

Chemical incidents

Planning for chemical incidents by implementing a Delphi based consensus study

V Murray

The past five years has seen much activity in the United Kingdom into the preparation for dealing with chemical incidents

For accident and emergency (A&E) departments, many chemical incidents occur each year. However, surveillance suggests that few incidents occur in any one department each year as probably not more than about 10 events are reported for each A&E.¹ The problem of A&E departments failing to manage incidents effectively has been reported.^{2,3} With little routine experience from any hazardous material incident or chemical incident, building the necessary skills to achieve the maximisation of patient care and the minimisation of harm to staff and hospital facilities has been difficult. Therefore, the need to prevent problems arising from a chemical incident, be it accidental or deliberate, for an A&E department has been a major concern.

Much activity has been undertaken in the United Kingdom over the past five years to tackle the issues of effective and safe chemical incident preparedness, response, and recovery for an A&E department.⁴ This work was accelerated by the terrible events in the United States on 11 September 2001, the succeeding concerns about anthrax in envelopes in the United States, white powders in the United Kingdom and elsewhere, and, most recently, the identification of toxic material in envelopes distributed in Belgium in June in 2003. In addition, the reporting of the high level of "terrorist threat" across the world has precipitated anxiety about preparedness for chemical, biological, radiological, and nuclear events for many emergency and healthcare professionals. Guidance on decontamination prepared by the Home Office is helping to take forward joint working and the concept that all agencies are required to save life.⁵

Before this, the work on an accelerated Delphi study into the planning for chemical incidents was undertaken between October 2000 and February 2001 and reported in this journal,^{6,7} became essential as little evidence based medicine exists in this area. This may in part have been attributable to a paucity of healthcare professionals, such as toxicologists, who have regarded such issues as a priority. Thus this work has provided an elegant platform to develop consensus and agreement on developing the way forward to improved facilities, equipment, and processes. The issues investigated by the study included planning and preparedness, risk assessment, and training. Work was undertaken on the prehospital response covering command and control, scene management and safety, communications, roles, triage, decontamination, treatment, and transport. Within the hospital response, issues such as facilities layout, decontamination and lifesaving first aid, treatment, specialist advice, and transfer were considered. Personal protective clothing and decontamination issues were reviewed.

What is the outcome of this work? This study, along with other work, has helped to develop the current equipment now in use at all acute hospital and ambulance trusts in the United Kingdom. It has led to the development of training programmes such as the structured approach to chemical casualties.⁸

Most significantly, the outcome of this and much else has been the development, on 1 April 2003, of the Health Protection Agency.⁹ This public health lead agency with the National Radiological Protection Board has six divisions and its functions¹⁰ are:

- to advise government on public health protection policies and programmes.
- to deliver services and to support the NHS and other agencies in protecting people from infections, poisons, chemical, and radiation hazards.
- to provide an impartial and authoritative source of information and advice to professionals and the public.
- to respond to new threats to public health and to provide a rapid response to health protection emergencies.
- to improve knowledge about health protection through research and development, education and training.

The future for improved response in collaboration with A&E departments is therefore brighter and continuing work with the Health Protection Agency and the Department of Health will take this process forward.

