South Western Sydney Area Health Service

Regional Trauma Registry

Report on 5 Years 1995 to 1999

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A project by the Trauma Department, Liverpool Hospital

SOUTH WESTERN SYDNEY AREA HEALTH SERVICE
REGIONAL TRAUMA REGISTRY 5 YEAR REPORT
1995 – 1999

INTRODUCTION

Trauma and injury is a major challenge for the community, not just of South Western Sydney Area Health Service but throughout Australia. Since it's inception in 1994, the Regional Trauma Registry has laid the foundation for objective analysis of trauma care. Over the 5 year period 23,600 patients have been admitted to the Area Health Services six receiving hospitals following a physical injury. The Registry now has increasing power of numbers to determine not just the demographics, treatment patterns and outcomes, but also to provide trends and shortly will be able to validate different aspects of care. The Registry has provided a source of information to alter clinical care, provided a focussed system of reporting for research, and has become a brick upon which we will continue to build our trauma service.

It has been through the commitment and support of the Area Health Service, the Hospital administration, Professor Stephen Deane in Surgery and many others that we have been in a position that we can continue with our vision. A vision to share and help through data and objective information in the future treatment of trauma patients, not just in South West Sydney Area Health Service but throughout Australia and Internationally.

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RECOMMENDATIONS

In view of the large number of trauma admissions, it's burden on the health system, trauma deserves the following issues to be addressed:

- Agreed better practice guidelines; specifically in relation to:
  - Injury Prevention
  - Prehospital care - Intubation / Protocols
  - Definitive care Rehabilitation
  - Outcome measures
  - Establishment of Australian norms in Trauma.

- Review of the process of injury prevention and health promotion and the linkage with the tertiary prevention side of trauma care.
- Review of car restraints and legislation related to air bags.
- Review of the pre-hospital triage process and the pattern of inter-hospital transfer.
- Established performance improvement program with outcome measures
- A Ministerial task force to link trauma benchmarks and norms between different Area Health Services allowing identification of area of strengths and weaknesses with rectification and engineering of systems to improve outcomes.
- Incorporation of registry data into targeted areas of injury prevention, prehospital care, resuscitation through to definitive care into rehabilitation.
- Appropriate resources must be allocated to deal with the large volume and workload involved in the provision of trauma care, to reduce interhospital trnasfers.
- Review of the current NSW Trauma System.
- Develop strategic partnerships with key trauma related organisations

INTRODUCTION

Welcome to the report on the first five years of South Western Sydney Area Health Service (SWSAHS) Regional Trauma Registry. The Trauma Department at Liverpool Health Service initiated the development of the Regional Trauma Registry in August 1994. Originally the project was supported by a grant from The Department of Health "Health Outcomes Project" for one year. In the following year we received support from The Motor Accident Authority of NSW and since then the SWSAHS have continued to fund the registry.

While many hospitals maintain an institutional registry, our registry aims to provide a broader view on trauma admissions throughout of all the six hospitals in SWSAHS. This information can be used to identify trends in injuries over a period of time. It is also useful to see the number and type of injuries, to monitor where the patients are admitted and keep track of where they go next, if they are transferred to another hospital in the same area or to a hospital in another health service. Other items of information can be collected about the condition and treatment of the injured patients.

The perceptions of individuals has been backed by a number of research studies over recent years which have shown that the ways we are organised and trained in the health care system can significantly affect the outcome of victims of injury. Achieving the best outcomes for injury victims requires high standards of performance in the Ambulance Service, Emergency Departments, Operating Theatres, Intensive Care Units, hospital wards and in Rehabilitation services. However, it is not always evident or emphasised that even if all of these components are functioning well, good outcomes require a high level of coordination, education, and quality assessment and improvement across the continuum of care. A desire for continuing performance improvement is fundamental to trauma care in SWSAHS and the Regional Trauma Registry is a useful tool for setting standards that are of national significance.

The South Western Sydney Area Health Service (SWSAHS) is responsible for a wide range of hospital and community health care services for 706,O00 residents living in the local government areas of Liverpool, Bankstown, Campbelltown, Camden, Fairfield, Wingecarribee and Wollondilly. These seven regions cover an area of 6,237 kilometres.

