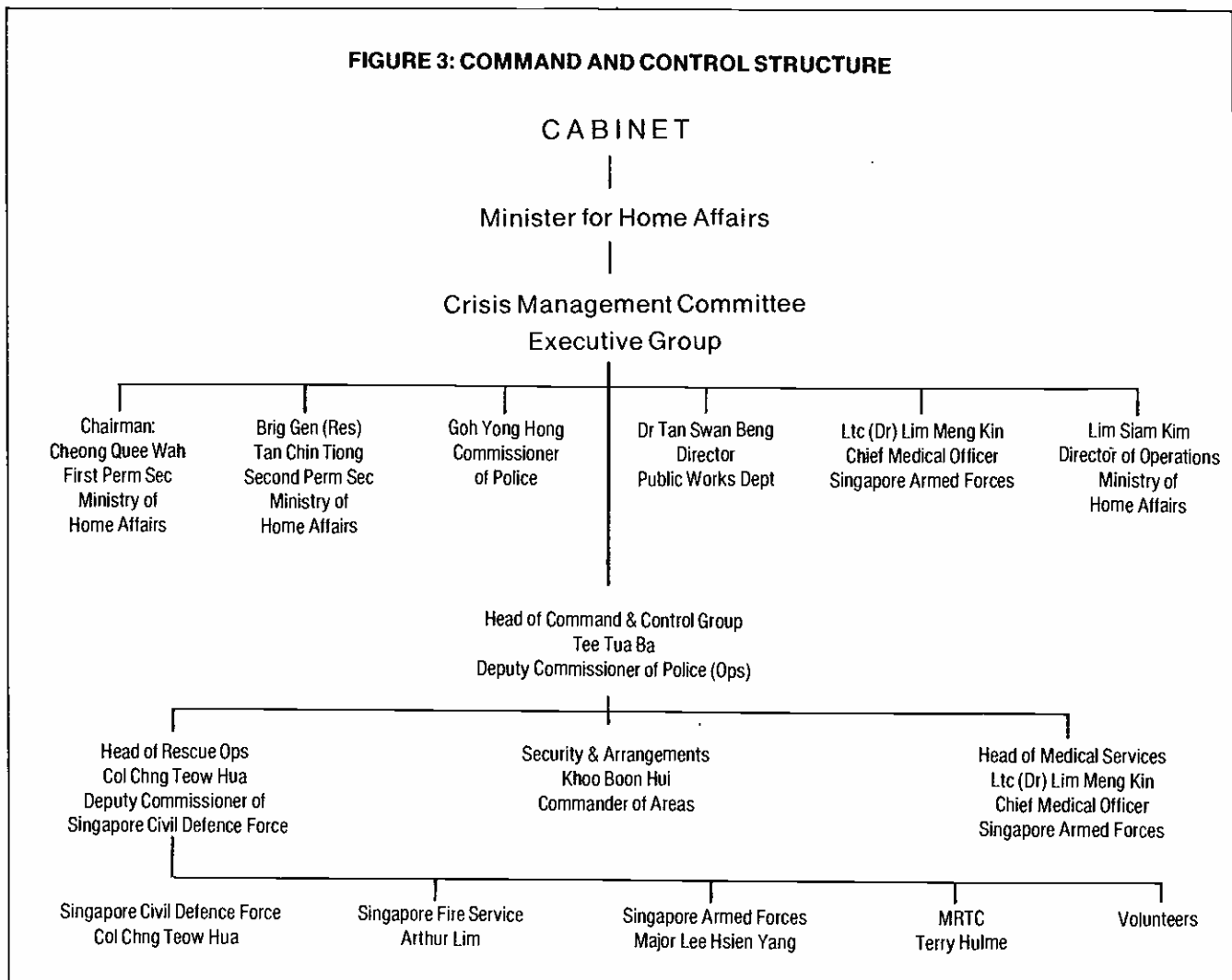


Fig. 2 Casualty Evacuation Plan

ualties and psychologically reassuring them. One girl we talked to through a narrow opening was sobbing away. It was a terrifying experience for her, trapped in the bathroom, with the air filled with leaked gas. Medical personnel took turns with other rescuers to comfort and reassure her before she was finally freed some 7 hours later. Another woman was less fortunate. It was in the Rangoon Road tunnel, soon after it was newly dug and with the roof still being precariously supported by 2-foot jacks, that one of us (LMK) crawled in, to talk to her. Her voice seemed faint, coming from some distance beyond the end of the 4-metre long tunnel. She pleaded to be brought out, and was also very concerned with another colleague whose condition appeared to be deteriorating.