Emerg Med J 2004;**21**:2

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REFERENCES

- 1 **Euripidou R.** Summary statistics of chemical incidents reported to Chemical Incident Response Service, 2001. *Chemical Incident Report* 2002;**23**:2-13.
- 2 **Thanabalasingham T,** Beckett MW, Murray V. Hospital response to a chemical incident: report on casualties of an ethyldichlorosilane spill. *BMJ* 1991;**302**:101-2.
- 3 **Harrison H,** Clarke SFJ, Wilson A, *et al.* Chemical contamination of health care facilities and staff. *Chemical Incident Report* 2002;**25**:2-5.
- 4 **Fisher J,** Morgan-Jones D, Murray V, *et al.* *Chemical incident management: accident and emergency clinicians.* Chemical Incident Management Series. London: The Stationery Office, 1999.
- 5 **Home Office.** The decontamination of people exposed to chemical, biological, radiological or nuclear (CBRN) substances or material, 2003. http://www.ukresilience.info/cbrn/cbrn_guidance.htm
- 6 **Crawford IWF,** Mackway-Jones K, Russell DR, *et al.* Planning for chemical incidents by implementing a Delphi based consensus study. *Emerg Med J* 2004;**21**:20-3.
- 7 **Crawford IWF,** Mackway-Jones K, Russell DR, *et al.* Delphi based consensus study into planning for chemical incidents. *Emerg Med J* 2004;**21**:24-8.
- 8 **Advanced Life Support Group.** *The structured approach to chemical casualties.* 2nd edn. Manchester: ALSG, 2002.
- 9 **Department of Health.** Getting ahead of the curve. <http://www.doh.gov.uk/cmo/idstrategy/idstrategy2002.pdf>
- 10 **Health Protection Agency.** Corporate plan: executive summary, 2003. http://www.hpa.org.uk/hpa/publications/corporateplan2003_8pdf

New biochemical marker for chest pain

“Ischemia modified albumin”: a new biochemical marker of myocardial ischaemia

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Biochemical marker that has the potential to change management of chest pains

Periodically in the course of a medical career a new technological advance occurs that dramatically changes the direction of our patient care. The brief history of emergency medicine has unveiled a few such marvels. Those of us who have been in practice for many years have on occasion boasted to our younger colleagues of the challenges of managing SVTs without adenosine, or diagnosing unconscious patients with no computed tomography scans. The report by Sinha *et al* on an “Ischemia modified albumin” (IME) assay in this issue of the journal has the potential to create a similar management change for the emergency department care of chest pain patients.¹

Differentiating transient myocardial ischaemia or angina from non-cardiac causes of chest pain is a major diagnostic challenge. Emergency physicians have a very limited number of answers they can provide a chest pain patient. We can identify an acute ST elevation myocardial infarction (MI) through examination of a standard 12 lead electrocardiogram, in most instances. We can also recognise a non-STE MI, and acute coronary syndromes though detection of raised myocardial enzymes. But once we have excluded either of these two conditions, we cannot readily tell a chest pain patient if they are at risk for any acute myocardial event. Our inability to identify occult cardiac disease is compounded by the potential for sudden cardiac death in patients with unrecognised significant coronary artery lesions.

Diagnostic options for chest pain patients in the ED include clinical assessment, provocative testing, or advanced imaging studies. None of these truly meet the practice needs of most emergency practitioners or our patients.

Unstructured use of a patient’s history and physical examination may be reliable in patients with classic presentations but it is certainly fraught with false positives and more significantly false negatives. The introduction of the Goldman criteria provided a formalised history and physical examination

scoring system and demonstrated improved diagnostic accuracy in chest pain patients but still had sensitivities below 60%.² Unfortunately, the accuracy of this approach is limited by both the ability of the interviewer to obtain an accurate history and that of the patient to correctly answer questions. Most experienced clinicians are well aware of the difficulties in interpreting an ambiguous or varying description of chest pain.

Provocative tests such as exercise and chemical stress tests have well established credibility in identifying patients with coronary artery lesions. Sensitivity for these tests range from 46% to 85% for simple exercise tests and up to 94% for nuclear medicine assisted tests.³⁻⁴ Unfortunately, emergency medicine utilisation of these tests is frequently limited by the logistics of arranging such tests or access to the consultants needed to interpret them. Even the most well designed rapid rule out units still require personnel and equipment to perform the exercise portion of the test and specialists to interpret either the nuclear medicine scans or echocardiograms. All of this takes control of the patient out of the hands of the emergency physician and forces us into a dependent role in patient decision making. More recently, magnetic resonance cardiology has been described, although access to this technology will be even more limited.