Each Area Health Service in metropolitan Sydney and beyond has a designated Major Trauma Service (MTS). Liverpool Hospital is the MTS for SWSAHS. Bankstown, Campbelltown, Fairfield, and Camden hospital are termed Urban Trauma Services (UTS) and Bowral is a Rural Trauma Service. Formal system of pre-hospital trauma triage was introduced by the Ambulance Service of New South Wales in 1992 and continues to be monitored by the Trauma System Advisory Committee. This system provides guidelines and protocols for ambulance officers. Protocol 4 guides transport decisions and allows seriously injured patients to bypass a nearer urban hospital and be delivered directly to the MTS.

The registry provides information that measures the ability of the health care system to respond to the needs of the injured patient. For example, it is possible to look at how long it takes for an ambulance to get to the patient, how much time is required to stabilise the patient at the scene or how long it takes to get a patient who needs an urgent operation to the operating theatre. There are many elements of care that can be measured and then compared. This data allows the measurement of care given to patients, to see where improvements can be made and then to measure whether system changes actually helped the patients' recovery.

Trauma admissions to SWSAHS are analysed in terms of demographics, pre-hospital interventions, resuscitative care and interventions, progress of patients within the hospital system and an analysis of patients' outcomes. Reports from the Regional Trauma Registry reflect changes in the organisation of injury care, which have occurred over the last 10-15 years and since the introduction of the Metropolitan Trauma Plan of NSW Health in March 1992. These changes include trauma team responses, pre-hospital trauma triage, education programs in

trauma care, injury prevention strategies. This report bears testimony to the degree of cooperation between individuals and hospitals in SWSAHS. It reflects the value of collaborating with other Major Trauma Services in Australia and internationally.

Injury Categories and Inclusions

The registry contains information on all patients admitted into each hospital via the Emergency Departments with injuries from some physical trauma. The registry does not include patients who are discharged from Emergency Departments following treatment. The registry consists of two distinct categories, "Minor " and "Major" Injury Categories. Patients placed in the Major Injury Category have injuries to more than one body region or may have single region injuries not included in the Minor Injury categories. Injury Severity Score does not determine inclusion in this category as the distinction is more descriptive of the breadth of information captured on these patients.

Patients placed in the Minor injury category include those patients with an isolated injury to one body region. These injuries are specific and include: upper limb at or below level of neck of humerus, lower limb at or below the level of the ankle, isolated fracture of fibula, patella, neck of femur, soft tissue injury, isolated mandibular fractures, and burns (less than 20% body surface area (BSA) in adults and less than 10% BSA in children). Sixteen items of data are collected on patients with Minor Category Injury consists of name, age, sex, mechanism of injury, place of injury, whether or not the trauma team was utilised, diagnosis, disposal from Emergency Department, specialty, and admission and discharge dates.

A much more comprehensive data set of 156 items is collected on patients in the Major Injury categories. Patients in the Major Injury category have injuries to more than one body region or may have single region injuries not included in the Minor Injury categories. Pre-hospital data includes date of injury, postcode of where the injury was sustained, ambulance movement times, transport decisions, level of ambulance officer attending, baseline vital signs, airway, fluids given and cardio-pulmonary interventions. Referring hospital data including date and time of arrival, baseline vital signs, administration of fluid, management of airway and cardio-pulmonary intervention. Emergency Department data includes date and time of arrival, mode of transport, vital signs, interventions, investigations and disposal. The dates and times of subsequent operation and number of days in intensive care unit are recorded. Patients that are transferred to another hospital are followed up to obtain the discharge date and survival outcome and to confirm injuries.

Performance indicators are measured and assessed for each patient in the major injury category. These indicators relate to the three phases of care: pre-hospital, resuscitative and definitive care phase. All complicating factors are coded according to the USCD Trauma Service "complications list" (a copy of this list is in the appendix). All injuries are coded according to the 1990 version of Abbreviated Injury Scale (AIS-90). With all the information entered the registry program automatically calculates the Injury Severity Score and Probability of Survival using TRISS methodology (Champion, Copes, Sacco 1990).

