

Review

Clinical review: Communication and logistics in the response to the 1998 terrorist bombing in Omagh, Northern Ireland

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Abstract

The Omagh bombing in August 1998 produced many of the problems documented in other major incidents. An initial imbalance between the demand and supply of clinical resources at the local hospital, poor information due to telecommunication problems, the need to triage victims and the need to transport the most severely injured significant distances were the most serious issues. The Royal Group Hospitals Trust (RGHT) received 30 severely injured secondary transfers over a 5-hour period, which stressed the hospital's systems even with the presence of extra staff that arrived voluntarily before the hospital's major incident plan was activated. Many patients were transferred to the RGHT by helicopter, but much of the time the gained advantage was lost due to lack of a helipad within the RGHT site. Identifying patients and tracking them through the hospital system was problematic. While the major incident plan ensured that communication with the relatives and the media was effective and timely, communication between the key clinical and managerial staff was hampered by the need to be mobile and by the limitations of the internal telephone system. The use of mobile anaesthetic teams helped maintain the flow of patients between the Emergency Department and radiology, operating theatres or the intensive care unit (ICU). The mobile anaesthetic teams were also responsible for efficient and timely resupply of the Emergency Department, which worked well. In the days that followed many victims required further surgical procedures. Coordination of the multidisciplinary teams required for many of these procedures was difficult. Although only seven patients required admission to adult general intensive care, no ICU beds were available for other admissions over the following 5 days. A total of 165 days of adult ICU treatment were required for the victims of the bombing.

Introduction

Although the circumstances of all major incidents are different, they show many similarities in the problems they pose to those responding and in the factors limiting the effectiveness of the response [1]. The quality of both the response and the pre-existing health care system may be

significant determinants of the ultimate impact of the event [2,3]. Although problems in areas such as communication, coordination and training have been documented [2,4–8], these problems are often still neglected [9,10]. While many institutions/government agencies have drawn up major incident plans (MIPs), these are often missing vital elements such as education/training and a coordinated approach to communication [6,10]. Most MIPs assume that the fabric of the acute health-care system will be intact. While the recent Indian Ocean Tsunami proved this to be a false assumption, it had been previously demonstrated in more localized catastrophic events [2,3,11]. MIPs also assume an epicentre for a major event, with problems reducing with increasing distance from that point – a 'ground zero'. This may not be the case in possible future disaster scenarios [12].

The Royal Group Hospitals Trust (RGHT) response to the Omagh bombing included elements of good practice developed in emergency responses during 25 years of terrorist activity [13–17]. Nevertheless, we made some decisions that, in hindsight, could have been better and our response had limitations due to factors both inside and outside our control.

Review of events

At 15:10 hours on Saturday 15 August 1998, a car bomb exploded in Omagh, Northern Ireland. Hundreds of shoppers had been evacuated from the town centre 'for safety' to an area adjacent to the car bomb due to confusion and/or misinformation regarding the location of the bomb.

Immediately following the explosion, many victims were taken 1.5 km to the small 158-bed local hospital (Tyrone County Hospital [TCH]), whose staff were confronted with a sudden influx of patients with major and minor injuries, of the dead

and of distraught relatives. Following the explosion, all local fixed-line telephones were non-operational. The mobile phone networks were severely overloaded to the point that it was almost impossible to make or receive calls for many hours. Local hospital staff that were off-duty either heard the explosion or received news of it via radio, television or by word of mouth. Many staff reported to the hospital and staff from nearby hospitals supplemented these over the first few hours. Nevertheless, the imbalance between the number of injured and local resources was quickly realized. Two hundred and nine patients received initial treatment in TCH while a further 127 were taken directly to three other hospitals 30–60 min away.

