REFERENCES


Organising the management of life-threatening injuries

Injuries are a major public-health problem. They lead to much disability and are the commonest cause of death in young people, yet interest in their prevention and treatment, except on the battlefield, is relatively recent.

Robert Jones organised the first comprehensive civilian accident service in the UK during the building of the Manchester Ship Canal from 1888 to 1893, and in 1941 under William Gissane, the Birmingham Accident Hospital achieved worldwide recognition as a centre for this type of surgery. Despite some earlier proposals it was not until the early 1960s that committees were set up to confront the problems of organisation on a national scale within the UK. In 1961 a committee of the British Medical Association proposed a three-tier system with Minor Injury Units staffed by general practitioners, District General Hospital Units under the supervision of specialists, and Regional Trauma Units serving populations of one to two million people; but the Regional Trauma Units were never created (Accident Services Review Committee 1961). In 1962 a Standing Medical Advisory Committee suggested a two-tier system, and the principal recommendations of this report were accepted by the Government of the time (HMSO 1962).

In 1979 West, Trunkey and Lim reported from the USA that severely injured patients taken to the nearest hospital had a much worse prognosis for survival than those admitted to special trauma units. Other studies (West, Cales and Gazzaniaga 1983; Shackford et al 1986) have since confirmed that such patients should be treated in specially staffed and equipped Trauma Centres working to the criteria laid down by the Committee on Trauma of the American College of Surgeons (1979).

Three levels of trauma service were suggested with level I, the Trauma Centre, having as its major commitment the management of severely injured patients. In 1984, Cales reported on the effect of the introduction of a Regional Trauma System in Orange County, California and showed that the death rate for patients without major injury to the central nervous system admitted to the Centre fell from 73% to 9%, while in other hospitals it continued to be about 67% throughout the same period. In 1987, the Confidential Enquiry into Perioperative Deaths in the UK (Buck, Devlin and Lunn 1987) revealed that many injured patients were not receiving the optimum treatment and in 1988 a survey in the USA by West et al showed that only two states, Maryland and Virginia, had satisfactory statewide systems. Twenty-nine states had no Trauma Centres and 19 lacked at least one of the eight components considered essential by the American College of Surgeons.

In continental Europe, Germany has developed a sophisticated accident service with emphasis on prehospital care and urgent evacuation to specialist hospital units. Several types of rescue vehicle are used and the services are co-ordinated by Regional Rescue Communication and

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Despatch Centres. If required, doctors ride in the ambulances and helicopters. In France there is much medical involvement in the planning and administration of rescue services. Each of the 95 Departments is required by law to provide a Service d'Aide Medicales Urgentes (SAMU). SAMU are located near the reception areas of designated hospitals and are controlled by specially qualified doctors. Medical staff are constantly available to travel to the scene of an accident; they are involved in the control and provision of prehospital care.

Preventative measures can reduce both mortality and morbidity after injury (HMSO 1985), but of the many patients injured each year only a relatively small proportion suffer severe injuries. These can be defined as those which, untreated, carry a significant risk of death and include those with a score of 16 or more on the Injury Severity Scale (Boyd, Tolson and Copes 1987). The main causes may vary and change: in the UK road-traffic accidents appear to be causing fewer severe injuries and deaths (HMSO 1992), but injuries from personal violence are increasing (Shepherd et al 1990).

As to numbers, a study from the North-West Midlands region of the UK showed that from a population of about two million approximately 350 severely injured patients were admitted to hospital each year (unpublished data). During the same period, about 100 people died at the scene of their injury or shortly afterwards.

In 1988 a report from the Royal College of Surgeons of England made it plain that many deaths after injury in England and Wales were preventable. Its recommendations included the proposals that only one hospital in each administrative district should have an Accident and Emergency Department fully equipped to receive injured patients, and that there should be one Trauma Centre for every two million of the population. Such a trauma system was set up in 1988 in the English Midlands, and in July 1990 the Department of Health provided a grant of £1 million per annum for a detailed evaluation of the Trauma Centre at Stoke-on-Trent. Preliminary results from an in-house research group at the Trauma Centre are encouraging.

Any trauma system requires three well-integrated sections: prehospital care, hospital care, and rehabilitation.

Prehospital care requires efficient highly trained ambulance personnel. They should perform triage, provide immediate treatment and then transport the injured patient directly to the most appropriate hospital in relation to the nature and degree of injury and the distance to be travelled.

Hospital care should be provided by a District General Hospital with a staff of at least four trained orthopaedic surgeons (BOA 1992) and an emergency physician. It should be capable of treating most patients from its community population of 200 000 to 300 000.

A Trauma Centre, as part of a designated multi-specialty hospital, should act as a referral centre for the severely injured patient. A resuscitation team led by a senior doctor should be immediately available on site at all times. All members of the team should be trained in Advanced Trauma Life Support (ATLS). This was developed in Nebraska in the late 1970s and was sponsored by the American College of Surgeons to deal specifically with the immediate hospital management of patients with major injuries. An initial primary rapid survey with resuscitation is followed by a detailed secondary survey to identify all injuries. Education in ATLS in the UK has been provided for over 2000 doctors.

A Trauma Centre requires comprehensive back-up in all specialties, including neurological, cardiothoracic, maxillofacial and plastic surgery. A good intensive-care unit is essential with rapid access to operating theatres. Resuscitation and surgical treatment of life-threatening injuries to the head and torso should take priority, but then an attempt should be made to deal immediately with all other injuries, particularly stabilisation of fractures of the long bones.

The roles of a Trauma Centre and a District General Hospital overlap and are complementary. A Trauma Centre will also act as a District General Hospital for its own immediate community; those District General Hospitals at a distance from a Trauma Centre will continue to receive some severely injured patients and must be prepared to resuscitate them. For example, it is important that all District General Hospitals can transmit CT scans to a Trauma Centre to assist in obtaining a neurosurgical opinion on head injuries (RCS 1986). In both types of hospital, rehabilitation should begin early, to minimise permanent disability.

In the UK, a population of 1.5 to 3.5 million requires a trauma system of 5 to 10 District General Hospitals and one Trauma Centre. The whole of the UK therefore needs about 26 such systems, including about 180 District General Hospitals designated to receive trauma. Such a network would greatly facilitate national planning for disasters and would lead to better, probably more cost-effective, care of the severely injured. Early experience at Stoke-on-Trent has produced increasing Government interest in such a system (RCS 1993): financial support has been extended into 1994, and evaluation by an independent group continues. The concept of Trauma Systems rather than just Trauma Centres appears to be the best solution for national organisation.

In the developing world there are very different problems and little epidemiological data. Injuries have a substantial effect on public health and quality of life (MMWR CDC Surveillance Summaries 1992): the World Health Organisation computes the cost of all accidents as about 1% of the gross national product of a country, whether developed or developing. This means that an efficient organisation for the care of the injured is probably cost-effective as well as a humanitarian necessity in all countries. The principles of the Trauma System should be applied, though details will vary widely with the geography and economy of each nation.

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