Collecting and Storing Data

Information for the Trauma Registry is collected at all SWSAHS hospitals. Patients are identified for inclusion in the Trauma Registry by reviewing the Emergency Department admission log. At Liverpool Hospital data collection forms are completed either by the Trauma Nurse Coordinator (who is a member of the trauma response team) or by the Data Manager who also checks and enters the data onto a desktop personal computer. Part of the role of the coordinator is to follow trauma patients through the system ensuring appropriate and timely interventions and ensuring that multi-disciplinary communications occur and providing education to staff. At Liverpool Health service data is collected prospectively and is incorporated into the process of patient care. The records of patients with major injuries are reviewed after discharge for scoring of injuries, review

of outcomes, performance indicators and complications, and to compare final diagnosis to provisional diagnosis. Minor category injuries patient files are viewed only once.
For the urban and rural hospitals in SWSAHS the information is collected, coded and entered into the computer retrospectively by the Regional Trauma Coordinator. In these hospitals patients are identified for inclusion by review of lists provided by Clinical Information Departments of all admissions through Emergency Department.

The registry automatically computes the Injury Severity Score and Probability of Survival using TRISS methodology (Champion, Copes, Sacco 1990).

Commitment to Quality

We are currently using version 9 of the Coding Instruction Manual (see appendix 1). Ongoing review and development of the registry has seen the addition of a number of fields that have included some new performance indicators, and a comprehensive list of complications.

Inter-observer variability is a recognised problem in data collection. We are committed to ensuring quality data by continuous monitoring of coding standards and attention to detail. The weekly practice of all data collectors independently coding one patient's records and comparing our findings to check for any variation allows for a simple yet valuable quality assessment of data collection and interpretation. This reduces coder variability and provides ongoing feedback and an opportunity to discuss variances. Records are kept of these comparisons and notes added to Coder's Manual to reduce ambiguity. This process of quality assurance has continued for five years since the inception of the regional trauma registry and the observer variability is minimised by the constancy of staff (there has only been one staff member change during the five year period).

Other Reports the Registry Has Provided

The Trauma Registry has been the basis for numerous formal and informal publications on trauma admissions, injuries and outcomes since 1994. Formal publications have included: 6 Month, 9 Months, The First Year, The First Eighteen Months, and The First Two Years of Data Collection, Three Year Report 1995 –1997. Each of these reports has attempted to describe the cumulative data and to build a picture of trauma in the SWSAHS region to date.

To assist with ongoing research and the development of injury management guidelines and procedures specific reports have been prepared. There include reports on: Sporting Injuries, Road Trauma, Falls, Interpersonal Violence, Penetrating injuries, Use of MAST in pre-hospital setting, Blunt Abdominal Trauma, Head Injuries, and Dog Bites. There have been many more reports generated for interested clinicians over the last five years.

This current report represents an analysis of trauma admissions to South Western Sydney Area Health Service over the five-year period from January 1995 until December 1999. We look at the demographics, pre-hospital interventions, resuscitative phase interventions and progression of the patient through the hospital system. Descriptions are provided of the severity and body regions affected as well as the pattern of inflow and outflow of patients. A detailed description of several types of injuries is presented including head, abdominal, thoracic and vascular injuries.

The report provides an overview of the range of trauma admitted and the interventions instituted as well as the outcome of the patients. Where appropriate a yearly or monthly breakdown of occurrences and interventions is provided for examination of the data to identify trends which may be useful in identify needs and to influence future care planning.

Software, Hardware and Training

The initial costs for setting up this registry involved purchase of hardware and software, software development, the development of the data set used, the development of our coding instruction manual, staff, training and technical backup. Staff received training in use of AIS-90 Injury Severity Scoring at Westmead Hospital. The AIS-90 is the standard coding manual for all existing registries in Australia. Currently the registry is housed in a Digital PC 3000 Pentium with NT

windows environment. Clinical Reporting Systems (CRS) was the original software for the registry. However the Information Services Department (ISD) for SWSAHS did not support CRS applications and therefore we were pleased when ISD expressed an interest in developing the existing database on a Sybase platform. The initiative was to convert the existing Trauma database written in CRS to a fully supported Windows New Technology using Datagate to interface with applications such as HOSPAS and EDIS and enables electronic transfer of patient information, including demographics to Health Care Providers, Medical Records and Consultant Medical Officers.