At 18:00 hours, ambulance control informed the RGHT, the regional referral centre for major trauma, that two or three patients were en route by air. No information was available on the types of injury, the estimated time of arrival or whether further patients would require transfer. The RGHT activated its MIP at 18:15 hours. Three victims arrived on the RGHT site by military helicopter at 18:25 hours. Many of the RGHT's staff had arrived as volunteers, having heard of the evolving situation on television and radio. This included medical and nursing staff, technical, administrative and domestic services staff. The RGHT received 20 blast victims between 18:25 and 22:00 hours, and received a further nine victims by 01:00 hours the next morning – many transferred by military helicopter (in groups of two or three). All transferred patients were admitted via the Emergency Department (ED) – there were no direct admissions to general or specialist wards. Seventeen of 27 adult patients were triaged/managed in the resuscitation room, and the remainder in cubicles within the ED. Three children were transferred directly to the Royal Belfast Hospital for Sick Children situated on the same campus. Six operating rooms were opened in anticipation of emergency surgery. A maximum of four theatres were required at any one time. In the first 24 hours after the blast, a wide spectrum of surgical teams utilized a total of 58 hours of operating theatre time.

Twenty-nine people died as a result of this incident; 27 at the scene or in/on the way to the local hospital. One patient, a 43-year-old woman, died in the resuscitation room of the RGHT. She had sustained severe liver laceration/contusion, which had been explored and packed in Omagh. She was profoundly shocked on arrival in the RGHT. Reopening of the patient's laparotomy wound in the resuscitation room revealed a large peri-renal haematoma with massive lower abdominal bleeding, probably from a torn inferior vena cava. She died within 1 hour of arrival. The final victim (a 62-year-old man) died of sepsis/multiple organ failure in intensive care after 21 days. The remaining 28 patients transferred to the RGHT survived.

After receiving 30 patients transferred from Omagh, seven adult intensive care unit (ICU) beds and two paediatric ICU beds were filled in the RGHT. The general intensive care unit

(GICU) had no available beds for 5 days. In total, 152 days of care were required for the bomb victims admitted to the GICU. In addition, 23 days of care were provided by the cardiac surgical ICU acting as an overflow GICU. These figures exclude the requirement for paediatric ICU care.

Further multimedia material on this terrorist bombing is available online (<http://www.bbc.co.uk/history/war/troubles/agreement/omagh.shtml> and <http://cain.ulst.ac.uk/events/omagh/>).

The major incident plan

The RGHT's MIP was activated without definitive triggering information being received and before the arrival of the first casualty. This was on the grounds that two or three patients were en route and it was 'highly probable' that many more would follow. The MIP fulfilled its purpose; to ensure the establishment of a 'control team', to designate those in charge of key services and to provide a cascade system mobilizing personnel. Our MIP designates an ED coordinator and a surgical coordinator, and also provides a framework to handle issues such as maximizing available beds, supplies, pharmacy, public relations, pathology services and counselling. The MIP does not deal with clinical issues. These are the province of the coordinators or may be addressed in departmental major incident response plans.

Due to its proximity to the blast and the communications blackout, TCH did not have the chance to institute a MIP prior to the arrival of blast victims. Since it was Saturday afternoon, only minimal staff were on site and a telephone call-out of appropriate staff (which would have been insufficient anyway given the size of the hospital) was not possible. The blast occurred near to the local bus depot and a bus was mobilized (it is unclear with what authority) to take the injured to the TCH. Unfortunately this meant that a large number of 'walking wounded' and victims with probable non-life-threatening injuries reached TCH first, since these were easier to move the short distance to the bus. At this point TCH had no clear information on the situation, and with only one inexperienced doctor in attendance initially there was no early triage at TCH. This meant that when ambulances arrived with the most severely injured victims, the ED was already overstretched – as was the case in small hospitals near the sites of the Madrid bombings [18]. The situation did improve gradually and the arrival of staff from other hospitals responding to media reports was a major help. The problems in TCH were compounded by the fact that many of the victims were related to, or known by, the hospital staff treating them. Distraught relatives in the ED were difficult to manage in the early stages.