**FIGURE 3: COMMAND AND CONTROL STRUCTURE**



Under such conditions, a number of psychological reactions developed:

- disorientation in time and space
- misinterpretation of sensory stimuli
- visual and auditory hallucinations
- indulgence in fantasising - for example one of the girls conducted a soliloquy as if she was carrying out her routine duties in the bank attending to customers
- delusions - mainly of a paranoid nature. One victim believed a rescuer was blackmailing the victims and another believed the FBI was taking her out for interrogation.

Observations of the victims in hospital subsequently indicated that the majority suffered from varying symptoms of survivor-guilt. All, without exception, showed some symptom or other of the post traumatic syndrome, such as anxiety, insomnia, recurrent and intrusive recollections of their experiences, and difficulties with memory such as patchy memory and mixing up the time sequence of events.

The patients were managed with a combination of supportive psychotherapy, medication and relaxation therapy. Counselling was also provided by various hospital welfare agencies. Three of the victims required long-term follow-up, mainly for depression over the loss of relatives in the disaster.

**Reactions of the Rescuers**

The rescuers themselves did not escape unscathed. Although they handled the grisly task of extricating

the bodies from the rubble with commendable composure, when rescue operations ended it became evident that a significant number who were in the forefront of the rescue work were troubled by recollections of the disaster scene, dreams involving their rescue work, and insomnia. One of us (FYH) conducted a group psychotherapy session with the civil defence officers. These officers in turn held debriefs and supportive counselling sessions with their own men. 3 persons needed psychiatric follow-up.

**Reactions of Relatives of Victims**

It was recognised early that the relatives of the victims had to be catered to, and welfare agencies were on hand to provide counselling and support. What was most important to relatives was the assurance that everything possible was being done and that they were constantly updated with accurate reports of the rescue operations. This probably helped to avoid any occurrences of scapegoating and unfounded accusations which are common in such situations. As far as we know, there has been no psychiatric breakdowns amongst the families of the victims.

From the experience gained through our handling of this disaster, we realise the need to inscale mental health teams to cater for all categories of persons involved in future disasters.

**MEDICAL ORGANISATION**

The importance of having contingency plans for management of disasters cannot be overemphasised. There are presently 2 main systems of medical disaster response in Singapore: one is based on an escala-