Coronary artery angiography is certainly an option, and occasionally the most reasonable diagnostic study for patients with extremely suspect histories and normal electrocardiograms. However, again, the emergency physician’s management revolves around additional services and consultants.

The introduction of the IMA assay for the first time provides emergency physicians with an objective diagnostic study to determine the presence of myocardial ischaemia completely within the control of the emergency department.

The IMA assay presents a quantitative accurate laboratory determination of the occurrence of an ischaemic myocardial

event, angina. Unlike previous serum studies that identify myocardial damage after the fact, this test allows emergency physicians to determine which patients have potential coronary artery lesions before occlusion occurs. The study in this month’s journal demonstrates a 95% sensitivity for the IMA assay when combined with the ECG and troponin T. This matches that of any other diagnostic modality short of coronary artery catheterisation. Considering the potential consequences for missing the presence of clinically significant coronary lesions the introduction of an objective decisions tool for these patients is a welcome aid to even the most confident clinician.

More important than the existence of this diagnostic test itself is the decision making capabilities it provides emergency physicians. The test can be performed and returned to the ordering physician in about 30 minutes providing a disposition point well within the limits of the typical ED visit. This compares very favourably with the 9–12 hour periods for chest pain unit stress testing or the multiple day admissions for inpatient evaluations.

Placing such management control completely within the initial ED visit will have dramatic effects on hospital bed and resource utilisation. Considering the universal prevalence of ED crowding, the safe discharge to home of chest pain patients will free inpatient beds for those admitted patients now boarding in ED hallways.

For as promising as the IMA assay appears some degree of caution is still indicated. Before we relinquish all those acute coronary syndrome beds and renovate the cardiac stress laboratory there are a number of questions on IMA testing that need to be established. Specifics on the timing of blood sampling in relation to the onset of chest pain must be established as well as other conditions that may cause false positive or negative results. Sinha’s study is certainly methodologically sound and supports other reports on the diagnostic value of assaying IMA concentrations in chest pain patients. If indeed this test bears up under additional scrutiny the next generation of emergency physicians may listen amazed at our care of chest pain patients without a serum marker for angina.

Emerg Med J 2004;21:3–4

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REFERENCES

- 1 Sinha MK, Roy D, Gaze D, *et al*. Role of “Ischemia Modified Albumin”, a new biochemical marker of myocardial ischaemia, in the early diagnosis of acute coronary syndromes. *Emerg Med J* 2004;21:29–34.

2 **Limkakang A**, Gibler WB, Pollack C, *et al*. Combination of Goldman risk and initial cardiac troponin I for emergency department chest pain risk stratification. *Acad Emerg Med* 2001;8:696–702.

3 **Belardinelli R**, Licalaprice F, Carle F, *et al*. Exercise-induced myocardial ischemia detected by cardiopulmonary exercise testing. *Eur Heart J* 2003;24:1304–13.

4 **Vitarelli GR**, Schillaci O, Lagana B, *et al*. Diagnostic accuracy and prognostic implications of stress testing for coronary artery disease in the elderly. *Ital Heart J* 2001;2:539–45.

Ambulance service reform

“Reforming Emergency Care” and ambulance services

T P Judge

The call to action must be heeded, getting there is the real challenge

Dr Robertson-Steel presents us with a call to action in transforming prehospital care called for in the government’s 2001 white paper “Reforming Emergency Care”.¹ Having laid out three underlying principles to guide the ambulance service response the author then outlines essentially three global strategies to meet the principles:

- linked if not national agreed standards for prioritisation of response;
- transforming the education and scope of practice of ambulance paramedics to more definitively assess and manage illness; and finally
- creating new networked partnerships between all providers of unscheduled care with core funding provided by a single source.