Communication issues

External communication

The telecommunications problems occurred because part of the local conventional 'fixed-line' network (including connections

to TCH) was directly damaged in the blast, and because all mobile phone networks quickly became overloaded due to heavy use by the public and arriving media personnel. This meant that the primary hospital (TCH) had no direct means of communicating with its off-duty staff, with other hospitals receiving victims evacuated from the scene or with the RGHT in Belfast, which supplies the majority of tertiary referral services for the region. Major problems with communication have been reported in other mass incidents [2,4,5,8], sometimes with fatal consequences [5].

If the mobile (cellular) phone systems become non-operational, a facility exists that enables emergency services to retain the ability to use some mobile phones. This facility is termed access overload control for cellular radio telephones (ACCOLC) and involves one or more cells in the normal networks being 'stood-down' and the activation of an alternative network for emergency communication only. Application has to be made (in advance to [UK] central government) for specified telephones to have access to such a network. ACCOLC mobile phones are usually held by incident officers, communication officers and others in the command and control structure of a major incident. The decision to move to ACCOLC lies with the police service.

Activation of ACCOLC was considered in the hours following the explosion but was not activated for three reasons. Incident management relied on radio communication and so was not handicapped by the lack of mobile telephone communication. Secondly, the use of ACCOLC would not have allowed communication with TCH since it did not have any ACCOLC registered phones. Finally, the mobile network was still operational but grossly overloaded. With persistence and good fortune, it was still possible to make mobile calls. To prevent this by switching off the conventional networks was viewed at the time as 'anti-humanitarian'. It might also result in more people going to TCH in an attempt to track down relatives or friends.

ACCOLC has never been activated in Northern Ireland but was included in contingency planning for the 'Millennium bug' in 1999/2000. Despite enquiries, the authors could not find a confirmed activation of ACCOLC anywhere in the United Kingdom.

By approximately 20:00 hours it was realized that, since the Regional Ambulance Control Centre could communicate with ambulances at TCH and with ambulances sitting at the RGHT, information could be relayed indirectly between the two hospitals. This allowed the passage of some clinical information during the remainder of the telephone blackout. The communication problems could also have been eased by direct ambulance-to-hospital radio communication. The lack of such a system has been an issue in the region for many years.

Television and radio were a potential means of mobilizing staff, as has been noted after other major incidents [19–21]. Immediately after the explosion, TCH needed experienced surgeons but did not ask for this specifically. This tendency to forget to ask for specific assistance, when receiving widespread but non-specific help from volunteers, was also noted in the response to the Loma Prieta earthquake [8]. We should consider the use of television and radio in a more specific and deliberate way; for example, mobilizing off-duty hospital staff during a major incident in a pre-meditated fashion. It should be remembered, however, that in Omagh the media contributed to the collapse of telephone communication, as noted in previous major incidents [19,21]. Broadband access to the Internet and satellite-linked devices (which do not depend on telephone landline integrity) have become valuable in receiving information in more recent major incidents [4] and may help reduce the amount of telephone and radio 'traffic' during major incidents. In the initial 6 hours after the Hillsborough Football Stadium Disaster, there were 1.75 million attempted telephone calls to the local telephone exchange – 250,000 (14%) were processed [21]. Efficient handling of information requires 'communication triage' [22] to ensure that critical information is delivered first to those who need it most. This might be possible in the future using e-mail if networks are secure and PDA-type devices are widely used in healthcare.

What disadvantages in the RGHT stemmed from the lack of communication with TCH? The scale of the event was unknown; six operating theatres were made ready but only four were ever required simultaneously. One patient was discharged from the GICU and three others transferred from the GICU to the cardiac surgical ICU with no certainty that those beds would actually be required. The mix and number of specialist surgeons and anaesthetists needed was unclear. Unreliable and sketchy information has been shown to produce inappropriate decision-making and deployment [4]. Patients arrived within 15 min of the hospital activating its MIP. With many senior staff living 20–30 min away, this could have been disastrous had staff not activated themselves in response to media information. Stress among staff in the early phase may have been lessened if they had a greater knowledge of what to expect.

