Trauma system and services

Report of the Trauma Working Group



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July 2007

Delivering a **Healthy WA**

Contents

Executive summary

The Trauma Working Group was established in 2005 at the request of Dr Neale Fong, Director General Health to review and advise on the implementation of Recommendation 33 of the Report of the Health Reform Commission (HRC).

"The Northern Tertiary Hospital should be designated as the State centre for major adult trauma, and Princess Margaret Hospital as the State centre for major paediatric trauma.

Emergency departments should be expanded in each of the four general hospitals to accommodate emergency adult and paediatric care, excluding only major trauma."

The terms of reference for the Trauma Working Group (TWG) are attached in Appendix 1.

Ultimately, the mandate bestowed upon the TWG was to consider current trauma service delivery, determine what needs to change in order to implement Recommendation 33, consider the impact on patients with 'special needs', consider the impact on trauma workforce, education and training and identify areas that are strongly associated with trauma that should be included in planning a comprehensive state-wide trauma service.

In fulfilling its mandate the TWG has developed a suite of initiatives that will provide a robust trauma system to WA via Emergency Department role delineation aligned with pre-hospital triage and retrieval systems and access to specialist care for paediatric, adolescent, maternity, burns, hyperbaric and spinal injured patients. The special needs of patients requiring rehabilitation have also been considered.

The TWG has also proposed a transition plan that facilitates a controlled implementation of the new system and change management with particular regard to legislation and long standing organisational culture. It is understood that there are workforce issues that will need to be resolved through education and training, data supported bed-modelling and on-going evaluation of the system.

This report provides background information and details of the initiatives proposed by the TWG to address the issues and progress the implementation of Recommendation 33. Whilst recognising the significant effort and resources that have contributed to the development of this report, it is acknowledged that the actual implementation will require additional resources, time, effort and commitment.

The TWG has attempted to be as comprehensive as possible within the timeframe available, but recognises that more discussion needs to occur around several concepts including Pre-Hospital Triage, Hospital Role Delineation and bed modelling, linkage to Disaster Response and Falls Related Injury Prevention, expansion of Trauma Registry data sets to accommodate system wide evaluation and, the role of Telehealth in provision of a Communication Plan to provide clinical support, networking, education and training for rural/remote areas.

Although the adult Major Trauma Service is not expected to be in operation before late 2007, the Trauma Working Group recommends that the following appointments be made by end 2007:

- Director State Trauma Services
- Director for the Major Trauma Services (RPH/PMH)
- Directors for the Metropolitan Trauma Services (SCGH, Fremantle Hospital)
- Trauma Coordinators for each of the Urban Trauma Services
- Trauma Coordinators for each of the country regions (based in each of the Regional Resource Centres).

This group, working together with the Injury and Trauma Health Network, will provide the leadership for phasing in the different elements that will constitute the WA Trauma System.

The TWG initiatives (with notation to the related 'Terms of Reference' (TOR)) are listed below -

The Trauma System

Initiative 1: A Trauma System will be developed, encompassing the continuum of care from injury detection and control, through definitive care and rehabilitation, incorporating all hospitals and health care facilities in Western Australia. The goal of the trauma system will be to deliver each patient to the trauma care facility, which has the right resources to match his/her needs, in the shortest time possible. (TOR 1, 2, 3)

Role delineation and hospital designation

Initiative 2: Trauma care will be delivered within a tiered system of hospitals and health care facilities, each of which will be allotted a designated role based upon its capacity to provide particular levels of care that match patient needs. (TOR 16)

Initiative 3: The system of designation of hospitals and health care facilities that has been recommended by the Trauma Working Group and will be implemented in Western Australia is as follows:

- Major Trauma Services: Form the central hub of the trauma system and provide definitive care for most of the State's major trauma caseload.
- Metropolitan Trauma Services: Provide a second level of trauma care to the Major Trauma Services.
- Urban Trauma Services: Provide definitive care for non-major trauma according to the availability of local expertise for their local communities.
- Regional Trauma Services: Located in a country regional centre, will provide a regional focus for definitive care of non-major trauma according to the availability of local expertise.
- Rural Trauma Services: Country hospitals, which have 24-hour availability of an on-duty medical practitioner, serving local communities.
- Remote Trauma Services: Small hospitals and health centres, which have no immediately available general practitioners, serving people in remote areas. (TOR 16)

The WA State Trauma Service

Initiative 4: There will be a single Major Trauma Service for adults, with Royal Perth Hospital taking on this role from late 2007 (the expected completion date of its new 30-bed trauma ward). The Fiona Stanley Hospital will take this role after 2012. (TOR 6, 7)

Initiative 5: There will be a single Major Trauma Service for children located at Princess Margaret Hospital that will be transferred to its new site when the hospital relocates. (TOR 6, 7)

Initiative 6: Sir Charles Gairdner and Fremantle Hospitals will be designated Metropolitan Trauma Services (Clinical Services Level 6), with the latter having its designation reviewed following the commissioning of the Fiona Stanley Hospital. (TOR 16)

Initiative 7: Rockingham/Kwinana, Armadale/Kelmscott, Swan and Joondalup Hospitals will be designated Urban Trauma Centres and as they are developed, with expansion of their emergency departments, operating theatres, beds and diagnostics, they will undertake an increasing complexity of trauma care, (Clinical Services Level 4/5). Joondalup Hospital will take on the role of a Metropolitan Trauma Service (Level 5/6) after 2011. (TOR 10, 16)

Initiative 8: Kalgoorlie, Albany, Bunbury, Geraldton, Port Hedland and Broome Hospitals will be designated as Regional Trauma Services (Clinical Services Level 4) and, as their capacity continues to expand, they will gradually increase their ability to manage most non-major trauma. (TOR 16)

Initiative 9: Appointment of the following positions will be completed by end 2007: -

- Director State Trauma Service
- Director for the Adult Major Trauma Services (RPH)
- Director for the Paediatric Major Trauma Services (PMH)
- Directors for each Metropolitan Trauma Service (SCGH, Fremantle Hospital)
- Trauma Coordinators for each of the Urban Trauma Services (Swan, Joondalup, Armadale/ Kelmscott, Rockingham/Kwinana Hospitals)
- Trauma Coordinators for each of the country regions (to be based in the Regional Resource Centres). (TOR 10)

Initiative 10: The Trauma System will be evaluated by 2011 to determine its effectiveness and, in particular, whether there is a need to develop a second Major Trauma Service for adults. (TOR 1)

Initiative 11: Critical infrastructure at Princess Margaret Hospital needs to be re-assessed to ensure that there is ready access to emergency services at all hours including:

- Ambulance access to the emergency department.
- An adequate level of resuscitation services.
- Appropriate and timely access for patients brought by helicopter.
- Access to 24 hour Blood Transfusion Services.
- Availability of 24 hour Anaesthetic Services.
- Access to 24 hour Laboratory and Imaging Services. (TOR 5)

Initiative 12: Princess Margaret Hospital will need to assess whether:

- Staffing of its critical clinical areas including the emergency department, intensive care unit, neurosurgical and general surgical services is sufficient to ensure that there is access to these services for paediatric major trauma victims 24 hours a day.
- After hours provision of biochemistry, haematology, imaging and transfusion services is appropriate for the timely provision of these services. (TOR 5)

Initiative 13: Children with major trauma up to and including 13 years of age will be triaged to the Paediatric Major Trauma Service, while adolescents from the age of 14 will be triaged to the Adult Major Trauma Service. (TOR 5)

Initiative 14: The Adult and Paediatric Major Trauma Services will develop processes for the conjoint management of adolescents to ensure that the special needs of adolescents, both for acute care and rehabilitation, are met. (TOR 7)

Initiative 15: A clear and consistent policy for the transfer of trauma patients from the north of WA to Darwin rather than Perth for definitive care will be negotiated with the Northern Territory Department of Health and Community Services. (TOR 3)

Special services in Trauma Care

Initiative 16: As the response to the injured pregnant patient must be a comprehensive trauma response with a prompt and secondary pregnancy response, pregnant women with major injury will be transported directly to the adult Major Trauma Service where initial assessment and resuscitation will be undertaken with obstetric and neonatal input from King Edward Memorial Hospital. (TOR 8, 9)

Initiative 17: Protocols will be put in place with transport providers and metropolitan and country hospitals and health services to ensure that pregnant women who suffer trauma can be transported to, and receive services in the most appropriate hospital. (TOR 8, 9)

Initiative 18: All patients with major trauma that includes a spinal cord injury will be triaged to the paediatric or adult Major Trauma Services where they will be transferred to the State Spinal Unit once they are medically stable. (TOR 5, 7, 9)

Initiative 19: The size and staffing of the current State Spinal Unit at Royal Perth Hospital will be reviewed with a view to consolidating all spinal cord surgery at the Hospital. (TOR 9)

Initiative 20: All patients with major trauma that includes severe burns will be triaged to the paediatric or adult Major Trauma Services where they will be transferred to the State Burns Unit once they are medically stable. (TOR 9)

Initiative 21: All diving related and other barotraumas, which can only be managed at a hyperbaric facility, will continue to be treated at Fremantle Hospital. (TOR 9)

Initiative 22: Specialised spinal injury, burns and hyperbaric services will all be relocated to the Fiona Stanley Hospital, consolidating the Major Trauma Service on the one site. (TOR 9)

Initiative 23: Emergency response in mass casualty events is governed by the policies and procedures of WESTPLAN – HEALTH and its sub plans, the Metropolitan Perth Business Continuity and Disaster Plan and the State Trauma Disaster Plan. Disaster Medical Assistance Teams, surge capacity, and education and training in disaster preparedness for mass casualty events should be maintained. (TOR 9, 11)

Initiative 24: In setting up the Major Trauma Service at Royal Perth Hospital, the Director will develop strategies for building a close working relationship between acute and rehabilitation trauma services. (TOR 6)

Initiative 25: Tertiary rehabilitation services for brain, spinal and major limb injuries will all be relocated to the Fiona Stanley Hospital, consolidating the Major Trauma Service on the one site. (TOR 9)

Initiative 26: Consideration needs to be given to the establishment of an intensive rehabilitation unit and day service at Princess Margaret Hospital as recommended in the State Rehabilitation Plan. (TOR 5, 9)

Pre-hospital triage

Initiative 27: The current pre-hospital process for transport is maintained and monitored for a six-month period after implementation of the Trauma System. A pre-hospital triage system with supporting triage tool is developed within one year of implementation of the Trauma System for adult and paediatric trauma. (TOR 11)

Initiative 28: A formal system for paramedics working in the road or helicopter retrieval services to consult with senior clinicians in the Major Trauma Services will be implemented. (TOR 11)

Initiative 29: Once developed, the performance of the trauma triage tool will be evaluated annually and modified as required. (TOR 11)

Triage destination and transport times

Initiative 30: Major trauma patients undergoing retrieval by road ambulance:

- Will be taken to a Major Trauma Service unless they appear to be in a life threatening situation when they will be diverted to the nearest designated trauma service for stabilisation.
- Where they are transported to a non-Major Trauma Service, liaison with the Major Trauma Service will be undertaken and inter-hospital retrieval activated as early as possible after initial assessment and resuscitation. (TOR 11)

Initiative 31: Major trauma patients undergoing retrieval by helicopter:

- Will be transported directly to a Major Trauma Service regardless of travel time.
- When transporting paediatric patients, the helicopter will use the landing facilities at Sir Charles Gairdner Hospital where it will be met by an ambulance and by a team from both that hospital and from Princess Margaret Hospital. (TOR 11)

Establishing a medical retrieval system

Initiative 32: Guidelines for the retrieval of critically ill and injured patients will be developed based on the minimum standards jointly endorsed by the Australian and New Zealand College of Anaesthetists, the Royal Australian College of Physicians and the Australasian College for Emergency Medicine. (TOR 11)

Initiative 33: Royal Flying Doctor Service (RFDS) services in the Northwest of the State will be reviewed with the aim of determining the most efficient and cost-effective way in which services can be enhanced to reduce transport times for critically ill and injured patients, staff fatigue and wear and tear on aircraft. (TOR 11)

Initiative 34: RFDS will continue to provide primary and secondary retrieval services, including medical coordination, for the rural and remote areas of WA outside a 200-kilometre radius of Perth and as designated under Initiative 36. (TOR 11)

Initiative 35: RFDS and St John Ambulance Australia (SJAA) will ensure that there is an effective communication system and appropriate protocols in place to ensure a high level of coordination between their services. (TOR 11)

Initiative 36: In conjunction with Fire Emergency Services Authority (FESA), a coordinated system for medical retrieval for primary and secondary retrievals by the Emergency Helicopter Retrieval Service will be developed and implemented with:

- SJAA funded to provide a part-time Medical Director and Medical Coordination.
- RFDS funded to provide the retrieval doctors for secondary retrieval. (TOR 11)

Initiative 37: Primary and secondary retrieval of critically ill and injured patients in the metropolitan area will be reviewed with the aim of determining whether there is a need for a dedicated service and, if so, what model would be most appropriate and cost-effective. (TOR 11)

Initiative 38: A multidisciplinary working group will be formed to examine the feasibility of developing a centrally coordinated retrieval system for children in Western Australia. (TOR 11)

Initiative 39: Following the commissioning of the Fiona Stanley Hospital in 2012, medical retrieval services, both adult and paediatric, will be reviewed to determine whether the arrangements in place are/have been effective or whether there is a need for an alternative model. (TOR 11)

Trauma registries

Initiative 40: Establish a WA State Trauma Registry under the leadership of the Director Major Trauma Service (Adult). Merging the existing trauma databases at RPH, SCGH, FHHS and PMH will form the WA State Trauma Registry. (TOR 13)

Initiative 41: Expand the WA State Trauma Registry to include the Urban Trauma Services and the Regional Resource Centres. The Directors of the Adult and Paediatric Major Trauma Service (MTS), with assistance from the Injury and Trauma Health Network Support Team, will develop the phased implementation plan. (TOR 13)

Initiative 42: Link the WA State Trauma Registry to the St John Ambulance, Royal Flying Doctor Service, Emergency Helicopter Service and the Coroner's databases. (TOR 13)

Initiative 43: The Clinical Lead of the Injury and Trauma Network will determine agreed outputs from the State Trauma Registry, in collaboration with the Directors of the Adult and Paediatric MTS and the Trauma Clinical Evaluation Committee. The Director of the Major Trauma Services (MTS) will ensure these outputs are delivered. (TOR 13)

Initiative 44: The Director of the Adult MTS will oversee the establishment of the Data Manager, Trauma Research Nurse and Data Entry Clerk positions at Adult MTS. (TOR 13)

Initiative 45: The Clinical Lead of the Injury and Trauma Health Network will establish the State Trauma Registry Committee, the Clinical Data Committee and the Clinical Evaluation Committee include developing terms of reference and membership. (TOR 13)

Initiative 46: The Injury and Trauma Health Network Support Team will assist the Director of the Adult MTS to develop budget holding and contract arrangements for the trauma registry staffing and performance outputs for the individual teaching hospital based trauma databases. (TOR 13)

Western Australian Trauma Services Advisory Group (WATSAG)

Initiative 47: The Clinical Lead of the Injury and Trauma Health Network will abolish WASTAG but ensure that its functions are continued under the auspices of the network. (TOR 4, 12)

Education and training

Initiative 48: The Western Australian Trauma Education Committee will develop a WA Injury and Trauma Education and Training Framework, under the auspices of the Clinical Lead and Network Advisory Group of the Injury and Trauma Health Network with support from the network secretariat. This framework will encompass the trauma education and training needs of injury prevention practitioners, pre-hospital personnel, the relevant medical specialties, general practice, nursing, allied health and will include the special needs of the rural and remote workforce. (TOR 14)

Initiative 49: The Clinical Lead of the Injury and Trauma Health Network will investigate aligning the resources of the Trauma Care Education Unit to the Adult MTS to support its state-wide education and training role. (TOR 14)

Initiative 50: The Adult and Paediatric MTS will develop and implement a range of strategies to enhance the trauma care skills of the workforce, including facilitating clinical rotations, developing innovative models of education and training and supporting rural and remote personnel who manage trauma care. (TOR 14)

Initiative 51: The Directors of the Adult and the Paediatric MTS are to develop clearly articulated approaches to ensuring that the workforce in services impacted on by the establishment of the Trauma System are provided with opportunities to maintain their major trauma care skills. (TOR 14)

Workforce

Initiative 52: The Clinical Lead of the Injury and Trauma Health Network will be responsible for developing the terms of reference, membership and specified outputs for the Trauma Workforce Working Party. (TOR 2, 12, 16)

1. Trauma system and services report

1.1 Introduction

There has been a growing recognition that trauma management and trauma response is a complex task and requires an integrated system approach to ensure that appropriate levels of treatment match the needs of the injured patient. As a consequence, integrated trauma systems have been established in recent years in a number of health systems across Australia.

Similarly WA trauma services have been reviewed and discussed across a variety of forums and working groups most significantly the Health Reform Committee (HRC) and Trauma Working Group (TWG).

1.2 Health Reform Committee

In 2003 the HRC chaired by Professor Michael Reid, examined a number of specific clinical services, including trauma services. To inform their deliberations, the HRC commissioned Professor Stephen Deane to review and make recommendations about the future direction of trauma services in Western Australia.

In their final report, *A Healthy Future for Western Australians*[1], the HRC recommendations focussed on hospital role delineation and networking of trauma services across the State. Recommendation 33 of the HRC states:

The Northern Tertiary Hospital should be designated as the State centre for major adult trauma, and Princess Margaret Hospital as the State centre for major paediatric trauma.

Emergency departments should be expanded in each of the four general hospitals to accommodate emergency adult and paediatric care, excluding only major trauma.

The HRC recognised that to establish this role differentiation would also require the implementation of a pre-hospital triage system to ensure that patients are accessing the most appropriate level of care.

1.3 Trauma Working Group

In August 2004 the Health Reform Implementation Taskforce was established to drive the health reform changes outlined by the HRC. At the request of Dr Neale Fong, Chairman of Health Reform Implementation Taskforce, the Trauma Working Group was established to review and advise on the implementation of Recommendation 33 of the Report of the HRC.

The terms of reference for the Trauma Working Group are attached in Appendix 1.

1.3.1 Trauma Working Group Committee Membership

The Trauma Working Group (TWG) membership comprised:

- Dr Simon Towler (Chair), Executive Director Clinical Policy and Health Reform, Department of Health WA
- Dr Paul Mark, Executive Director, Medical Services, Fremantle Hospital
- Dr Andrew Robertson, Director Disaster Preparedness, Department of Health WA
- Dr Robyn Lawrence, Acting Executive Director, Medical Services, SCGH

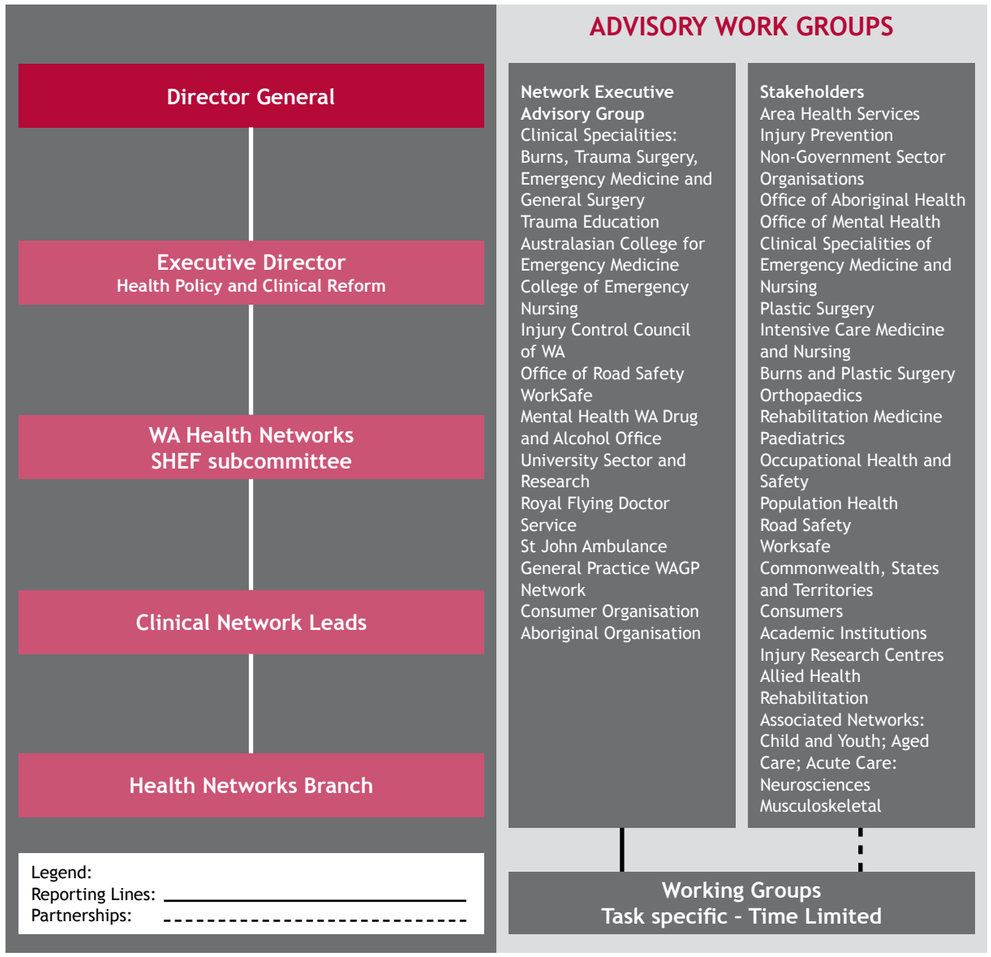
- Mr Sudhakar Rao, Chairman Trauma Services, Consultant General Surgeon, RPH
- Associate Professor Jeff Hamdorf, Consultant Surgeon, SCGH
- Dr Geoff Smith, Adj. Associate Professor, John Curtin Institute of Public Policy Curtin University Medical Director, WA Centre for Mental Health Policy Research.