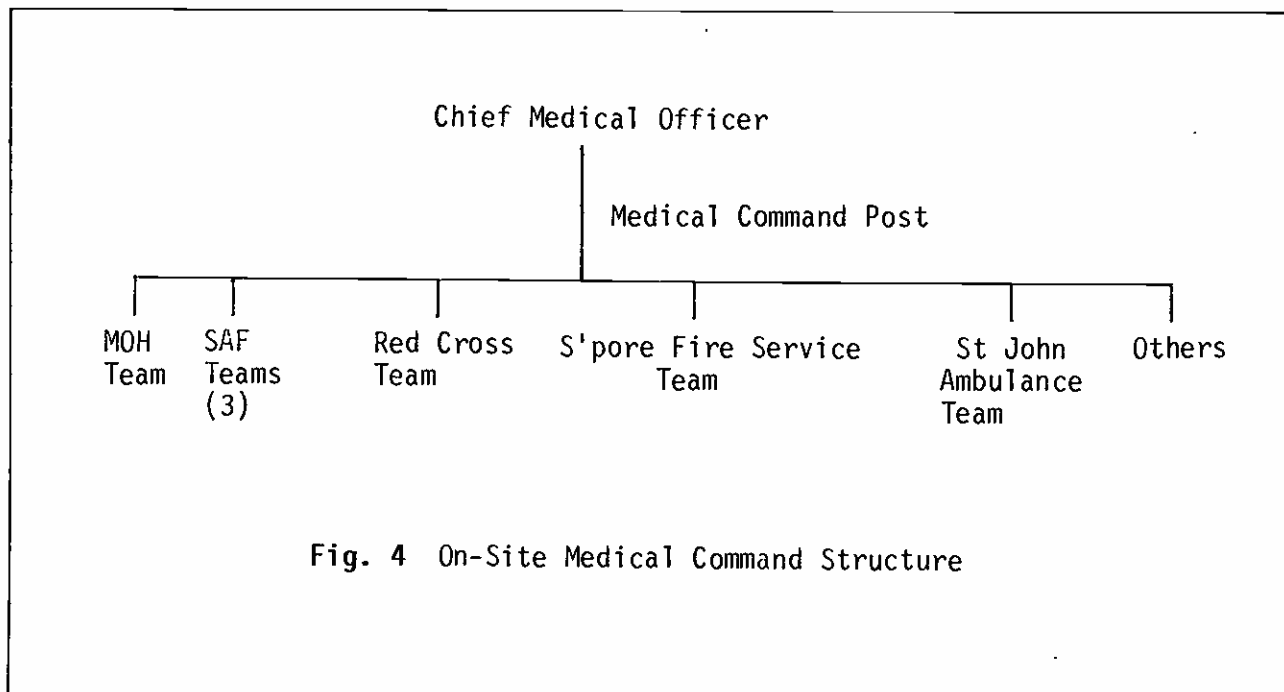


Fig. 4 On-Site Medical Command Structure

tion of "everyday response" of the existing emergency medical services i.e. the Fire Service and the Accident and Emergency Departments of the hospitals. The other is the SAF's Field Medical Support System which is geared to handle the disaster of war.

As it turned out, these two systems complemented each other very well: the Fire Service were the initial responders, and handled the first seven victims expeditiously. The A & E Departments of hospitals were placed on full alert to receive casualties. When it became clear that the rescue operation would take days, requiring sustained, round-the-clock medical readiness at the site, the SAF Medical Services, with its already existing command structure, communications, and the capability to provide stabilisation and advanced life support in the field, took charge of the medical support at the scene, leaving the Ministry of Health's hospitals to concentrate on higher level medical and definitive surgical treatment.

#### Overall Command and Control

The overall command and control structure is shown in Fig 3.

The SAF's Chief Medical Officer was represented at 2 levels, i.e. the Emergency Group, where he could advise the top-level decision-makers on medical-related matters, and at the Command and Control Group, from where he could direct the medical rescue operations on the ground.

#### Organisation of On-site Medical Resources

The organisation of on-site medical resources is depicted in Figure 4.

The Ministry of Health team comprised 1 orthopaedic surgeon, 1 anaesthetist, 1 A & E doctor and 2 nurses.

#### Shift System

To ensure round-the-clock medical cover at a sustained pace, the medical teams operated on an 8-hour shift system, while the medical command post staff rotated on a 12-hourly basis.

#### Communications

Effective communications is absolutely essential for such a complex task, and the SAF's sophisticated field communications facilities proved more than adequate. VHF sets provided secure communications between CMO, his deputy, the 3 medical tents and other SAF agencies on the ground. Communications with other members of the Command and Control Group was established through a parallel police net. The SAF also provided portable direct-dialing telephone facilities which enabled telephone communications from the medical tents to the Ops Room at HQ Medical Services, the Central Medical Stores, and for that matter, any other part of the island reached by telephone lines.

#### CONCLUSION

The entire rescue operation lasted one week. Overall, the medical services played a significant role, and acquitted itself satisfactorily. However, there is no cause for complacency. It is possible had there been unfavourable circumstances (eg. fire, explosion), or had the scale of the disaster been much bigger, that adequate medical response could have been more difficult to master.

If nothing else, the hotel disaster has demonstrated that the unthinkable can happen. We need to review and brainstorm medical contingency plans based on as many different disaster scenarios as possible. The medical profession should ask itself such questions as: Can we handle other mass casualty situations such as that following a jumbo jet crash? Do we have enough specialised treatment facilities for burns and smoke inhalation affecting large numbers of people? What resources would be needed to handle a Bophal-type incident? Or a Beirut-type blitz?

Just as no stone has been left unturned in the search for answers as to how the disaster happened, why it happened and most importantly, how to prevent a recurrence, so also should the medical profession take stock and learn from the hotel disaster, lessons that would enhance our capability to meet future challenges in disaster medicine.