Monitoring trauma outcomes in NSW

This article, by the NSW Trauma System Advisory Committee, outlines the rationale, objectives and development of the NSW Trauma System since its inception in 1988 and reports on methods devised to monitor the health outcomes of the system.

BACKGROUND

In November 1988, on the basis of strong professional support and clear evidence for what worked, the NSW Health Department endorsed the establishment of a network of regional trauma services that would improve patient care and outcomes[1]. The design of the system was based on the findings of clinical research indicating that an effective trauma system is based on:

- accurate pre-hospital triage;
- rapid transport of seriously injured patients to hospital; and
- a systematic response in hospitals to the reception and treatment of trauma.

In 1991 the Policy for Trauma Service was revised[2] to take account of earlier structural changes in NSW Health introduced in 1988. These changes involved reorganising the health care system into ten Health Areas and six rural Regions[3]. In 1993 the plan was updated to take account of the rural restructuring into Health Districts[4].

On March 29, 1992 the pre-hospital component of the NSW State Trauma Plan was activated in Sydney. To ensure the right patient is taken to the right hospital, ambulance officers use a set of assessment guidelines (trauma triage guidelines) to sort patients according to the presence or risk of serious injury. Patients with serious injury are transported directly to a major trauma service hospital, even if this means bypassing a local hospital. The following year (1993) an early trauma notification system was introduced in some localities of rural NSW.

NSW TRAUMA SYSTEM

The NSW Trauma System aims to improve the outcomes of trauma patients continuously through better integration and efficient use of pre-hospital and hospital resources across the State, the adoption of more effective approaches to trauma management, and the use of nationally and internationally accepted best practice guidelines.

This is being achieved through the:

- organisation and delivery of effective pre-hospital and hospital services, including efficient management of the linkages between and within these services;
- planning and provision of educational and skills maintenance programs for all staff involved in trauma care;
- monitoring and evaluating the core components of the system – ambulance services, hospital trauma services, local networks and the linkages between metropolitan and rural networks – and providing feedback continuously to improve the performance of the system;
- review of aspects of related services that have an impact on the care and outcomes of trauma patients, such as medical retrieval services;
- reporting on recent advances and emerging standards in trauma care;

- identification of issues for, and participation in, injury prevention programs;
- ongoing formulation of policy regarding trauma services in NSW; and
- evaluation of health outcomes.

The NSW Trauma System now operates within Local Area Networks bounded by existing Health Areas and Rural Networks that cover several Health Districts. Hospitals within each network provide trauma services appropriate to their designated role. A System Advisory Committee co-ordinates the system-wide organisation of trauma services and reviews the performance of the system.

MONITORING HEALTH OUTCOMES

Consistent with recommendations of the National Road Trauma Advisory Committee Report on Trauma Systems, a program is being implemented to monitor the performance of core components of the NSW Trauma System[5]. This program builds on the work done on the initial evaluation of the metropolitan component of the NSW State Trauma Plan and draws on developments in system-wide quality assurance put forward by the American College of Surgeons and San Diego County trauma system[6].

Monitoring involves two separate but concurrent review processes:

- Clinical audit – a confidential process that clinicians undertake at hospital, network and system levels and involves the detailed review of cases according to certain criteria.
- Statistical review – reporting on aggregate data to evaluate the process of trauma care from the pre-hospital phase to discharge from hospital or rehabilitation.

Major issues addressed by the monitoring program will include[7] assessing the appropriateness of care (comparing the process of care against an evidence-based 'gold standard'), assessing performance of the trauma system (concentrating on issues of efficiency), and assessing the outcomes of trauma care (examining mortality and quality of life after injury). The monitoring program will involve both the urban and rural components of the system and take account of statutory provisions for confidentiality of the Local Area, Rural Network, and State-wide quality assurance processes.

TRAUMA INDICATORS

National and international standards and performance criteria for trauma systems underpin the proposed trauma indicators. Specific reference has been made to the American College of Surgeons' guidelines for trauma systems, Royal Australasian College of Surgeons' guidelines and the National Trauma Systems Guidelines of the National Road Trauma Advisory Council (NRTAC) released in October 1993. Consideration has also been given to other indicators recommended by the Australian Council of Healthcare Standards and by the professional colleges.

Monitoring the outcomes of trauma care will occur at each level of the system from hospital to Local Area Network and State-wide (system-wide).