The first meeting of the TWG took place in March 2005.

1.4 Injury and Trauma Health Network

In parallel with the work of the TWG, the Injury and Trauma Health Network has been established under the auspices of the Executive Director, Health Policy and Clinical Reform. The role of the health network is to assist in improving the coordination of clinical services and provides direction on where and how services should be delivered. The Injury and Trauma Health Network will have a vital role in supporting the implementation of the recommendations of the TWG.

Injury and Trauma Health Network



The establishment of the Health Networks and the implementation of the Health Network Framework have established the deliverables for the Injury and Trauma Health Network. A number of these deliverables are of direct significance for supporting the implementation of the recommendations of the TWG.

Injury and Trauma Health Network deliverables

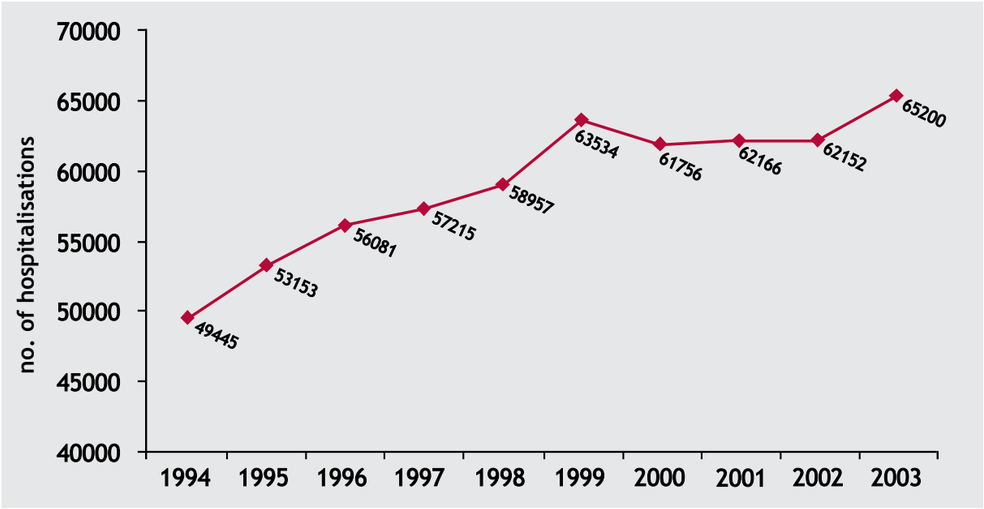
Planning	Policy	Protocol	Performance	People/ Partnerships	Priorities
Develop the Models of Care for the WA Trauma System.	Develop a strategic plan for the prevention of falls in seniors across the continuum of care.	Develop identified clinical and service delivery protocols to support the WA Trauma System.	Evaluate and monitor key elements of the TWG recommendations.	Develop system level working groups to inform planning and policy requirements of the WA Trauma System.	Support the implementation of the recommendations of the TWG Report.
Develop state plans to guide the priorities for injury and trauma.	Evaluate and develop the immediate state priorities to implement key action areas in alignment with the National Injury Prevention and Safety Promotion Plan 2004-2014.			Develop partnerships with government agencies in the area of injury prevention ie Road Safety and Worksafe.	

1.5 The burden of injury on WA Hospitals

While major trauma care is necessarily resource intensive and focused in the tertiary hospitals, the number of people requiring treatment is relatively small. By contrast, there were over 65,000 hospitalisations for injuries across all WA public hospitals in 2003. Injury that requires hospitalisation has to be an important consideration when developing a WA State Trauma System.

A recent ten-year trend analysis of hospital inpatient admissions for injury 1994 to 2003 concluded that the burden of injury on WA hospitals is growing at the rate of 3 percent per year for hospitalisations and bed-days, with cost increasing at the rate of 7 percent per year. A major contributor to this increase is the 10 percent per year increase in the number of hospital admissions due to falls in older people.

Figure 1. Number of hospitalisations in Western Australia due to injury 1994-2003



Source: WA Hospital Morbidity Data System 2005

The trend in actual numbers of hospitalisations for injury in Western Australia rose sharply from 1994 to 1999, and more slowly to 2003. The overall ten year average increase was 3.2 percent per annum.

1.6 Trauma data and trends

1.6.1 Definitions

There is no consistent and internationally agreed definition of major trauma. While various methods for assessing injury severity have been developed, including the Trauma Score[2], the Glasgow Coma Scale[3,4] and the Injury Severity Score[5] (ISS). The ISS is the most commonly used, with an ISS score of greater than 15 being widely recognised as defining major trauma.

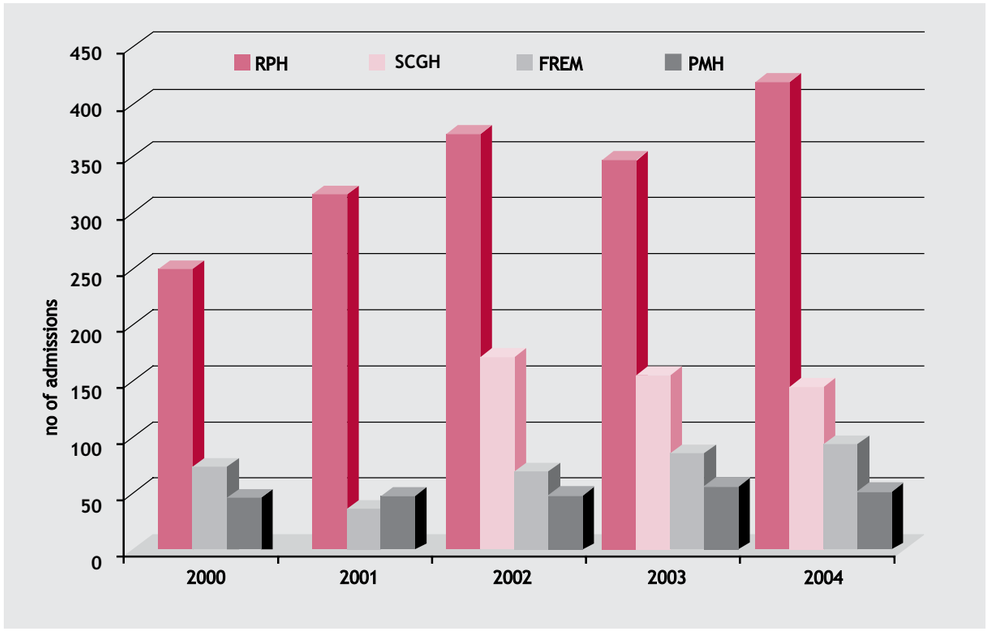
Major trauma is characterised by the following features:

- A fatal or potentially fatal outcome.
- ISS of more than 15.
- Acutely disordered cardiovascular, respiratory or neurological function.
- Urgent surgery for intracranial, intrathoracic or intra-abdominal injury or for fixation of major pelvic or spinal fractures.
- Serious injuries to two or more body regions.
- A need for the patient's admission to an intensive care unit including the need for mechanical ventilation[6].

1.6.2 Major trauma hospital admissions

Figure 2 shows major trauma admissions for tertiary hospitals for the years 2000–2004.

Figure 2. Major trauma admission by WA tertiary hospitals from 2000-2004



Source: WA Tertiary Hospitals Trauma Registries 2000 – 2004

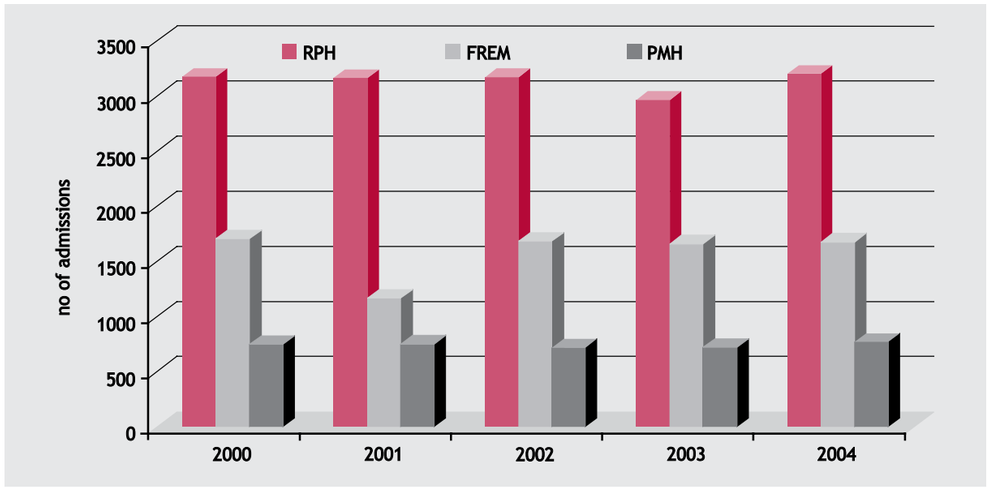
Note: Figures for SCGH are not available for the years 2000-2001.

Overall numbers of major trauma admissions at the tertiary hospitals between 2002 and 2004 have increased from 659 to 712. RPH recorded the most admissions each year, accounting for 57 percent of major trauma admissions between 2002 and 2004. SCGH received 23 percent of major trauma admissions, Fremantle took 13 percent and PMH took 7 percent of admissions[7].

1.6.3 Non-major trauma admissions

Figure 3 below shows non-major trauma admissions for tertiary hospitals for the years 2000-2004. Overall numbers have remained stable and this occurred at each hospital. RPH recorded the most admissions each year.

