

ABSTRACTS

Wednesday, May 22, 2002

The aim of the pre-congress was to focus on the use of trauma registries to improve trauma systems and to find ways of enhancing this process. Experiences from different countries and systems, and experiences with various kinds of data, were presented. Will international standards for collecting data help improve trauma systems, patient care, and survival rates?

Pre-Congress: Utstein Symposium on Improving Trauma Systems and the Role of Trauma Registries

— Session I — Plenary

Trauma Systems and Trauma Registries from the Public Health Perspective

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Introduction to Utstein Terminology, Guidelines, and Consensus Process: Utstein Symposium on Improving Trauma Systems and the Role of Trauma Registries

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The Utstein terminology has its name from the estate which, in 872, was the residence of the King of Norway, from 1264 a monastery (Augustinian brothers), and from 1537 the property of the King of Denmark/Norway for a while. It has lent its name to a series of papers on how to conduct, write, and review various emergency care topics, as most of the expert meetings on these topics have taken place at the Abbey. With the exception of the trauma paper, all have been concerned with cardiac arrest.

The rationale for the Utstein style was that there were so many papers on outcome after cardiac arrest. These came from emergency medical services systems, with great variations in structure, resources, and operation, which hindered a uniform set of criteria and definitions for events, time intervals, outcomes, etc. Various factors were therefore reported, creating the possibility for comparing apples and oranges.

A specific Utstein consensus process was developed: An international group of experts receives a draft skeleton. They convene ideally without phone, fax, radio, TV etc = Utstein! Short plenary state-of-the-art sessions are given before the participants rotate through six to eight 45-minute breakout sessions. These breakout groups discuss an initial draft for the topic session prepared by breakout co-chairs. The group members then rotate to the next breakout session while the co-chairs stay and modify their original draft. The next breakout group discusses the modified draft, and all is repeated again thereafter.

The breakout group co-chairs thereafter prepare a final draft of their topic. The Utstein co-chairs prepare a draft of Utstein-style paper, and all the experts get a chance to comment before the Utstein-style paper is submitted to multiple journals for simultaneous publication.

Trauma is a situation very different from cardiac arrest. Major registries already exist with much information. Differences between the registries make comparisons difficult. There is usually a very large number of data points, which makes it time consuming to gather and enter data. In parallel, the quality and the completeness of the data can often be questioned.

The International Trauma Anesthesia and Critical Care Society took the initiative to launch an Utstein-style consensus conference on trauma. The purpose of the paper, "Recommendations for uniform reporting of data following major trauma—The Utstein style,"¹⁻³ is to offer a structured reporting system, permit compilation of data and statistics, facilitate and validate independent or comparative audit, encompass both out-of-hospital and in-hospital trauma care, allow identification of system factors that affect outcome, and facilitate studies of factors that affect outcome.

It contains sections on

- Trauma data structure development
- Terms and definitions
- Factors related to the circumstances of injury
- System factors
- Patient factors
- Outcome
- Ethical issues
- Documentation (methodology and technology)

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Injury Severity Scoring—Time for an International Update of the Abbreviated Injury Scale?

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— Session II —

Experiences with Trauma Registries from Country to Country—Factors Associated with Success and Failure

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The Role of Trauma Registries in Improving Trauma System Performance and Outcome—The Danish Experience

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Trauma registries have become an essential component of trauma systems. Data are managed by collecting and organizing pieces of information. A computerized database is valuable due to its ability to retrieve, sort, and report data. The database should be arranged in blocks of information, each block containing data you have decided to create for any element you want to collect. It is important to decide what questions you want to answer in the future.

There are generally two options for trauma registry software:

- An established trauma database, which is often commercial
- An in-house developed database

We have chosen to use both options at the Trauma Centre, Rigshospitalet, Copenhagen. We joined TARN in 1999 (at that time, the United Kingdom Trauma Audit & Research Network). This is a large multicentre database with more than 100 participating hospitals. In addition to TARN, we have developed our own in-house database. One reason is the delay in processed data from TARN (patient registration forms are mailed to TARN at discharge or 93 days after the patient has been admitted). Another reason being the exclusion of patients in the TARN. This is a problem for me as a trauma coordinator, with a need to have a total overview of all patients treated by the trauma team. This is necessary to keep track of the individual trauma patient during the hospital stay, and important information on number of trauma team activations, patient profile, and resources allocated. The in-house database is updated daily. Thus, relevant data are available for monthly reports, and data can be used to process data, in case specific questions are asked.