The indicators outlined here focus on system-wide monitoring in Health Areas and are designed to answer a series of questions about the quality and outcomes of

TABLE 2

INITIAL LIST OF SYSTEM-WIDE TRAUMA INDICATORS FOR IMPLEMENTATION IN THE SYDNEY HEALTH AREAS 1994

Phase of care	Data items	Data sources	Trauma indicators
1 Pre-hospital phase			
1.1 How many trauma patients are triaged to attend a major trauma service hospital?	ambulance triage category	Ambulance Service	*Bypass caseload* number and percentage of trauma cases triaged 'serious-bypass', and 'serious-major trauma service nearest hospital'
1.2 How many trauma patients are triaged as 'dying' and transported to the nearest hospital?	ambulance triage category	Ambulance Service	*Dying caseload* number of trauma cases triaged 'dying' transported to urban trauma service hospitals and major trauma service hospitals.
1.3 How accurate are ambulance officers' triage decisions?	ambulance triage category Injury Severity Score (ISS)	Ambulance Service Trauma Registry ISS mapping of Inpatient Statistics Collection (ISC)	*Over-triage rate* percentage of patients triaged 'serious' or 'dying' whose ISS <15 *Sensitivity of guidelines* percentage of patients with ISS >15 who were triaged 'serious' or 'dying'
1.4 Do trauma patients selected to bypass urban trauma service hospitals reach hospital promptly?	pre-hospital treatment and transport times	Ambulance Service	*Scene time – bypass cases* percentage of patients spending less than 20 minutes at scene of accident *Transport time – bypass cases* percentage of bypass patients arriving at hospital within 30 minutes of leaving the scene of accident *Pre-hospital treatment time – bypass cases* percentage of bypass patients arriving at hospital within 60 minutes
1.5 Do all ambulance transports for trauma reach hospital promptly?	pre-hospital treatment and transport times	Ambulance Service	*Response time* percentage of ambulance arriving at scene of accident within 10 minutes of the call for assistance *Scene time* percentage of patients spending less than 20 minutes at scene of accident *Pre-hospital treatment time* percentage of patients arriving at hospital within 60 minutes
2 Major trauma service hospital Emergency Department			
2.1 What is the source of referral for major trauma victims?	source of referral ISS	Trauma Registry	*Major trauma caseload* number of trauma patients ISS >15 treated at major trauma service hospitals by source of referral
2.2 How accurate are triage decisions that initiate a trauma response?	nurse triage decision ISS	Trauma Registry	*Appropriateness of trauma response* percentage of trauma patients with ISS >15 assessed by organised trauma response
2.3 How prompt is the trauma response?	time of arrival at ED time trauma call made	Trauma Registry	*Speed of trauma response* percentage of trauma calls initiated within 5 minutes of patient arriving at ED
3 Major trauma service hospital Definitive care			
3.1 Is definitive care organised promptly for trauma patients?	clinical diagnosis time of injury time taken to operative suite	Trauma Registry	*Time to definitive care for patients with:* **Head injury requiring craniotomy** percentage taken to operative suite within two hours of injury **Abdominal bleeding requiring surgical correction** percentage taken to operative suite within four hours of injury **Open fractures requiring debridement** percentage taken to operative suite within six hours of injury
4 Patient outcomes			
4.1 Are trauma deaths concentrated in major trauma service hospitals?	vital status locality of death	Area Network trauma death register	*Site of trauma death* percentage of inhospital deaths occurring in major trauma service hospitals
4.2 What is the potentially avoidable death rate?	West's preventability criteria[a]	Statistical summary of Clinical Audit	*Potentially avoidable death rate* percentage of deaths from intra-thoracic and abdominal injury operated on within six hours of arrival at hospital
4.3 What percentage of severely injured patients who were salvageable and survived?	vital status ISS/AIS (Wesson's criteria)[a]	Trauma Registry ISS mapping of ISC	*Trauma salvageable rate* percentage of patients with severe but salvageable injuries who survive

ISS/AIS = Injury Severity Score/Abbreviated Injury Scale: clinical scoring systems that assess the severity of physical injuries.
Prepared by: NSW Trauma System Advisory Committee, June 1994

PUBLIC HEALTH ABSTRACTS

Professor James S. Lawson, Professor and Head of the School of Health Service Management at the University of NSW, has prepared the following public health items from the literature.

IS DIAGNOSTIC ULTRASOUND SAFE?
Diagnostic ultrasound is being used in an increasing number of ways. It is particularly useful in the practice of obstetrics, and it is pleasing to report that the use of ultrasound is safe from the point of view of overheating the unborn foetus in particular. Exposures to ultrasound resulting in temperatures less than 38.5 degrees Centigrade can be used without reservation.