Figure 3. Non-major trauma admissions by WA tertiary hospitals from 2000-2004



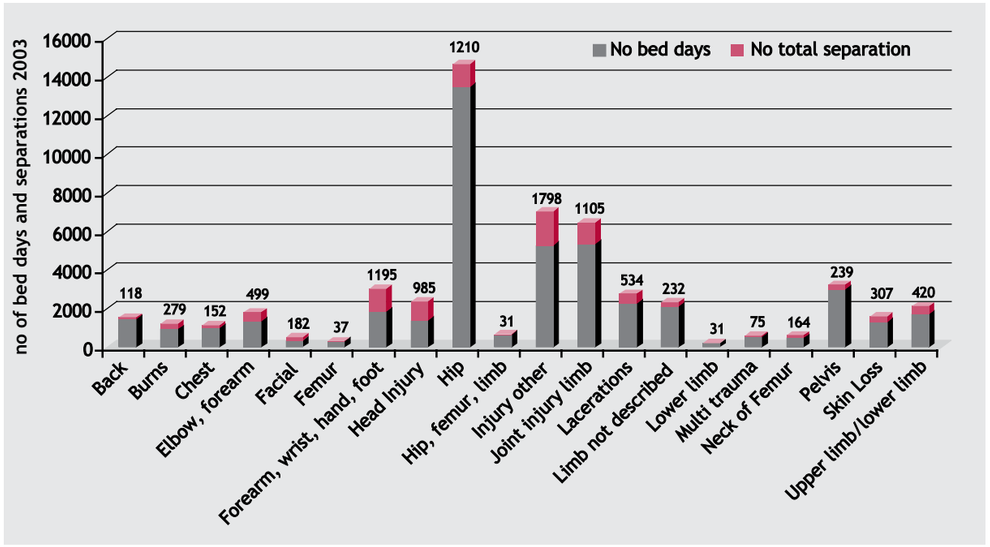
Source: WA Tertiary Hospitals Trauma Registries 2000 – 2004

Note: Figures for SCGH were not available.

While major trauma admissions are resource intensive and primarily are located in tertiary hospitals, the overall burden of non-major trauma poses a significant resource burden on WA hospitals and health services state-wide.

Figure 4 below shows hospital admissions for country and metropolitan hospitals and health services by Diagnosis Related Group codes by number of bed days and hospital separations for 2003. A significant proportion of these admissions are for injuries, which would be classified under the ISS classification as minor injury and in the main would constitute injuries such as fractures, lacerations, contusions and skin loss.

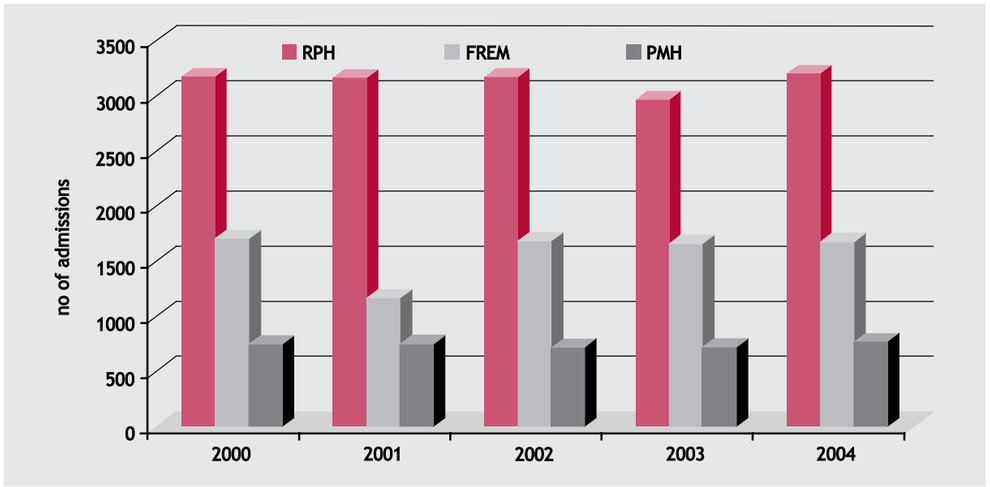
Figure 4. Trauma admissions to WA Hospitals and Health Services by DRG Codes, numbers of separations and numbers of bed days for 2003



Source: WA Hospital Morbidity Data System

Figure 5 below shows a stable trend in minor trauma admissions to WA Tertiary Hospitals between 2000-2004 (excluding SCGH) with a similar number of admissions annually over the time period. As other data presented supports a trend of an average between 3-4 percent annual increase in injury admissions, the overall increase in major trauma would not in total account for this increase, non-major trauma therefore contributes significantly to increase in the injury admission rates.

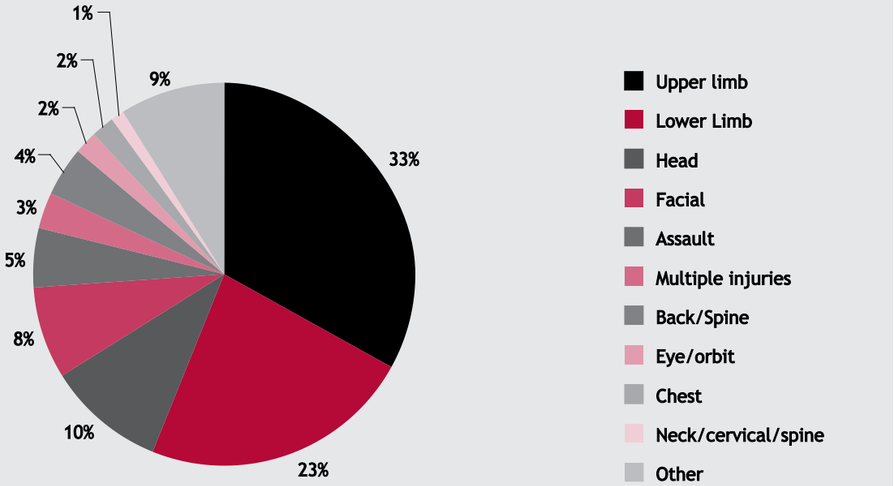
Figure 5. Non-major trauma admissions by WA tertiary hospital from 2000-2004



1.6.4 Demand and utilisation metropolitan emergency departments

Injury and trauma were the primary reason for presentation to metropolitan emergency departments for all age groups apart from 0-4 years in 2004-2005[8]. Injury and trauma accounted for approximately 30 percent of all presentations representing 97,834 presentations in 2004-2005. Of these presentations, 20 percent were admitted or transferred to a hospital. Figure 6 below shows the proportions of presentations to emergency departments by injury area and type. Of these presentations over 50 percent were from injuries to upper and lower limbs and would in most instances be classified as minor trauma.

Figure 6: Proportion of presentations to emergency departments by injury area 2004-2005



Source: WA Emergency Department Information System

2. Trauma system and services

2.1 Towards a systematised approach

Despite a number of reviews of trauma services in Western Australia recommending the introduction of a system to streamline the delivery of trauma management, the provision of acute trauma services is still poorly coordinated in this State. Acute trauma services are provided, with varying degrees of complexity, at the three adult and one paediatric teaching hospitals and at a number of smaller metropolitan and country hospitals.

Inter-hospital transfer of major trauma patients is common and this is not simply confined to the rural and remote areas. In 2002, 37 percent of major trauma admissions to RPH from the metropolitan area arrived by inter-hospital transfer[9], while the corresponding number for SCGH in 1999 was 32 percent[10]. The PMH trauma register report of 2001 showed that 55 percent of major trauma admissions for children were first assessed in a metropolitan hospital[11].

One of the major stumbling blocks to the introduction of a 'systematized' approach to trauma management has been the debate about the role of the teaching hospitals in the management of major trauma. During 2004, the management of major trauma in adults was split between RPH (64 %), SCGH (22%) and Fremantle Hospital (14%).

In October 2003, Professor Stephen Dean, in his report to the Health Reform Committee, highlighted the lack of any systematic approach to trauma management. He recommended the establishment of a State *Trauma System* incorporating a single Major Trauma Service (MTS) for adults and a single MTS for children: specifically recommending RPH for adults and PMH for children[12].

2.2 Trauma System

A **Trauma System** is a coordinated system of trauma care organized on a geographic area basis with close cooperation among providers in each phase of treatment. It encompasses the continuum of care from injury detection through definitive care including injury rehabilitation and injury control. It provides a comprehensive approach to the triage, treatment, transport and ultimate care of trauma victims. Evidence in the Australian context suggests that a trauma system is likely to be most effective and sustainable when the population of the area being served is two million or more[13].

An inclusive system is one in which every health care provider and health care facility in the geographic area participates. Although paying particular attention to the care of victims of major trauma, it recognizes the significance of other hospitals within the system that care for the majority of injured patients. The goal of a trauma system is to deliver each patient to the trauma care facility, which has the right resources to match his/her needs, in the shortest time possible. Numerous studies in Australia and overseas have shown that regionalized systems of trauma care improve survival rates for the injured population[14,15].

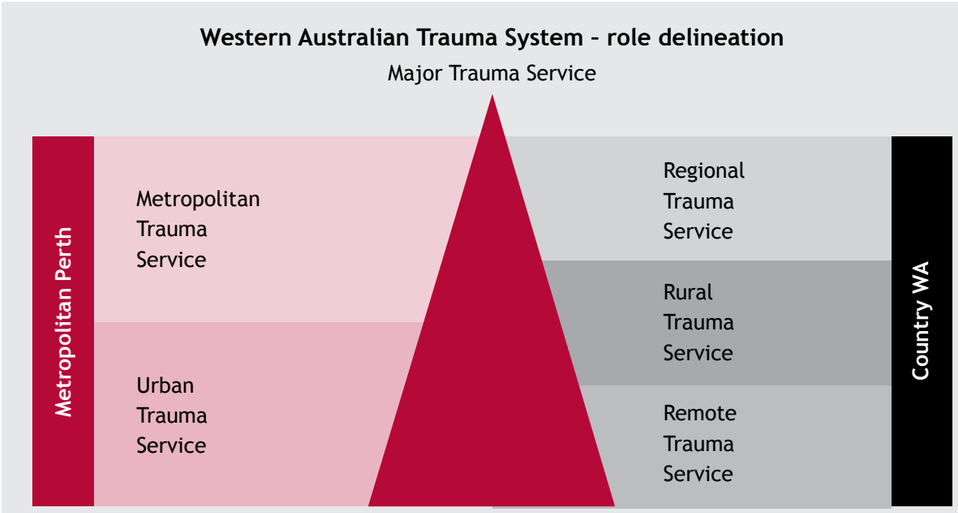
Initiative 1: A Trauma System will be developed, encompassing the continuum of care from injury detection and control, through definitive care and rehabilitation, incorporating all hospitals and health care facilities in Western Australia. The goal of the trauma system will be to deliver each patient to the trauma care facility, which has the right resources to match his/her needs, in the shortest time possible.

2.3 Role delineation and hospital designation

Regionalisation of acute care trauma services within a trauma system begins with the recognition that different levels of resources and sophistication of care are required for different subgroups of trauma patients. It is no longer acceptable for severely injured patients to be simply taken to the nearest hospital. Each hospital within the trauma system has to have a designated role based upon its capacity to provide particular levels of care and the resources necessary to support this role.

The Trauma System model recommended for implementation by the WA Trauma Working Group has been adapted from that put forward by the National Road Trauma Advisory Council in its Report of the Working Party on Trauma Systems (July 1993) to fit the WA context[16].

Figure 7. Western Australian Trauma System – role delineation



Modeled on Report of the Working Party on Trauma Systems, National Road Trauma Advisory Council (1993)

2.3.1 Major Trauma Service

The Major Trauma Service forms the central hub of its regional network and provides definitive care for most of the State's major trauma caseload, either through primary triage or secondary transfer. It will provide leadership and support to the system as a whole and, in this way, will function not as a trauma *centre*, confined within the walls of the hospital, but as a trauma *service*, driving an integrated system.