Internal communication

We found internal communication at the RGHT between specific individuals coordinating activity in the key areas (ED, operating theatres, GICU and cardiac surgical ICU) difficult, as has been found elsewhere [4]. Due to the need to be mobile, the hospital telephone system was of limited use and on many occasions the coordinators had to meet face to face. This was practical because the GICU, the ED and the operating theatre complex were close together, but with a different floor-plan it might have led to significant difficulty. At Bellevue Hospital, medical students were used on 11 September as 'runners' since they were familiar with staff,

equipment and hospital layout [4]. The problems of intrahospital communication between teams in different clinical areas and the potential use of mobile radios/pagers have been discussed previously [4,17,19,21].

Public Relations were specifically charged with the task of liaising with the media and with relatives. Senior doctors and nurses were asked to contribute only when required, thus allowing them to remain focused on their main tasks. The early distribution of accurate and relevant information to relatives and victims with minor injuries may be very important in preventing problems post trauma [23].

Logistics

Mode of transfer and distribution of patients

Because of its small size, excellent road system and lack of traffic congestion, Northern Ireland has not frequently seen helicopter transport used to ferry critically injured patients to (or between) hospitals. The nature of this incident and the availability of military helicopters made their use appropriate. However the only real advantage, time saved [24], was partially lost due to the need to land a considerable distance from the hospital and transfer the patients to the ED by ground ambulance.

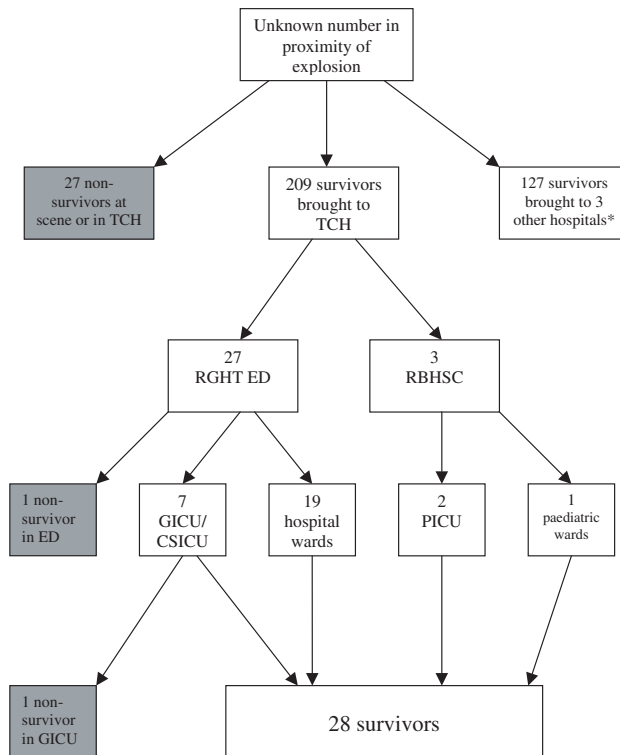
Although initially there was a huge mismatch between resources at TCH and clinical need, and there was an early lack of triage, the distribution of casualties (two-thirds to TCH and one-third to three other primary hospitals) helped to reduce the initial problems. The actions of the ambulance personnel in Omagh and the good sense of the public who, on seeing the situation at TCH, took those with lesser injuries elsewhere, should be commended. This is in contrast to the events in Nottingham after the Kegworth air crash [19].

All trauma-related surgical specialties (neurosurgery, thoracic surgery, vascular surgery and fracture, plastic/burns, etc.) and the largest GICU in the region were available in one institution in Belfast. This meant mandatory triage (only those with the perceived need for such services were transferred to the RGHT). Some victims perceived to have need for fracture treatment only were also transferred to Altnagelvin hospital (30 miles away). In this regard triage worked well, with no inappropriate transfers. Unfortunately, the 70-mile transfer from TCH to the RGHT was too far for one patient with major abdominal haemorrhage (see above).