Experience from Our Perspective. The trauma coordinator must establish a close working relationship with the entire staff handling trauma patients—across all departments, including the management and prehospital staff. Information is the keyword. You need to keep everyone informed about your activities related to the data collection—explain how the data you collect on your rounds are used. Another important aspect is how this information affects the quality of care. Distribute regular reports with a summary of activity statistics and a few key performance indicators. Also consider morbidity and mortality conferences to discuss recent cases and procedures. The ultimate goal is to foster institutional commitment for the

trauma registry. Both doctors and nurses are usually likely to cooperate, and it is very important for you that they become your allies and get interested in the work.

Education. Trauma coordinators must be aware of the needs for education at their own hospital and for the staff from the hospitals transferring patients to your trauma centre. Be sure to collect the right data, in order to establish a basis for performance improvement, your daily work, and educational activities.

The validity of information decreases as the information ages. Information needs to be collected and processed while the patient is still in the hospital. Data can be validated and refined during rounds and clinical conferences.

Data security is a major issue and needs to be addressed according to rules and regulations.

Local trauma registries are valuable. However, local data are of limited value without the possibility of comparisons and benchmarking. Furthermore, larger databases will allow more meaningful studies with greater statistical power. Thus, a Danish national data registry—or, even better, a Scandinavian or European registry—should be the goal.

Experiences with Trauma Registries from Country to Country— Factors Associated With Success and Failure: England

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Following a report from the Royal College of Surgeons of England in 1988,¹ the British Government funded the Major Trauma Outcome Study (MTOS-UK) to collect and compare data from seriously injured patients. It was designed to serve as a UK version of a study that had been carried out in the United States comparing outcomes between different hospitals using the TRISS logistic regression methodology. The study group was based within the University of Manchester, but received data from a set of core hospitals throughout the country. After funding the study for several years, the government has gradually withdrawn its financial support, as had been planned in this pump-prime project. The organisation has continued under the new name of the Trauma Audit and Research Network (TARN) and has been self-supporting for 5 years, receiving funding directly from participating hospitals, whose involvement is voluntary.

TARN currently serves as a trauma registry for nearly half of the 300 or so acute hospitals in the country. Monthly and quarterly reports are sent back to the contributing hospitals, including a graphical comparison of outcome in relation to the other hospitals. This is presented as a Ws chart,² using a modification of the W statistic, the number of excess survivors (above the number predicted) per 100 patients, adjusted for the severity mix in the population. It had been intended to complete the audit loop by feeding back this performance data to local purchasers of trauma care, so that poor performers could either be supported by extra resources or reprimanded with the threat of withdrawing support for trauma care. In the latter case, major trauma cases could then be dealt with elsewhere in successful centres that would, in turn, receive funding diverted from the poorly functioning centres. This plan represents an evolutionary approach to continuous quality improvement in trauma care throughout the country—a laudable if somewhat controversial aim.

The government has not yet given support to mandatory reporting and purchaser feedback, despite a strong recommendation in a further Royal College report.³ While this weakens TARN's ability to influence standards of trauma care in the UK, it may be that the time is not yet right to use the data in this potentially threatening way. Two problems that are universal in trauma registries throughout the world plague the programme: data validation and database design. These must be addressed first.

TARN has made a major effort to train data collectors in the various hospitals in their highly rated start-up courses. At the same time, the organisation has greatly enhanced its own internal data validation and quality assurance processes, but this is not the main problem. Complete, accurate injury descriptions are often lacking in the original clinical records and times of events and interventions are frequently omitted. Without reliable and easily accessible raw data, subsequent attempts at validation are flawed. More disturbingly, there has been concern about whether information could be consciously or unconsciously recorded differently if poor performance were to have serious consequences for individual clinicians or their hospitals. The publication of league tables, the suspension of poorly performing clinicians, and increasing medico-legal concerns have already had a significant impact on morale. Will the current blame culture inhibit honest reporting?

The second problem of database design is also universal. Data fields have often been added piecemeal in poorly constructed tables in response to new fashions. Missing data have not always been well handled in binary fields. If a tick box on the data entry form is not ticked, is this because the answer is 'no' or because it is unknown or missing? TARN is responding to such database problems with a new generic design that is being developed to function over the Internet, speeding up communication with participating centres.

Despite these problems, much of TARN's data are robust and reliable, spawning a flourishing research programme with some 25 projects in progress. TARN continues to promote high standards of trauma care and still has the ear of government agencies, even if it lacks a more direct influence on standards of care. In its new self-supporting role, it has maintained considerable respect throughout the country and has attracted participants from abroad, including Scandinavia.

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Factors Associated with Success and Failure of Trauma Registries: Scottish Trauma Audit Group (STAG)

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This prospective national audit was established in 1992 with the aim of improving the management of seriously injured patients in Scotland. STAG has achieved 98% national coverage and a 96% data capture rate, with 26 hospitals contributing a total of 47,000 patients to the database.