A Major Trauma Service will have the capability of providing total care for every aspect of injury, from prevention through rehabilitation. It will have 24-hour availability of resources for resuscitation and initial assessment, investigation, definitive care of injuries with expertise in all major surgical disciplines (including neurosurgery and cardiothoracic surgery), in the management of burns, spinal injury, injured women during pregnancy, and state-of-the-art intensive care support services.

A Major Trauma Service will provide leadership in education, research, performance monitoring and quality improvement and provide advice to other services within the system.

2.3.2 Metropolitan Trauma Service

Metropolitan Trauma Services provide a second level of trauma care to the Major Trauma Service. It will stabilize major trauma patients who cannot be transported directly to the Major Trauma Service due to life threatening condition prior to transfer.

It will, in agreement with the Major Trauma Service, also provide definitive care for a limited number of major trauma patients where the patient's injuries are not considered severe enough to warrant transfer to the Major Trauma Service and it has the capability to deliver the required level of care.

A Metropolitan Trauma Service will provide a support role for the Major Trauma Service in times of high demand. It would also participate in system-wide education, quality and performance monitoring and undertake research.

2.3.3 Urban Trauma Service

Urban Trauma Services serve local communities in urban areas. They will provide the basic services for managing the large number of injuries of minor to medium severity that occur throughout these areas. Urban Trauma Services will be able to provide prompt assessment, resuscitation and stabilization of a small number of seriously injured patients while arranging their transfer to the responsible Major Trauma Service.

In general, however, the potentially most seriously injured patients from the surrounding community will be selected for bypass of these services and transported directly to the Major Trauma Service.

2.3.4 Regional Trauma Service

A hospital designated as a Regional Trauma Service will be located in a country regional centre and will provide a regional focus for definitive care of non-major trauma according to the availability of local expertise.

Unlike their counterparts in the States with large regional populations, Regional Trauma Services in WA will not provide definitive care for major trauma patients; but rather will provide resuscitation and stabilization of any major trauma patients taken there prior to their transfer to the Major Trauma Service. The most seriously injured patients from the region will be selected for bypass of these services and transported directly to the Major Trauma Service.

2.3.5 Rural Trauma Service

Rural Trauma Services serve local communities in rural areas. They will be able to provide prompt assessment, resuscitation and stabilization while liaising with the responsible major trauma service with regard to transfer.

They will require 24-hour availability of an on-duty medical practitioner, as well as a nurse experienced in the care of trauma.

2.3.6. Remote Trauma Service

In the remote areas of WA, some small hospitals or clinics will occasionally receive severely injured patients. With limited access to acute care facilities and no immediately available medical practitioner, the prime role of such a service is for early triage, basic stabilization of the patient, early consultation with the Major Trauma Service, activation of medical retrieval and early transfer.

Remote Trauma Services, in general, will only be able to provide definitive care for patients with

minor trauma. Patients with moderate trauma will generally be referred on to a Rural or Regional Trauma Service, while major trauma patients will bypass them and be transported directly to the Major Trauma Service.

[illegible] facilities, each of which will be allotted a designated role based upon its capacity to provide particular levels of care that match patient needs.

Initiative 3: The system of designation of hospitals and health care facilities that has been recommended by the Trauma Working Group and will be implemented in Western Australia is as follows:

- **Major Trauma Services: Form the central hub of the trauma system and provide definitive care for most of the State's major trauma caseload.**
- **Metropolitan Trauma Services: Provide a second level of trauma care to the Major Trauma Services.**
- **Urban Trauma Services: Provide definitive care for non-major trauma according to the availability of local expertise for their local communities.**
- **Regional Trauma Services: Located in a country regional centre, will provide a regional focus for definitive care of non-major trauma according to the availability of local expertise.**
- **Rural Trauma Services: Country hospitals, which have 24-hour availability of an on-duty medical practitioner, serving local communities.**
- **Remote Trauma Services: Small hospitals and health centres, which have no immediately available general practitioners, serving people in remote areas.**

2.4. The WA State Trauma System

2.4.1 Adult Major Trauma Service

The Health Reform Committee, in its report *A Healthy Future for Western Australians* (March 2004), recommended that there should be one tertiary hospital in the north metropolitan area located either on the Sir Charles Gairdner or Royal Perth Hospital sites and one tertiary hospital in the southern metropolitan area, preferably located on the Murdoch site. It went on to recommend that the northern tertiary hospital be designated as the Major Trauma Centre for adults[12].

It has subsequently been determined that the SCGH will be retained as the northern tertiary hospital and the Fiona Stanley Hospital will be developed on the Murdoch site as the southern tertiary hospital. Current planning will see the Fiona Stanley Hospital commissioned after 2012.

Following careful deliberation and consultation with major stakeholders, the Trauma Working Group has reached the conclusion that the adult trauma care needs of the WA population would be best served by:

- Development of a single, comprehensive adult Trauma System for WA incorporating all trauma service providers in the State.
- Development of a single Major Trauma Service for adults, with Royal Perth Hospital taking on this role from late 2007, the expected completion date of its new 30-bed trauma ward. Fiona Stanley Hospital will take over this role when commissioned.
- Designation of hospitals within the Trauma System in line with the role delineation model as outlined in Figure 7, page 18.

Before finalising the above position, the Trauma Working Group went through the process of re-evaluating the model put forward by the Health Reform Committee, particularly with regard to its recommendation for a single adult Major Trauma Service for WA. Concern had been expressed during consultation that focusing major trauma in a single centre could deskill other critical care staff, which could compromise the State's multiple trauma/disaster response. Concern was also raised about the potential impact that disruption to the freeway system could have with only one Major Trauma Service based south of the Swan River.

Major trauma is, however, a highly specialised, low volume, high cost service and the concerns raised are by no means insurmountable. Based upon experience in other States, where the adult Major Trauma Services are managing around 80 percent of major trauma in their States[6], and a rate of serious injury in WA of around 650 episodes per annum, it can be estimated that the State's adult Major Trauma Service will be managing some 520 cases each year[17]. This is well within the range recommended for the maintenance of high levels of safety and effectiveness and for ensuring the sustainability of on-call rosters for the range of specialist services required for the operation of a Major Trauma Service[6]. Based on this, and the fact that the rate of major trauma has remained static, the Trauma Working Group concluded that there is no justification for having more than one such service in Western Australia at this time or indeed, in the foreseeable future.

The Trauma Working Group took a different position from the Health Reform Committee on the site of the Major Trauma Service for adults, preferring the Royal Perth Hospital (2007 – 2012) followed by the Fiona Stanley Hospital rather than the "Northern Tertiary Hospital"[1]. Royal Perth Hospital is currently managing almost two thirds of major trauma cases in WA, including the majority of cases from the rural and remote areas of the State. The supporting argument for this proposal is presented in Professor Stephen Deane's final report on trauma services (October 2003)[18].

Many of the tertiary services currently being provided by Royal Perth Hospital will be transferred to the Fiona Stanley Hospital upon its commissioning after 2012. There would be a significant advantage in simply transferring the already well-established Major Trauma Service role to the new campus together with all the required specialist services.

The proximity of the new hospital to Jandakot Airport also offers a very significant advantage, given that the Royal Flying Doctor Service and WA Emergency Rescue Helicopter Service operate from this base. This will minimize transport times for major trauma patients transferred to Perth by fixed-wing aircraft. It will also reduce response times for the helicopter service when picking up medical retrieval staff.

During the period 2007–2012, in which Royal Perth Hospital will be the single Major Trauma Service for adults, there will be an opportunity to evaluate the effectiveness of the WA Trauma System and, in particular, determine whether there are problems with its operation that might require the development of a second Major Trauma Service. Lessons learned can then inform future planning for population based service requirements for trauma care for the WA Health System.

Although the adult Major Trauma Service is not expected to be in operation before late 2007, the Trauma Working Group recommends that the following appointments be made by end 2007:

- Director State Trauma Services
- Director for the Major Trauma Services (RPH/PMH)
- Directors for the Metropolitan Trauma Services (SCGH, Fremantle Hospital)
- Trauma Coordinators for each of the Urban Trauma Services
- Trauma Coordinators for each of the country regions (based in each of the Regional Resource Centres).

Although there can be no Trauma System without a Major Trauma Service, the Major Trauma Service does not constitute a Trauma System in itself. The Directors and Coordinators of the Trauma Services, working together with the Injury and Trauma Health Network, will provide the leadership for phasing in the different elements that will constitute the WA Trauma System.

2.4.2 Roles of Other Metropolitan Hospitals

Under the role delineation trauma system for hospitals outlined in Figure 7, page 18, Sir Charles Gairdner and Fremantle Hospitals would both be designated Metropolitan Trauma Service (Level 6, Clinical Services Framework 2005–2012) with Sir Charles Gairdner remaining at Level 6 and Fremantle at Level 6 until the commissioning of the Fiona Stanley Hospital). Amongst their other roles, these hospitals will be able to provide a back-up role for the Major Trauma Service at times of high demand, including disasters and multi-casualty situations. Fremantle Hospital will need to have its trauma designation reviewed following the commissioning of the Fiona Stanley Hospital.

The Health Reform Committee also recommended that the four general hospitals – Rockingham/Kwinana, Armadale/Kelmscott, Swan Districts and Joondalup – be developed, with expansion of their emergency departments, operating theatres, beds and diagnostics. Under the role delineation for the trauma system (Figure 7, page 18) these hospitals would be designated Urban Trauma Services (Level 4 under the Clinical Services Framework 2005-2012. Rockingham/Kwinana, Armadale/Kelmscott and Swan Districts would move to level 4/5 by 2012 with Joondalup moving from Level 4 to Level 5/6 by 2011). It was envisaged that, as a result of this development program, these hospitals would be able to undertake an increasing complexity of trauma care, with Joondalup Hospital taking on the role of a Metropolitan Trauma Service (Level 5/6) after 2011.

2.4.3 Paediatric Trauma Services

The relatively small number of children presenting with major trauma and the range of specialised services required for their management, makes it necessary to concentrate the care of this group in a central location in a paediatric Major Trauma Service. In line with the recommendations of the Health Reform Committee, Princess Margaret Hospital, which already treats the bulk of major trauma in children in WA, will logically take on this role.

There are important differences, as well as similarities, in the behaviour, needs and response to treatment of injured children when compared to adults. The best outcomes are achieved when those who assess and manage injured children have a good understanding of paediatric responses and needs. Accordingly, the paediatric Major Trauma Service should have a trauma team that will provide for all the needs of children with significant injuries. This team should have a director and clinical staff who are experienced in the fields of surgery, anaesthetics, intensive care and rehabilitation and should include nursing and allied health staff with the relevant expertise.