Patient reception and tracking at the RGHT

The RGHT admitted 27 adult victims and three paediatric victims in a period of less than 6 hours. Their subsequent progress through the hospital system is summarized in Figure 1 and Table 1. The RGHT normally operates a double portal of entry when dealing with single or multiple victims of trauma. This means such patients may only be admitted via the resuscitation room or the GICU. In this incident the GICU was fully occupied making beds available and accepting the

Figure 1



Patient flow after the explosion. TCH, Tyrone County Hospital; RGHT, Royal Group Hospitals Trust; ED, Emergency Department; RBHSC, Royal Belfast Hospital for Sick Children; GICU, general intensive care unit; CSICU, cardiac surgical intensive care unit; PICU, paediatric intensive care unit.

three early admissions, so there was a single portal of entry via the ED. Such a policy is designed to avoid the problems such as those after the Clapham rail crash, when the opening of a second entrance to the ED resulted in patients with significant injuries being processed as minor casualties [25].

The next day, it was difficult to check on the less severely injured patients because they were scattered throughout several wards within the hospital. Two patients requiring relatively minor surgery were 'discovered' on Sunday morning. It was unclear when or how they reached the orthopaedic unit. There was a board in the ED specifically to track patients. It was, however, tucked away in a side cubicle. Although Public Relations were using this in their work with relatives, the surgical teams reviewing patients were unaware of the tracking board. Difficulties in tracking patients moving between different locations and professional groups are common [5]. In future, the Internet may provide an excellent method of tracking patients [26] but may be vulnerable like other communications systems [27].

One injury was missed due to poor communication. A patient underwent surgery 24 hours after the explosion for repair of a

Table 1**Admitting units and outcome of patients**

Admitting unit	Number of patients	Additional information	Outcome
ICU	7	Burns (2), head injury (3), orthopaedics/ophthalmic surgery (1), vascular/orthopaedics/neurosurgery (1)	6 survived, 1 deceased
Burns	3		Survived
Neurosurgery	5		Survived
Orthopaedics	6		Survived
Thoracic surgery	1		Survived
Ophthalmic surgery	4	Enucleation (2), bilateral enucleation (1)	Survived
Children's hospital	3	ICU/abdominal injury, ICU/burns, burns	Survived
Emergency Department/ vascular general surgery	1	Abdominal injury – laparotomy in resuscitation room	Deceased

ICU, intensive care unit.

carotid artery aneurysm. He had multiple orthopaedic and blast/soft tissue injuries. It was recorded on his anaesthetic sheet that an X-ray showed 'intracranial metallic debris' but this was not known by the neurosurgical staff for a further 18 hours. He did not require any additional surgery for this.

Patient identification

The RGHT has, for 20 years, used an identity card system based on letters as temporary identifiers. Eight hours after the explosion, two patients (one in an orthopaedic ward and one in the GICU) had been 'identified' with the same name. Sorting this out required almost 1 hour of senior medical time. Malone has suggested the use of identification cards, which could be standardized for all (UK) hospitals [19]. Such cards would be used throughout the management of all patients of unknown or doubtful identity, co-existing with their 'real' identity, when known. This would have avoided the earlier stated problem of identification and the resultant emotional stress to staff and relatives. Such problems occurred after the Oklahoma bomb [28] and diverted staff from their main tasks.

Personnel issues

Due to its proximity to the blast and the telecommunications difficulties, the biggest problem at TCH was the lack of medical and nursing staff. The decision by doctors and nurses from other hospitals to drive to TCH and offer help was not a planned response, but was of great assistance. Clinical staff responding to a major incident by working outside their normal environment can be counterproductive [5]. On this occasion, it appears to have worked since the staff concerned were mainly medical trainees in anaesthesia (who are used to working in the ED and frequently move from one hospital to another as part of their training) and ED nurses. Working within an appropriate role in a MIP improves effectiveness [29].