Critical to the success of the trauma registry is clinician support from all of the specialties involved in managing trauma. The quality of the data and rapid feedback are major factors in securing cooperation from the multidisciplinary teams in A&E departments, who enter the patients into the audit in addition to their routine workload. The unique structure of STAG is such that patients who are transferred for further specialist care in a tertiary centre are followed up by regional audit staff. Feedback on the patient's status and the quality of the transfer process is supplied to the referring hospital. Having an independent, external audit team improving communication between disciplines, specialties, and hospitals is one of the benefits of a national trauma registry.

Clinical audit is regarded as a long-term investment in Scotland. The government funds the cost of STAG (£463,000 per year), which is divided almost equally between local data collection and centralised data processing. It is essential therefore that optimal use is made of the data to demonstrate improvements in patient care and to identify areas for further improvement. To date, STAG has 23 publications in peer-reviewed journals.

Factors that impinge on the success of a trauma registry can be classified into three groups. First, the limitations of TRISS methodology, specifically the problems in obtaining respiratory rates and AIS scoring anomalies, are well recognised. The negative impact can be minimized, however, by ensuring absolute standardisation of recording of physiological variables when the patient presents to the A&E department and by ensuring each injury AIS score is checked by a single individual. The second problem group relates to obstructive characters who are not team players and who are resentful of external monitoring. These individuals are in the minority and can generally be persuaded to cooperate by the exertion of peer pressure or by direct instruction from hospital management. Finally, one of the most difficult problems encountered is the lack of power to enforce solutions when clinical risk has been identified by the audit but denied by the individuals involved. In the majority of cases, adverse events are handled efficiently and appropriately at a departmental or hospital level. There have been (rare) instances where action to address a clinical risk issue has not been taken at a hospital level and STAG has to initiate an escalation process that leads to the involvement of the Chief Medical Officer for Scotland. This is not an ideal solution.

The "take-home" message from STAG is simple: collect robust data, aim for national coverage, and develop a system to deal with suboptimal performance. This requires significant long-term investment but results in a registry that can demonstrably improve the management of trauma patients.

Experiences with Trauma Registries from Country to Country— Factors Associated with Success and Failure: Sweden

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Trauma registries can be used as tools for medical outcome, quality assurance, quality improvement, research, injury prevention, care planning, and utilisation of resources. It is important to have accurate and reliable data. To assure good data quality, it is essential to provide education, training, time, and support to the registry staff. It is equally essential that medical records contain accurate documentation and data. Many obstacles can hinder good intentions, but with awareness of these obstacles, good planning, effective computer programs, and support, any hospital can have well-functioning trauma registries.

In the development of the software for the Swedish Trauma Registry (Kvittra) focus was placed on means of simplifying data entry. A graphical interface for coding of AIS was adopted from Strada (Swedish Traffic Accident Data Acquisition) by kind permission of Professor O. Bunkertorp. This, together with built-in calculation of ISS as well as TRISS, speeds up data collection and also decreases the risk of "human error" during this phase of the process.

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— Session III —

Experiences with Trauma Registries in Special Groups of Patients and from Special Types of Data**Neurotrauma**

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— Session IV —

The Utstein Style Recommendations for Reporting Data Following Major Trauma—An Update

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In 1998, a multidisciplinary group of clinicians met in Mainz to define the requirements

for reporting major trauma data for research and audit. Core and optional data requirements were debated and defined in a process that mirrored the one used successfully for cardiorespiratory arrest data at Utstein Abbey near Stavanger.

Collecting data following major trauma is inherently more complex than after cardiorespiratory arrest. There are more than 150 data points in the Utstein trauma data set, including more than 80 in the core data, compared with only 15 in the recommendations for cardiorespiratory arrest. In the first study to test the Utstein recommendations, Lossius et al found that only 47% of the core data were available retrospectively. While reducing the data set would improve the logistics of data collection, this would risk oversimplification.

A generic model of trauma care emerged during the Mainz workshop. It was based on the object-orientated concepts used in software engineering to model complex systems. It was hoped that this would handle complexity, facilitate data structure development (i.e., database design), and better recognise the different phases of trauma care (rather than focusing only on events at the scene and on arrival in hospital). The patient starts in a pre-morbid state, sustains a set of injuries, and proceeds through a set of locations (scene, ambulance, resuscitation room, CT scanner, operating theatre, ICU, etc., to the rehabilitation unit), accompanied by a set of attendants (bystander, paramedic, immediate care doctor, trauma team, etc.). As the patient passes through each location, information is received from the patient as observations and investigations (sensors) and interventions are effected as fluids, drugs, operations, and other interventions (effectors). Object-orientated concepts help to describe different instances of objects in the model, e.g., a bystander is an attendant with a more restricted skill set than an intensive care doctor and plays a different role, but the generic model encompasses them both within a simple data structure.