Of the 51 major trauma admissions during 2004, only 23 (45%) were admitted directly to Princess Margaret Hospital, while 21 (41%) and seven (14%) were transferred in after initial assessment and treatment from other metropolitan and country hospitals respectively[20]. It is clear that metropolitan hospitals such as Joondalup, Fremantle, Rockingham/Kwinana, Swan Districts, Peel and Armadale/Kelmscott, often play an important role in the primary stabilisation of children before referral to Princess Margaret Hospital for definitive care.

There is evidence in the literature suggesting that increasing direct transfer of patients to paediatric Major Trauma Services improves outcomes, particularly in patients with severe traumatic brain injury[21,22]. Despite increasing expertise in childhood trauma management at the peripheral metropolitan hospitals, children with major trauma should be triaged directly to Princess Margaret Hospital for definitive care unless there is an acute life-threatening situation or significant alteration in vital signs requiring stabilisation at the nearest appropriate hospital before transport to Princess Margaret Hospital.

Like its adult counterpart, Princess Margaret Hospital will be responsible for coordinating paediatric trauma education, training and research, as well as quality management throughout WA in conjunction with the adult Major Trauma Service.

From late 2007, when the State Trauma System becomes operational, the paediatric Major Trauma Service will commence operation from the current Princess Margaret Hospital site, where it will remain until the redevelopment of the hospital at a site, which has yet to be determined.

Given that the paediatric Major Trauma Service will be operating from the current Princess Margaret Hospital site for some time to come and the planned increase in direct admissions to the hospital, there needs to be a re-assessment of the adequacy of some of the infrastructure and services to enable the hospital to take on its proposed role. Several areas have been identified by the Trauma Working Group and in an evaluation of clinical services conducted at the request of the Director General of Health[23].

- Improving ambulance access – development of a dedicated ambulance access area to prevent delay in priority one ambulances accessing the emergency department.
- Expanding the emergency department resuscitation cubicle – increasing space to allow for a minimum of a four-bed resuscitation bay with trauma trolleys and x-ray gantry.
- Access to 24 hour Blood Transfusion Service.
- Availability of 24 hour Anaesthesia Services.
- Access to 24 hour Laboratory and Imaging Services.

There is currently no heliport at Princess Margaret Hospital and patients retrieved by the Emergency Rescue Helicopter Service (ERHS) have to be taken to another hospital with a heliport – generally Sir Charles Gairdner Hospital - and then transferred by ambulance to Princess Margaret Hospital. Secondary retrieval from Sir Charles Gairdner by a specialist paediatric retrieval team, has been suggested, and is feasible but will increase the time to definitive care. In a number of cases, which would be expected to be transported by the ERHS, this counters the benefits expected from the establishment of a Major Trauma Service. Given the proposal to relocate Princess Margaret Hospital to a new site under the clinical services planning process, the TWG would recommend the implementation of a formal paediatric retrieval team in collaboration with Sir Charles Gairdner Hospital as an interim measure, with Sir Charles Gairdner Hospital designated as the preferred landing site for helicopter transports. Protocols to describe procedures, roles and responsibilities for Sir Charles Gairdner and the Paediatric Retrieval Team should be developed by both hospitals.

As part of the establishment of Princess Margaret as the paediatric Major Trauma Service, the levels of staffing in some of the critical clinical areas including the emergency department, the intensive care unit and neurosurgical and general surgical services will need to be reviewed. It needs to be ensured that there is urgent access to biochemistry, haematology, imaging and transfusion services for major trauma victims 24 hours a day.

2.4.4 Trauma services for adolescents

Of the 51 major trauma patients admitted for treatment to Princess Margaret Hospital during 2004, nine (18%) were adolescents aged 13 to 15 years inclusive. This represented 39 percent of the 23 adolescents in this age group admitted to hospital with major trauma during the same year. The remaining adolescent patients were treated in the adult tertiary hospitals, including 35 percent at Royal Perth Hospital.

This highlights the important issue of where the management of severely injured adolescents would be best located. There are essentially three options:

- Trauma care, including rehabilitation, provided within the adult Major Trauma Service.
- Trauma care provided exclusively within the paediatric Major Trauma Service.
- Acute trauma care provided within the adult Major Trauma Service, with ongoing rehabilitation provided within the paediatric Major Trauma Service.

The establishment of beds for older, larger adolescents within the paediatric Major Trauma Service would require a significant increase in services and infrastructure to accommodate both the increase in workload and the special needs of this age group. On the other hand, the establishment of this service within the adult Major Trauma Service would require that appropriate attention be given to the psychosocial, activity and schooling needs of the adolescent patients; areas of expertise that can be found within the paediatric Major Trauma Service. The literature on this issue is not extensive and there is little evidence that there is any difference in outcomes for adolescents being treated in either an adult or paediatric Major Trauma Centre[24]. However, a recently published review of the Victorian Trauma System demonstrated benefits in outcomes for adolescents being treated in major trauma centres particularly for the predominant injury in the population group of traumatic head injuries[25].

The Victorian Trauma System triage policy dictates transport of patients with an age of 15 years or more to the adult trauma centre and less than 15 years to the paediatric trauma centre. Retrospective study of patients with significant head injuries in the State of Victoria showed an incidence rate of significant adolescent head injury of 19.2 per 100,000 compared to 12.9 and 14.7 for children and young adults respectively between 2001 and 2004. These data correlate with other evidence as significant traumatic brain injury as the most common injury and cause of death and morbidity in adolescents. Head injuries in this age group were predominantly high velocity deceleration injuries in road trauma and were often associated with multiple injuries demonstrating a greater need for trauma teams. In contrast, head injuries in children most often occurred in the home and as a result of falls and falls from height. Current practice in Victoria results in 69 percent of significant head injuries of adolescents being managed in the adult trauma centre.

The Mitra et al study[25] demonstrated significant similarities between adolescents and young adults across injury patterns. These similarities also included clinical course including initial assessments, clinical features, response to treatment and improved outcomes within Victoria over the study period. The findings of the study support the practice of adolescents being managed in the adult trauma centre within the Victorian Trauma System.

The Trauma Working Group, after due consideration of the options and their implications, reached the view that children with major trauma up to and including 13 years of age should be triaged to the paediatric Major Trauma Service and adolescents from the age of 14 to the adult Major Trauma Service. There would need to be mutually agreed processes for conjoint management in place between the two services to ensure that the special need of the adolescents can be met. Consideration would need to be given on an individual case basis about the best environment for meeting the ongoing rehabilitation needs of the adolescents.

2.4.5 Trauma services in country WA

In the *Report of the Working Party on Trauma Services* (July 1993)[16], the National Road Trauma Advisory Council proposed a framework for categorizing hospitals within a *Trauma System*, with the highest designation in country areas being referred to as Regional Trauma Services. It was envisaged that they would service a population of over 100,000 and be able to provide high quality services in such areas as emergency medicine, anaesthetics, intensive care, general surgery and orthopaedics.

It was expected that the Regional Trauma Services would have an important role in coordinating the management of trauma throughout their regions and that they would be staffed to provide definitive care for all but complex major trauma patients who would be transferred to the Major Trauma Services.

While this makes sense in States like New South Wales, Victoria and Queensland that have large regional population centres, it is not an appropriate model for WA where the population outside Perth is widely dispersed. In fact, the South West Region is the only area with a population approaching the requisite size to support the range of specialist services required for a Regional Trauma Service.

The WA Country Health Service has embarked on the implementation of the recommendations of the *Country Health Services Review* (2003)[26] and is establishing regional networks of health services across each region, with Regional Resource Centres at the *hub* of each network. The Regional Resource Centres are located in Broome, Port Hedland, Geraldton, Kalgoorlie, Albany and Bunbury.

The aim of this initiative is to be able to deliver as much acute care as possible within the regions, limiting the need for travel to Perth to those services only available at tertiary hospitals. The Regional Resource Centres will not only form the focus for an increase in the provision of specialist services in the regions, but will also provide clinical and non-clinical support for other services in their region.

Formal partnerships are being established between the country regions and metropolitan health services in order to provide support for country services such as:

- Visiting specialists/locum specialists/specialist rotations.
- Telehealth clinical consultations and support.
- Assistance with recruitment of specialists, doctors, nurses, allied health staff and joint appointments.
- Graduate medical, nursing and allied health rotations.
- In-service education and training.
- Clinical advice and audit support.

WA Country Health Service has set as one of its priorities over the next five years, building the clinical workforce in Regional Resource Centres, particularly their resident and visiting specialist services. Nevertheless, apart from Bunbury, which is the closest regional centre to Perth in any case, it is not envisaged that the Regional Resource Centres will be able to manage complex trauma cases despite the growth in specialist staffing, but it is expected that they will gradually increase their capacity for managing most non-major trauma. In terms of emergency and trauma services, this would give the Regional Resource Centres a clinical service role delineation of Level 4 under the Clinical Services Framework 2005-2012, which is defined as:

- Local general practitioners rostered to provide 24 hour cover with service by registered nurse.
- Emergency operating theatre facilities.

- Resuscitation and stabilisation capacity.
- On-call generalist specialists.
- Access to specialist senior registered nurse.

A significant amount of major trauma occurs in the rural and remote areas, yet the amount seen in each hospital is small. The first health professional to see a seriously injured person in a rural location is likely to be a nurse or general practitioner. However, it has been shown that they can provide an effective service when they are organised, provided with training in advanced trauma skills and have direct access at all times by telephone to advice from experienced critical care specialists. The paediatric and adult Major Trauma Services will have an important role in providing this education and advice.

A Regional Coordinator for Trauma Services will be appointed in each country region. The Coordinator, working in partnership with the Director, State Trauma Services and the Directors of the Major and Metropolitan Trauma Services and the Coordinators of the Urban Trauma Services will ensure that:

- Health professionals working in the acute care area in their region have a good knowledge of the trauma system and its operation.
- Services are appropriately organised and staff properly trained to enable them respond effectively to trauma.
- There are close linkages between rural service providers and those that can offer definitive care for the seriously injured.
- Guidelines for the care of injured patients are available in all rural hospitals.
- The requisite technology is available and standardised between rural hospitals and the hospitals to which they refer patients.
- Direct access telephones are available in emergency areas and theatres to permit consultation between staff in rural and remote areas and specialists in Major Trauma Services.
- Transport and retrieval systems are properly organised and coordinated and work effectively.

A policy for the transfer of trauma patients from the north of WA to Darwin rather than Perth for definitive care will need to be negotiated with the Northern Territory Department of Health and Community Services. Clearly, there would be major advantages in terms of time to care where the type and level of care is available in the Darwin Hospital.

Initiative 4: There will be a single Major Trauma Service for adults, with Royal Perth Hospital taking on this role from late 2007 (the expected completion date of its new 30-bed trauma ward). The Fiona Stanley Hospital will take over this role from 2012.