The new system was written in WEB technology utilising Internet Explorer and resides in a SYBASE database. All formulas and functions previously available were incorporated into the new system. The ability to report from the database can be user definable and designable. Appropriate security levels have been built into the system, allowing for administrative; data entry and view only access to the system. The Sybase environment provides a simple interface between the two data entry points. Sybase also interfaces with other software, reducing data entry and improving accuracy. Interfaces to other applications using Datagate ensure that data transferred into the trauma database is real-time and validated by the data administrators. This approach ensures that any changes to feeder systems such as HOSPAS will cause minimum effect to the functionality in trauma. Datagate allows for a seamless interface to the user. Patient master index and laboratory and radiology records are accessed through Reflection software. HAS Emergency Department Information System (EDIS) is used to confirm patient's Medical Record Number and triage details. The trauma registry is fully supported by SWSAHS Information Services Department staff who are on-site to support the application. Patient details in trauma registry are confidential and all reports are de-identified. A range of programmed retrievals for recurring reports have been created and ad hoc queries are generated using SQL and Access. Improved turnaround time of information is achieved with the real-time interfaces. The ability to FAX data using either Exchange or Winfax Pro Version 8 will contribute to implementing continuum of care.

The great deal of interest in the new system from a range of local and interstate hospitals has been very encouraging. It is possible that several of the currently existing trauma registries in Sydney metropolitan hospitals will adopt our software development. (See appendix for screen samples).

Major Trauma Service Accreditation

Recently Liverpool Hospital was proud to be selected as one of the four Australian hospitals to undergo a verification process for the future accreditation of Major Trauma Services. Clinicians from hospitals in Australia and the United States visited our hospital to critically evaluate the care we provide to injured patients. The trauma registry is a useful tool to measure the care we administer and provide benchmarks for improvement.

Injury Advisory Committee

There is a commitment to drive change within the health system. Recently SWSAHS has implemented the development of several Advisory Committees. The Advisory Committees have an important role to play in the development of clinical leadership and a strategic approach to change within the Health System. Each Committee is to make recommendations on new services to be funded based on prioritisation and taking into account resource limitation. While a consensus on need will be difficult to reach due to differing definitions of need and perceived judgements on education and socioeconomic status, the principle of need based service provision and planning should be applied. Evidence based practice is an important method of improving the quality of health care provided. The trauma registry can be useful to support the Injury Advisory Committee.

We have provided in this report a comprehensive overview of what the trauma registry captures. It is neither possible nor practicable to provide a detailed analysis of every aspect of trauma and its management. What we provide is an explanation of what data is collected and some of the ways this can be examined to monitor and improve outcomes for trauma.

Grateful Thanks

It would not have been possible without initial funding to set up the project and ongoing support of SWSAHS management. The ongoing success of the registry depends on an enormous amount of goodwill and cooperation between many individuals and groups. We are particularly grateful to the staff of Clinical Information Departments at each of the hospitals who ensured patients' records were available for viewing. Medical, nursing and allied health staffs within the hospital have been supportive and helpful. Switch operators at Liverpool Hospital have assisted by keeping a record of Trauma "Hot-line calls" which facilitates monitoring of the inter-hospital transfer system. The NSW Ambulance Service has cooperated fully to promote excellent communication between service providers and the documentation of patients' treatment sheets. These records are vital to clinicians and to accuracy and completion of registry data. Clerical and nursing staff at Liverpool Hospital Emergency Department have assisted in promoting a system to improve the capture of these records. The SWSAHS Information Services Department (ISD) has provided excellent PC support and assistance. Particular thanks must go to Paul Haynes, Oleg Gluschenko, Jane Prain, and Andy Carnaghan. This has been invaluable to the integrity and continuance of the registry.

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NSW Trauma System

Care of patients with injuries begins before the patient arrives in the hospital. In NSW the system of care involves ambulance officers and hospital working together to ensure the patient receives the most appropriate care. Historically patients were transported to the nearest hospital. However in order that the patient with serious injuries gets the most appropriate care as soon as possible there was a change in the system of pre-hospital care. This new system empowered the ambulance officers at the scene of injury to make decisions about the transport of patients depending on the patients' injuries and condition. This decision-making process is known as "triage".

Pre-hospital Triage System Overview

A formal system of pre-hospital trauma triage was introduced by the Ambulance Service of New South Wales in 1992 and monitored by the Trauma System Advisory Committee. The State Trauma Committee developed a plan for implementation of the policy. Part of this plan was to provide specialist trauma services at centralised hospitals within clusters of hospitals. Each Area Health Service has one hospital designated to provide definitive care to critically ill trauma victims. This hospital is known as the Major Trauma Service for the Area.

So that there is no delay for the patient to receive appropriate care there was a system of "triage" (or transport decision based on the patient's condition and injuries). When a person suffers serious injuries the ambulance officers will take that person to the nearest Major Trauma Service, bypassing the closest hospital if necessary. If the ambulance were to take the patient to a closer hospital but the patient needed the care that he can only get at a Major Trauma Service, then the patient would have to be transferred from one hospital to the other. This delay might be the difference between life and death for the patient.