A database design has been developed in Stoke-on-Trent, UK, to pilot this approach, using a Microsoft SQL Server® database with a Microsoft Access® front end. For the last 18 months, information on new trauma patients has been entered and data from more than 10,000 patients on the old database have been transferred across. A reporting, profiling, and downloading capability has been developed.

A full analysis of the system's capability has not yet been performed, but it is so far proving to be practical and robust. Despite initial concerns that it would be too all-embracing, it has been well received by the data collectors. The system expects all entries to be timed, but copes well with missing times. It tracks locations and personnel throughout the patient's stay in hospital. New concepts have been introduced, such as the attending area (to cope with different levels of care within the same location) and the diagnostic track (to follow the evolution of diagnosis, including suspected, missed, definitive, and refuted injuries). The automatic reporting and analysis modules, while of considerable value, are currently undergoing further development. Importantly, the design allows the data set and range of entries to be extended without programming.

In summary, the Utstein recommendations have highlighted the difficulties of data collection following trauma. The way to cope with the intrinsic complexity of trauma data is to develop a generic, object-orientated model of trauma care, mirrored in the data structures that represent it. The challenge then is to implement it as a convenient, robust system.

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Thursday, May 23, 2002

Plenary Session: Keynote Lectures**Improving the Trauma Chain of Survival and the Trauma Team: Do We Have the Answers?**

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Learning objective: To reflect on the organisational changes we need to make for effective trauma care; to embrace more fully new clinical practices, such as permissive hypotension and damage control; and to respond to the new opportunities offered by a better understanding of information technology and team ergonomics.

The ancient art of trauma care continues to evolve. The nature of trauma itself sets the agenda for our efforts, demanding competence, commitment, and cooperation. We already know many of the answers needed to make further improvements in trauma care. In countries without established trauma systems, more can be achieved by organisational change than the application of new knowledge. The key components of an effective trauma system are well understood, based mainly on studies in North America.¹ Despite cultural differences, this kind of organisational structure can be transferred at the generic level, if not in fine detail, to other countries.

While it remains uncertain how we should staff our trauma team in all its forms from the scene, through the emergency department, to the operating theatre, and beyond, one thing is clear: commitment to trauma care is as important as the speciality background of its proponents. In addition, a legal mandate, supported by the local population, is needed to 'officialise' triage decisions and referral patterns.

However we set up our systems, we must address the need for continuity. In the trauma systems in North America, Germany, and Austria, trauma surgeons (derived from general surgery in North America and orthopaedics in Europe) have succeeded in providing continuity, despite the pressures of increasing specialisation. Elsewhere, emergency physicians, anaesthesiologists, orthopaedic surgeons, and general surgeons must examine their working practices to fill this gap. We must also centralise severe trauma, as far as our geography will allow. Without high-volume centres with all the relevant specialities in house, we are unlikely to achieve and maintain world-class levels of expertise.

New solutions relating to permissive hypotension are well established in principle, even if they are not universally applied. This approach has been extended to patients with head injuries complicated by uncontrolled haemorrhage elsewhere.² A philosophy of damage control surgery has been adopted and extended to musculoskeletal trauma.³ Awareness of abdominal compartment syndrome has radically altered surgical practice. New developments in imaging and in digital technology are promising new, if sometimes costly, solutions.

Biochemical and genetic solutions have yet to have their day. The benefits of survival

they will undoubtedly bring will be balanced by ethical burdens we must face in the future.

We remain uncertain about the best way of clearing the spine in obtunded patients, though several solutions have been suggested.⁴ We are tempted to image more completely using both benign and potentially harmful radiation, but we are ambivalent about the extra information and its attendant cost. Will it provide more signal, or just more noise and delay?

We are hampered by poor data collection methods, an issue that is being addressed at the international level by new database designs. Several problems continue to limit our ability to compare centres. Validating data, restricting what is collected but capturing it completely, and extending statistical methods to deal better with any missing data are currently areas of concern. We now recognise mortality as a poor discriminator between centres, unmasking the need to develop better measures of morbidity and disability.

As we learn more about effective team care and realise the need for specialist information throughout the chain of care, communication skills and the innovative use of digital technology will be critical in producing a comprehensive solution. If data capture, validation, and interpretation can keep pace with the technology, this will surely be a prolific source of new ideas and ergonomic solutions, though it will subject us as individuals to uncomfortable scrutiny along the way, as our every move is watched.

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The Patient is Bleeding and in Hemorrhagic Shock! Now What?

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Trauma Nursing in Scandinavia—More Than Just a Vision!

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