In articulating a vision of the future the author echoes work by Nicholl *et al*² regarding the future of the ambulance services within the UK and rightly acknowledges the challenges of delivering ever more and improved services within a near static delivery structure and budget. Inexorable increases in demand, the probable inability to agree on prioritisation standards, the lack of agreed standards of access and destination (potentially requiring reconfiguration of the “entire health-care system”), the problem of unlinked “perverse incentives” in funding multiple providers working within a single health catchment area are all specifically noted in the paper. The author concludes by highlighting the opportunity for the ambulance services to become “integrators” of care within robust partnerships of multiple providers in the prehospital arena.

Several questions and issues remain regarding both the extent of the problems and the achievability of the presented strategies for solution. With limited space allow me to lay out three:

Firstly, while the author acknowledges the demand problem, the strategies envisioned do not tackle the underlying issue

of whether the system is supposed to passively respond to constantly increasing demand or actively manage and separate demand from need. This remains an unresolved philosophical question across emergency care systems more based on political rather than clinical rationale. The “Response Generator” while perhaps more efficiently matching demand (hopefully need) and resources will re-allocate rather than reduce patient loads. Until “emergency care” is defined and understood by the public, there will be unrelenting increases in undifferentiated, unscheduled, and unplanned care and a constant unfulfilled search for efficiency.

Secondly, it is unclear whether the true appropriate scope of practice for the ambulance services is one of transport or one of care. Nicholl and colleagues have identified that the attributes of an emergency care system that manages trauma extremely well may not be synchronous with a system that manages asthma or diabetes.³ Emergency medical services (EMS) have been organised and structured to on a population basis primarily meet two time critical clinical needs—cardiac arrest and life taking trauma. Recognising that these conditions represent a fraction of total emergent patients it is always tempting to look for alternative, more productive uses of an already deployed work force. This may not be an effective strategy for either the original design problem or the new design strategy—chronic disease management. Furthermore, faced with the need to improve response time in an already maximised resource availability it is unclear whether the operational needs of the ambulance services can afford the cost and time to train the paramedics, much less treat the patients in a response and non-transport system. Such a system also begins to look very similar to the remit of the already deployed GPs who not only have greater training but work within a defined and known patient list.

Finally, the author’s “radical change” does so within the existing corporate structure of the NHS. GPs, ambulance services, NHS Direct, primary care trusts, and hospital trusts remain distinct entities albeit with a cohesive funding scheme from an envisioned “Local care group.” Current provider incentives and disincentives are neither aligned nor indeed even recognised. As an example, the author notes that a national agreed prioritisation system linking NHS Direct and ambulance service 999 control could potentially divert one million cases (transports) a year from existing demand “to alternative, appropriate care.” It is unclear whose budget and which providers would absorb this shift.

Within a system that measures quality through the proxies of response time and volume, a service decrease of this magnitude would invariably result in a budget reduction for the providers of the original services. Ambulance services, already struggling to cope with increased demand, and among the most cost efficient and effective EMS services in the world, could not absorb a budget decrease to shift capitated resources to the provider(s) absorbing the shifted demand. Nor is it likely that other providers of community care would willingly transfer additional resources to the ambulance services. Finally, the author does not acknowledge the complex interplay and non-aligned incentive/disincentives between emergency care providers and social services, mental health, and housing providers.

While the preceding and additional unanswered questions remain, these comments are by no means critical of the vision. Without question, partnerships in care with common measurements of quality across a continuum, a more widely capable workforce, and demand management are all essential strategies and opportunities for the EMS services of the future. The call to action must be heeded, getting there is the real challenge.

Emerg Med J 2004;21:4

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REFERENCES

- 1 **Department of Health**. *Reforming emergency care*. Norwich: The Stationery Office, 2001.
- 2 **Nicholl J**, Turner J, Martin D. *The future of ambulance services in the United Kingdom*. Sheffield: Medical Care Research Unit, SCHARR, University of Sheffield, 2001.
- 3 **Nicholl J**, Turner J, Pickin M. *A review of evidence for the provision of emergency services*. Sheffield: Medical Care Research Unit, University of Sheffield, 1998.