Allocation of staff at the RGHT was planned to ensure the initial response could be sustained beyond 24 hours if

required. Six operating rooms were available but only four were utilized. This was because the urgency of cases waiting for surgery did not justify six theatres working simultaneously. The staff 'saved' by withholding two unjustified operating theatres from service helped man four anaesthetic teams that assisted in the ED and transferred critically ill patients for scans, X-rays and to the operating theatre/ICU.

One GICU consultant, arriving at 18:45 hours, went home despite the arrival of bomb victims since two GICU consultants were already there. He returned at 23:00 hours to relieve his colleagues at a time when many patients were being admitted to the GICU. In some disaster situations there may in fact be plenty of staff [18], but it may be difficult to get staff to leave, take a break or to delay coming to work [8].

The attitude of staff in volunteering and turning up in such situations has been noted previously [17–21,28,30] and is a recognized behaviour [31]. In particular, the readiness of anaesthetists to volunteer in this incident was striking and has been noted by many authors [20,21,30]. The presence of a ward clerk in the GICU helped prevent inappropriate diversion of clinical staff to deal with telephones, media, and so on, and this was complemented by the Public Relations staff, mobilized as part of the MIP.

Supplies

The anaesthetic teams were also responsible for resupplying the ED with drugs, equipment and disposables. These were transferred from theatres and ICUs in parallel with the patient transfers being performed by these teams. This is similar to a 'just in time' resupply strategy used by some private companies. It was obviously important to ensure the reserve, although modest, guaranteed that supplies would not run out. Using this strategy, there were no recorded supply shortfalls in the ED. The problems of oversupply, and potential wastage have been documented in the response to the Oklahoma

Table 2

The system's response to bombing: strengths and weaknesses

Strengths in system's response	Weaknesses in system's response
Clinical staff going to Omagh to help initial response	External communications poor and no back-up with ACCOLC during telephone blackout
Distribution of victims between four hospitals for initial care	No direct communication between ambulance and hospitals
Triggering of the MIP at the RGHT without waiting for absolute proof that it was required	Delayed realization of the use of ambulance control to relay communication between TCH and the RGHT
Utilization of day-shift staff and night-shift staff at the RGHT and having replacements for later in the incident response	Internal communication reliant on overloaded internal telephone system and face-to-face meetings
Public Relations staff tasked with ensuring good quality, timely information for relatives	Little communication between hospitals regarding victims' identity and status (for families with victims in more than one hospital)
Appropriate triage of small number of patients for tertiary care to regional centre	Advantages of helicopter negated by lack of previous experience and no helipad at regional centre
Availability of all trauma-related specialties on one site at the RGHT	GICU busy initially, discharging and transferring patients to vacate beds. Too few beds in system for a larger incident
Single portal of entry to the RGHT to avoid missed injury and direct admission to surgical wards	Patient identity mistaken due to early acceptance of spurious information
	System for tracking patients in regional centre not used by surgical teams for follow-up

ACCOLC = access overload control for cellular radio telephones; GICU, general intensive care unit; MIP, major incident plan; RGHT, Royal Group Hospitals Trust; TCH, Tyrone County Hospital.

bombing [29] and the world Trade Centre attack [4]. In the latter case, one clinical department estimated a loss of \$20,000 in consumables and equipment.

Planning ongoing surgery

The logistical problems arising in hospital over the period soon after a major incident have received little attention. Stevens and Partridge [25] noted that the disruptive effect of the Clapham rail crash lasted up to 1 week, while Sharpe and Foo documented the problems delivering an adequate plastic surgical service after the Bradford city fire [30]. Between day 2 and day 5 following the Omagh bombing, 26 hours of theatre time (i.e. almost four normal working days) was devoted to further surgical treatment of the victims (this excludes the three paediatric patients). Many of the ICU patients required multiple surgical teams to be involved in procedures. In some cases it proved difficult/impossible to ensure all the relevant disciplines were available and, occasionally, some staff (e.g. plastic surgeons) were double-booked in different theatre suites. Due to the nature of the injuries and the length of procedures required, plastic surgery was particularly hard pressed. The increased workload for the ICU lasted for 2 months after the incident.