Barnett SB, Kossoff G and E, Marshall J. *Med J of Aust* 1994; 160:33-37.

GOING BLIND IN AUSTRALIA
Going blind in Australia is overwhelmingly a problem of older people, with 85 per cent of those who are legally blind being 50 years of age and over. There are three main issues:

- most visually impaired people retire with relatively normal eyesight and with no more than presbyopia (loss of visual acuity as a consequence of aging);
- those with visual impairment very often have eye disease and are not merely suffering from old age; and
- the major eye disorders affecting the older population, such as cataract, glaucoma and age-related macular degeneration, are all progressive and if untreated will cause visual impairment and eventual blindness.

Early detection and treatment can effectively control most of these disorders.

Livingston PM, Guest CS and Taylor HR. *Med J of Aust* 1994; 160:3-4

PROGRESS IN POLIO ERADICATION
Few issues in public health policy have generated a longer controversy than the choice between oral and inactivated polio virus vaccines. Experts in the field have concluded that the combined approach could be usefully evaluated in countries (such as Australia) with high vaccination coverage and that have achieved, or are on the verge of achieving, elimination of natural infection. The use of sequential schedules of two doses of inactivated polio virus vaccine followed by two or more doses of polio virus vaccine could be considered, particularly in countries where vaccine-associated poliomyelitis has become a major concern but where the threat of importation of wild polio virus remains. In most countries an inactivated polio virus vaccine-only schedule is a realistic option only when natural infection has apparently been eliminated globally.

Patriarca PA, Foege WH and Swartz TA. *Lancet* 1993; 1461-1463

HIGH-SUGAR DIET AND CHILDHOOD BEHAVIOUR
Both dietary sucrose (refined sugar) and the sweetener aspartame have been considered a possible cause of hyperactivity and other behaviour problems in children. An American prospective study among small numbers of children (about 25 in each of two groups) has clearly shown that even when intake of sucrose and aspartame exceeds typical dietary levels neither dietary sucrose nor aspartame affects children's behaviour or cognitive function. One group contained normal pre-school children and the other consisted of children who were recruited through advertisements and were allegedly sensitive to sugar.

Wolraich ML, Lindgren SD, Stumbo PJ et al. *New Eng J of Med* 1994; 330:301-7.

PEPTIC ULCER DEATHS IN AUSTRALIA
Johanna Westbrook and Louise Rushworth of the NSW Health Department have examined the mortality due to peptic ulcer in Australia between 1953 and 1989. Their study shows that deaths are associated with particular periods of birth. For example, women born between 1898 and 1913 have a greater risk of dying from duodenal ulceration than preceding or subsequent generations. This effect has been found in other countries. There is likely to have been an environmental problem for these women, perhaps the stress associated with World War I and the economic depression of the 1930s.

More than 800 people die each year in Australia as a result of peptic ulcer disease. The vast majority of peptic ulcer deaths occur in the elderly.

Westbrook JI and Rushworth RL. *Int J of Epidemiol* 1993; 22:1085-1092.

Monitoring trauma outcomes

trauma care. Other review processes operate at the network and hospital levels. Some of these, such as clinical audit of deaths, will provide statistical summaries for system-wide review.

Information on trauma indicators is presented in Table 2 as follows:

- phase of care being monitored;
- questions to be answered about the appropriateness, performance or outcomes of the relevant components functioning at this phase;
- data requirements to provide outcome information; and
- health outcome indicators used to monitor this phase of care.

EDITOR'S NOTE
In June 1994 the NSW Health Department released the document New South Wales Trauma System Policy Review 1994, on which this report is based.

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3. NSW Health Department. Blueprint for Health, NSW Health Department 1988.
4. Progress in Rural Health. Rural Health Directorate, November 1993; State Health Publications – RH 93-138.
5. National Road Trauma Advisory Council. Report of the Working Party on Trauma Systems – Commonwealth Department of Health, Housing, Local Government and Community Services. Canberra 1993 ISBN 0 644 29691 7.
6. McArdle MS, Shackford SR, Eastman AB et al. Trauma Quality Assurance System, Department of Health Services, Division of Emergency Medical Services, County of San Diego.
7. Irwig L. An approach to evaluating health outcomes. *NSW Public Health Bulletin* 1993; 4:135-6.
8. West JG. An Autopsy Method for Evaluating Trauma Care. *J Trauma* 1981; 21:32-34.
9. Wesson DE, Williams JI, Salmi LR, Spence LJ, Armstrong PF, Filler RM. Evaluating a pediatric trauma program: effectiveness versus preventable death rate. *J Trauma* 1988; 28(8):1226-31.