Major Trauma Services for Heath Service Areas in Metropolitan Sydney

Area	Hospital	Telephone
Central Sydney	Royal Prince Alfred	02 9515 6111
Eastern Sydney	Prince of Wales/ St Vincents	02 9382 2222 02 9339 1111
Northern Sydney	Royal North Shore	02 9926 7111
Southern Sydney	St George	02 9350 1111
South Western Sydney	Liverpool	02 9828 3000
Wentworth	Nepean	02 4734 2000
Western Sydney	Westmead	02 9845 5555

In metropolitan Sydney the small number of patients identified by ambulance officers as belonging in the seriously ill category (less than10%) are transported directly to the Major Trauma service, bypassing local hospitals if necessary.

The vast majority of patients continue to be taken to the nearest hospital. A decision to transfer the patient to another hospital may be made after assessment and stabilisation of the patient at the Major Trauma Service. Reasons for transfer might include need for a specialty service that is not available in the Urban hospital e.g. plastic, neurosurgeon or orthopaedic surgeon, or diagnostic (CT scan).

Major Trauma Services for Heath Service Areas outside Metropolitan Sydney

Area	Hospital	Telephone
Hunter	John Hunter	02 49 21 3000
Illawarra	Illawarra /Wollongong	02 42 22 5000

This system of bypass for seriously injured patients currently only applies in the Sydney metropolitan area. The Illawarra and Hunter Area Health Services are excluded from the pre-hospital triage process at present.

Regional Health Services in Rural Regions in New South Wales

Region	Hospital	Telephone
New England	Tamworth Base	02 67 66 1722
Northern Rivers	Lismore Base	02 66 21 8000
Mid Western	Orange Base	02 63 62 1411
Macquarie	Dubbo Base	02 68 85 8666
Far West	Broken Hill Base	08 8080 1333
Southern	Goulburn Base	02 4827 3111
Greater Murray	Wagga Wagga Base Albury Base	02 6938 6666 02 6058 4444

Trauma Services For Children

Trauma is the principle cause of death and disability in children over the age of 1 year in New South Wales. Although many injury prevention programs have had a major impact on deaths and disability, the percentage contribution made by injury to the child death rate is increasing. There are three State Trauma Services for children. These are New Children's Hospital (at Westmead), Sydney Children's Hospital (at Randwick - formerly known as Prince of Wales Children's Hospital), and John Hunter Hospital. The Area Trauma Hospitals for children are Hornsby Hospital, St George Hospital, Nepean Hospital, Royal North Shore Hospital, Liverpool Hospital. These hospitals function as temporary resuscitation stops for seriously injured children. Children for whom definitive treatment cannot be provided will be transferred on to one of the State Trauma Services for Children.

State Trauma Service for Children	Telephone	Area Trauma Service
New Children's Hospital Sydney Children's Hospital John Hunter Hospital	02 9845 0000 02 9382 1111 02 4921 3000	Royal Prince Alfred Royal North Shore Prince of Wales/ St Vincents St George Nepean Royal North Shore Liverpool Westmead

Protocol for Pre-Hospital Trauma Triage

Ambulance officers triage adult and paediatric patients according to the protocol below, which was developed by key Critical Care Clinicians for the New South Wales Department of Health. Decisions to bypass a local hospital and transport the patient to the Major Trauma service are based on the vital signs of the patient, the presence of serious injuries, or high-risk mechanisms of injury.

- If an ambulance officer considers a seriously ill patient will not survive the time of transport to an Area Trauma Service, the patient should be taken to the nearest hospital en route for urgent resuscitation
- At times the patient has serious injuries but the situation is difficult (entrapment, difficult access, resource limitations, time delay over 30min before delivery to an Area Trauma service, or circumstances which the scene officer determines at his discretion warrant medical assistance). In these instances the scene officer will radio control to notify that "difficult conditions" apply and be advised regarding availability of a primary medical response team.
- If the patient is apparently not seriously injured but has been involved in a mechanism of injury which is high risk, then the officer will re-evaluate the situation and decide whether to take the patient to an Area Trauma Service or to the nearest hospital.

1 NSW Health Department Emergency Services in NSW - Policy for Trauma Service State Health Publication, NSW Health Department 1988 ISBN 0 7305 3317 4