Initiative 5: There will be a single Major Trauma Service for children located at Princess Margaret Hospital that will be transferred to its new site when the hospital relocates.

Initiative 6: Sir Charles Gairdner and Fremantle Hospitals will be designated Metropolitan Trauma Services (Clinical Services Level 6), with the latter having its designation reviewed following the commissioning of the Fiona Stanley Hospital.

Initiative 7: Rockingham/Kwinana, Armadale/Kelmscott, Swan and Joondalup Hospitals will designated Urban Trauma Centres and as they are developed, with expansion of their emergency departments, operating theatres, beds and diagnostics, they will undertake an increasing complexity of trauma care, (Clinical Services Level 4/5). Joondalup Hospital will take on the role of a Metropolitan Trauma Service Level 5/6 after 2011.

Initiative 8: Kalgoorlie, Albany, Bunbury, Geraldton, Port Hedland and Broome Hospitals will be designated as Regional Trauma Services (Clinical Services Level 4) and, as their capacity continues to expand, they will gradually increase their ability to manage most non-major trauma.

Initiative 9: Appointment of the following positions will be completed by end 2007: -

- **Director State Trauma Services**
- **Director for the Adult Major Trauma Services (RPH)**
- **Director for the Paediatric Major Trauma Services (PMH)**
- **Directors for each Metropolitan Trauma Service (SCGH, Fremantle Hospital)**
- **Trauma Coordinators for each of the Urban Trauma Services (Swan, Joondalup, Armadale/ Kelmscott, Rockingham/Kwinana Hospitals)**
- **Trauma Coordinators for each of the country regions (to be based in the Regional Resource Centres).**

Initiative 10: The Trauma System will be evaluated by 2011 to determine its effectiveness and, in particular, whether there is a need to develop a second Major Trauma Service for adults.

Initiative 11: Critical infrastructure at Princess Margaret Hospital needs to be re-assessed to ensure that there is ready access to emergency services at all hours including:

- **Ambulance access to the emergency department.**
- **An adequate level of resuscitation services.**
- **Appropriate and timely access for patients brought by helicopter.**
- **Access to 24 hour Blood Transfusion Services.**
- **Availability of 24 hour Anaesthetic Services.**
- **Access to 24 hour Laboratory and Imaging Services.**

Initiative 12: Princess Margaret Hospital will need to assess whether:

- **Staffing of its critical clinical areas including the emergency department, intensive care unit, neurosurgical and general surgical services is sufficient to ensure that there is access to these services for paediatric major trauma victims 24 hours a day.**
- **After hours provision of biochemistry, haematology, imaging and transfusion services is appropriate for the timely provision of these services.**

Initiative 13: Children with major trauma up to and including 13 years of age will be triaged to the Paediatric Major Trauma Service, while adolescents from the age of 14 will be triaged to the Adult Major Trauma Service.

Initiative 14: The Adult and Paediatric Major Trauma Services will develop processes for the conjoint management of adolescents to ensure that the special needs of adolescents, both for acute care and rehabilitation, are met.

Initiative 15: A clear and consistent policy for the transfer of trauma patients from the north of WA to Darwin rather than Perth for definitive care will be negotiated with the Northern Territory Department of Health and Community Services.

2.5 Special services in trauma care

2.5.1 Management of pregnant women with trauma

Adequate resuscitation of the mother is the most important means by which foetal resuscitation occurs. It is important, therefore, that the trauma system response to the injured pregnant patient is a comprehensive trauma response with a prompt and secondary pregnancy response rather than the reverse. Major trauma in pregnancy is a rare but complicated event and all pregnant patients, including adolescent patients, at risk of major injury must be transported directly to the adult Major Trauma Service where the trauma team response for initial assessment and resuscitation will require obstetric and neonatal input from King Edward Memorial Hospital.

King Edward Memorial Hospital is able to provide obstetric staff, foetal monitoring, and vaginal or caesarean delivery in the Major Trauma Service and retrieval of babies to the neonatal unit. There is currently a protocol in place between Royal Perth Hospital and King Edward Memorial Hospital for the management of pregnant women admitted as a result of major trauma[27]. The Director of the adult Major Trauma Service, working in partnership with transport providers and his/her counterparts in the metropolitan and country areas, should ensure that there are protocols in place to ensure that pregnant women who suffer trauma can be transported correctly to the most appropriate hospital.

2.5.2 Spinal injury

The management of acute spinal cord injury, including early surgical intervention, is carried out in the State's specialised four-bed acute spinal injury unit at Royal Perth Hospital. Subsequent management, including follow-up surgery and rehabilitation, is carried out at Shenton Park.

It has been recommended by the surgeons that all surgery for spinal cord injuries is carried out at Royal Perth Hospital. This will require an increase in the number of beds with redevelopment of the unit and associated infrastructure. Staffing will also need to be reviewed.

This service will be transferred to the new Fiona Stanley Hospital with the closure of Royal Perth Hospital after 2012 and this will need to be taken into account in planning for the new facility.

All major traumas that include a spinal cord injury (including isolated spinal trauma) should be triaged to the Major Trauma Service. Early consultation by all trauma services receiving spinal cord trauma patients with the spinal injury unit should occur to optimise patient outcomes. Patients with multiple injuries, including spinal cord trauma, should be transferred to the spinal injury unit once they are medically stable. Isolated spinal cord trauma should be transferred to the unit at the earliest opportunity.

Any spinal cord trauma in children should continue to be transferred to, and managed at, Princess Margaret Hospital.

2.5.3 Burns

Specialised burns units providing optimal care for severely burned adults and children are situated at Royal Perth Hospital and Princess Margaret Hospital respectively. Trauma services at any level may receive patients with major burns and traumatic injury for resuscitation and stabilisation. All patients with severe burns should be sent to the Major Trauma Services where they will subsequently be transferred to the burns unit once they are medically stable.

2.5.4 Barotrauma

Treatment for diving related and other barotrauma, which can only be definitively provided at a hyperbaric facility, will continue to be provided at Fremantle Hospital until the commissioning of the Fiona Stanley Hospital after 2012, when the service will be transferred. Other hospitals receiving barotrauma patients should consult early and transfer as soon as possible to the specialist hyperbaric facility.

2.5.5 Mass casualty events

In the event of a mass casualty event, the management of emergency response is governed by the Western Australian Emergency Management Support Plan (WESTPLAN – HEALTH)[28] and its sub plans. WESTPLAN – HEALTH is an authorised support plan under the *Emergency Management Act* 2005. The sub plans include the Metropolitan Perth Business Continuity and Disaster Plan (MPBCDP)[29] and the State Health Trauma Disaster Plan[30]. The Director General Health is the State Health Coordinator under the Western Australian Emergency Management Support Plan. This role is delegated to the Divisional Director, Health Protection Group. The policies and procedures in these plans supersede all other health policies in the direction of emergency response for WA trauma services when and if activated. The State Health Coordinator activates these plans in the event of an incident or event that may overwhelm a single health facility or require coordination of health resources. In this situation, the State Health Coordinator has absolute authority over the resources in WA Health.

With the establishment of the Disaster Preparedness and Management Unit (DPMU) of the Department of Health, there have been additional resources allocated to the emergency response capacity and capabilities of the WA hospital system. Initiatives under WESTPLAN – HEALTH and the Metropolitan Perth Business Continuity and Disaster Plan have been implemented. This has significantly increased the responsiveness of the hospital system and improved coordination of health resources. Key elements achieved have been the establishment of the State Health Emergency Operations Centre and improvements in the communications infrastructure, coordination of resources and development of surge capacity in hospitals and health services, and a strong education and clinical training program. Major training exercises to test the system, in collaboration with other State emergency agencies, occur annually, with up to 5 major events held in 2005. The DPMU has established and are preparing the Disaster Medical Assistance Teams (DMATs) through a focused training program, which now have the capacity to respond to state, interstate and international requests for emergency response. While strong progress has been made, particularly in the development of surge capacity and DMATs, this development has largely been funded by $9 million over 4 years of Premier's Counter-terrorist funding, which will conclude in July 2009.

The TWG recommends that support be maintained to continue the stockpiles required to support DMATs and hospital surge capacity and the training programs in disaster preparedness for mass casualty events. Western Australia's proximity to vulnerable countries in Asia, subject to terrorist incidents and natural disasters, and increasing risks of natural and other disasters in WA and other Australian States and Territories, requires WA Health to ensure its personnel are adequately prepared, both with equipment and training, to respond to requests for aid in the event of local, intrastate, interstate and international incidents.

2.5.6 Trauma rehabilitation services for adults

There is an ongoing need for care after the injured person is no longer in need of acute medical treatment. This ongoing care will require a variety of support services, including comprehensive specialist rehabilitation services for patients with brain injury, spinal injury and major limb injury.

In designated trauma services of all levels of sophistication, there should be a clear understanding

of the rehabilitation services available within the trauma network and the means of access to those services and to family support services. The best outcomes for trauma victims are achieved when rehabilitation services are involved from an early stage and those involved in acute care should ensure that rehabilitation specialists are involved, where possible, in the assessment of patients and their families early in the acute phase of their care.

While the acute treatment of adult major trauma patients is carried out in the metropolitan tertiary hospitals, their rehabilitation is provided at the Shenton Park Hospital campus. As Professor Stephen Deane noted in his report:

> *"There appears to be a fairly sharp cultural separation between acute injury care and rehabilitation with respect to adult injury victims managed in Perth's major hospitals. This separation probably reflects historical developments as well as the geographic separation of the facilities. If the acute and rehabilitation facilities are to remain geographically separate, more staff movement between the respective facilities is encouraged with the goal of early joint patient assessments between acute care staff and staff of the rehabilitation units."*[31]

This separation between the acute and rehabilitation services needs to be addressed and should be one of the early issues on the agenda for the State Director Trauma Services and the Director of Trauma Services at the Major Trauma Service. With the relocation of the Major Trauma Service to the new Fiona Stanley Hospital after 2012, consideration needs to be given to co-locating tertiary rehabilitation services, including services for patients with brain injury, spinal injury and major limb injury, on the Fiona Stanley Hospital campus. Non-tertiary rehabilitation services could be transferred to the general hospital sites as these hospitals are further developed.

2.5.7 Paediatric trauma rehabilitation services

The Department of Paediatric Rehabilitation at Princess Margaret Hospital is responsible for the rehabilitation of children with Acquired Brain Injury, a significant component of which is due to Traumatic Brain Injury. Only children with moderate to severe brain injury are accepted.

On average, 18-20 patients are referred to the Department each year, the majority of which are children, with only a few adolescents aged 14-16 years old. Most remain under the management of the Department until adulthood. The number attending outpatient clinics is around 150-200 at any particular point in time. As mentioned earlier, decisions would need to be made on an individual case basis about the best environment for meeting the ongoing rehabilitation needs of the adolescents who have had their acute care provided in the adult Major Trauma Service.