What factors could have made this incident better or worse?

The strengths and weaknesses of our response to this event are summarized in Table 2. Had the bombing occurred in any neighbouring towns that do not have a hospital, the problems would have been greater in terms of transfer from the scene

to hospital and in terms of triage. Difficult decisions regarding whether to go to the nearest hospital (TCH) or to be transferred immediately for specialist treatment at the RGHT did not have to be made at the scene in Omagh. A bomb in a neighbouring town would not have affected Omagh's fixed-line telephone system. This and the additional time before casualties arrived would have been an advantage to TCH.

The timing of the explosion (Saturday afternoon) meant that hospitals had no elective surgery and so on occurring but therefore had minimal staff on-site. This was a disadvantage in TCH, a small local hospital, but a big advantage in the RGHT, a regional centre with more staff. When many of the patients arrived in Belfast both day and night nursing shifts were in the hospital. The staffing and activity levels of a hospital at the time of a major incident may be a vital (but uncontrollable) factor in the response [18].

It may be forgotten in such incidents that other ('routine') clinical problems arise to divert resources [7]. In the GICU, three patients unconnected with the explosion became unstable during the night and required approximately 3 hours of medical time. In addition, at 06:00 hours, a retrieval team had to make a 3-hour round trip to collect a patient with a serious closed head injury.

The number of patients requiring tertiary referral services was less than 10% of the total number of patients who came to the four primary hospitals. Only 3–4% of blast victims needed admission to the ICU. This pattern (a huge number of non-life-

threatening injuries and a relatively small number of patients needing critical care) is the normal injury pattern in terrorist bombing [16,18,32,33]. Had the proportion requiring ICU admission been higher, there would have been significant problems providing critical care in a system where ICU bed occupancy often exceeds 90% [34].

Discussion/lessons learned

Recommendations

1. Direct hospital-to-ambulance communication must be available for use in a major incident.
2. Hospital pagers or radios should be issued (or re-allocated) to those coordinating clinical activity in separate areas of the hospital.
3. Allocating numbers/letters to unidentified patients should be done in only one area. This should over-ride any labelling made in a previous hospital. Labels with the appropriate identifying number/letter should be tied/attached to the patient. The letter designation should not be abandoned until there is irrefutable proof of the patient's real identity.
4. A system for tracking the location, destination and clinical team responsible for all patients should be available and its existence widely disseminated. The number of units admitting patients should be minimized to facilitate follow-up.
5. A hospital such as the RGHT should have a helipad and a system to quickly transport patients from the pad to the resuscitation area.

Corrective actions since 1998

1. The ambulance service now has mobile phone communication from all emergency ambulances, which allows ambulance-to-hospital communication if required. Planning is underway for the introduction of digital trunk radio in 2006/2007. This will be the standard radio system for all emergency services and will allow the 'patching' of digital trunk radio into the telephone system if required.
2. Hospital pagers – no official change as yet. Since 1998 the ownership and use of mobile phones has increased dramatically and has supplanted the pager as the commonest means of contacting staff off-site. The use of mobile phones for intrahospital communication, however, has been hampered by worries regarding electromedical interference [35,36]. Studies now suggest that electromedical interference may be less of a problem than previously suggested and that the zone of risk for electromedical interference is limited to 1 metre or less around susceptible equipment [37–39].
3. Identity cards – recommendations have been enacted.
4. A revision of the MIP in the RGHT calls for the establishment of a tracking board in the ED and also calls for the transfer of patients from a designated ward to empty beds throughout the hospital. All victims from a major incident suitable for general ward care should be

cohorted in the designated ward, making tracking and reviewing patients simpler and quicker.

5. A new hospital block has been designed and is due for completion in 2008/2009. It houses the new ED and the GICU, and has direct (same-level) communications with the existing theatres. It will have a helipad on the roof serviced by a dedicated lift.
6. The MIP requires a senior surgeon to act as coordinator for surgical activity in the days following a major event.

Competing interests

The author(s) declare that they have no competing interests.

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