At present there is limited funding for rehabilitation services for these children many of whom have high and ongoing rehabilitation needs. There is currently no medical staffing for inpatient management and minimal allocated for outpatient services. Allied health staffing is also low for both inpatient and outpatient services. The majority of these children remain dependent on Departmental outpatient services because of their complex needs and low level of access to therapy services from other agencies, such as the Disability Services Commission.

Although the Department has the expertise to manage these children, there is a need for additional funding to bring current services up to an acceptable level of care. At present children requiring an intensive rehabilitation inpatient program have to be admitted to acute beds at Princess Margaret Hospital, but without access to dedicated beds, a number miss out on the program. There is considerable evidence that intensive rehabilitation programs for children significantly improve their clinical outcomes and there is concern that the current level of service is compromising their outcomes.

The State Rehabilitation Plan has recommended a ten bed intensive rehabilitation unit and a day service providing a comprehensive intensive rehabilitation program. Children with traumatic brain injury would not be the only beneficiaries from the establishment of such a service. Other groups, such as children requiring spinal rehabilitation and those with complex neurological conditions, rheumatological disorders and chronic pain syndromes would get significant benefits as well. The preferred option is for this facility to be located on the Princess Margaret Hospital campus. This will ensure a close partnership between acute and rehabilitation services[32].

Initiative 16: As the response to the injured pregnant patient must be a comprehensive trauma response with a prompt and secondary pregnancy response, pregnant women with major injury will be transported directly to the adult Major Trauma Service where initial assessment and resuscitation will be undertaken with obstetric and neonatal input from King Edward Memorial Hospital.

Initiative 17: Protocols will be put in place with transport providers and metropolitan and country hospitals and health services to ensure that pregnant women who suffer trauma can be transported to, and receive services in the most appropriate hospital.

Initiative 18: All patients with major trauma that includes a spinal cord injury will be triaged to the paediatric or adult Major Trauma Services where they will be transferred to the State Spinal Unit once they are medically stable.

Initiative 19: The size and staffing of the current State Spinal Unit at Royal Perth Hospital will be reviewed with a view to consolidating all spinal cord surgery at the Hospital.

Initiative 20: All patients with major trauma that includes severe burns will be triaged to the paediatric or adult Major Trauma Services where they will be transferred to the State Burns Unit once they are medically stable.

Initiative 21: All diving related and other barotraumas, which can only be managed at a hyperbaric facility, will continue to be treated at Fremantle Hospital.

Initiative 22: Specialised spinal injury, burns and hyperbaric services will all be relocated to the Fiona Stanley Hospital, consolidating the Major Trauma Service on the one site.

Initiative 23. Emergency response in mass casualty events is governed by the policies and procedures of WESTPLAN – HEALTH and its sub plans, the Metropolitan Perth Business Continuity and Disaster Plan and the State Trauma Disaster Plan. Disaster Medical Assistance Teams, surge capacity, and education and training in disaster preparedness for mass casualty events should be maintained.

Initiative 24: In setting up the Major Trauma Service at Royal Perth Hospital, the Director will develop strategies for building a close working relationship between acute and rehabilitation trauma services.

Initiative 25: Tertiary rehabilitation services for brain, spinal and major limb injuries will all be relocated to the Fiona Stanley Hospital, consolidating the Major Trauma Service on the one site.

Initiative 26: Consideration needs to be given to the establishment of an intensive rehabilitation unit and day service at Princess Margaret Hospital as recommended in the State Rehabilitation Plan.

3. Pre-hospital services and patient transport

3.1 Pre-hospital triage

For trauma systems to function effectively the severity of the trauma that patients have sustained must be identified in the field and the patients then transported to the trauma service best able to provide the required level of care. Trauma triage is the process of sorting patients according to the kind and severity of injury and the facilities available. The ideal triage tool would be applied quickly and easily under field conditions, give consistent results when used by different observers and have a high rate of accuracy.

The goal of a triage system is to consistently get the right patient to the right hospital in the right amount of time. This is particularly critical for major trauma victims where the time to definitive care in a Major Trauma Service has been shown to have a significant impact on clinical outcome.

There are a number of pre-hospital triage tools available for both adults and children, most of which employ checklists of items grouped into three categories, namely:

- physiological observations
- readily evident injuries
- mechanisms of injury.

Most of these tools have demonstrated a high sensitivity in identifying patients who are subsequently shown to have serious injuries[33]. However, the reliable predictive value of the abbreviated trauma score used in these tools is low and contributes to rates of over-triage. A study by Mackin and Manovel in Sydney demonstrated an over triage of rate of approximately 33 percent with one third of patients designated as major trauma being discharged home from the Emergency Department or having a hospital stay of less than one day[34]. Over triage has cost and resource implications for the major trauma centre, however a degree of over-triage is unavoidable and necessary, to ensure consistent detection of serious injuries. It is evident that further refining of standard triage tools is required in order to maintain sensitivity while at the same time limiting over triage rates.

The issue of under triage rates is just as concerning given the well documented and accepted benefits of trauma centre care for survival and improved patient outcomes for serious injuries[35,36]. A clinical review of data on major trauma cases admitted to Royal Perth Hospital in 2005 was conducted in early 2006. Four hundred and eleven major trauma (411) cases were admitted to Royal Perth Hospital in 2005. Of these, two hundred and nine cases were transported by ambulance services either directly to Royal Perth Hospital or to another hospital. Seventy-five (75) cases were transferred to Royal Perth Hospital after initial transport to another hospital (Note: patients who were physiologically unstable were excluded from the review). The review demonstrated an under triage rate of 14 percent (29 of 75) of the major trauma cases transferred to Royal Perth for definitive care after initial transport to another hospital. Delay in appropriate specialised treatment would have been avoided by direct triage to Royal Perth Hospital[37]. This rate is reflective of current policy and practice of transport to nearest hospital or tertiary hospital within the Perth metropolitan area for emergency cases[38].

Pre-hospital triage has been successfully implemented in other States of Australia, including New South Wales (metropolitan and modified for country) and Victoria where they have been operating for some years. Similarly WA needs to adopt a pre-hospital triage system and supporting tool. However, given the issues with the reliability and sensitivity of supporting triage tools, the TWG believe an appropriate pre-hospital triage system and supporting tool requires development within the context of the Perth Metropolitan Trauma Service. The TWG therefore recommends the current process for pre-hospital transport using existing ambulance assessment protocols remain in place for the first six months after implementation of the Trauma System. This would implement the policy of direct transport of adult and paediatric major trauma to the AMTS and PMTS and change existing practice from transport to nearest hospital except for physiologically unstable patients.

The trauma registry has played a significant role in most States in monitoring the effectiveness of pre-hospital triage tools and, on occasions, in highlighting the need for modification. The WA State Trauma Registry would prospectively monitor triage rates and outcomes for a six-month trial after the implementation of the Trauma System. This data and evaluation would be used to inform a decision regarding the development of pre-hospital triage system and supporting tools within one year for adult and paediatric trauma.

Skilled medical assistance has been found to be of considerable benefit when determining the disposition of trauma victims and physicians do not need to be present at the accident scene to be able to provide useful advice. It is essential that there is a system in place that allows ready, direct radio or telephone conversations with the on-call trauma specialist at the Major Trauma Service for advice and instruction about management and destination.

Initiative 27: The current pre-hospital process for transport is maintained and monitored for a six-month period after implementation of the Trauma System. A pre-hospital triage system with supporting triage tool is developed within one year of implementation of the Trauma System for adult and paediatric trauma.

Initiative 28: A formal system for paramedics working in the road or helicopter retrieval services to consult with senior clinicians in the Major Trauma Services will be implemented.

Initiative 29: The performance of the trauma triage tool will be evaluated annually and modified as required.

3.2 Triage destination

Having identified a patient as suffering from major trauma using a standard triage tool, the aim of the ambulance crew is to try to get the patient to the Major Trauma Service from the accident site. The aim is to minimise the time from injury to definitive treatment. There is significant evidence, which demonstrates improved outcomes for major trauma patients who reach definitive treatment as soon as possible. This is best achieved by primary triage of major trauma patients from the scene of injury to a Major Trauma Service and by avoiding subsequent need for acute inter-hospital transfer whenever possible.

Where, in the view of a paramedic, a major trauma patient severely deteriorates at the scene of the accident or during transport and is considered to be in a life-threatening situation, the patient should be taken to the nearest designated trauma service for resuscitation and stabilisation. Instances of life-threatening situation might involve failed airway control, uncontrolled bleeding, cardiac arrest and tension pneumothorax. It would be unworkable to set out solely objective criteria for ambulance diversion.

The Emergency Rescue Helicopter Service (ERHS), which operates within a 50 to 200 kilometre radius of Perth, operates essentially a primary retrieval service, picking up trauma victims from accident sites. It transports all suspected major trauma victims directly to a tertiary hospital. When transporting paediatric major trauma patients, the helicopter generally uses the landing facility at Sir Charles Gairdner Hospital, as Princess Margaret Hospital currently has no heliport.

Initiative 30: Major trauma patients undergoing retrieval by road ambulance:

- **Will be taken to a Major Trauma Service unless they appear to be in a life threatening situation when they will be diverted to the nearest designated trauma service for stabilisation;**
- **Where they are transported to a non-Major Trauma Service, liaison with the Major Trauma Service will be undertaken and inter-hospital retrieval activated as early as possible after initial assessment and resuscitation.**

Initiative 31: Major trauma patients undergoing retrieval by helicopter:

- **Will be transported directly to a Major Trauma Service regardless of travel time;**
- **When transporting paediatric patients, the helicopter will use the landing facilities at Sir Charles Gairdner Hospital where it will be met by an ambulance and by a team from both that hospital and from Princess Margaret Hospital.**

3.3 Retrieval and transfer

3.3.1 Standards for retrieval

Retrieval refers to the transfer of time critical emergency patients from accident site to hospital (primary retrieval) or between hospitals (secondary retrieval). Trauma retrieval is only one component of the overall retrieval workload and therefore the development of a retrieval service in WA needs to take into account the broader requirements of the health system.

The Australian and New Zealand College of Anaesthetists, the Royal Australian College of Physicians and the Australasian College for Emergency Medicine have jointly endorsed a set of minimum standards for the transport of critically ill or injured patients. The principle underlying the policy is that clinical management during transport must be at similar or higher level of care than at the point of referral and must prepare the patient for admission to the receiving hospital.

The policy states that:

> *"There should be appropriate planning of transport and optimum utilisation of communication. Safe transport requires the deployment of appropriately trained staff with essential equipment and effective liaison between referring, transporting and receiving staff at senior level. Inter-hospital transport of critically ill patients must be performed by an appropriately qualified retrieval team including an experienced medical practitioner[39]."*

3.3.2 Patient transport services in WA

In WA, there are three services that have the capability to transport critically ill or injured patients:

- St John Ambulance Australia (SJAA)
- The Royal Flying Doctor Service, Western Operations (RFDSWO)
- The Emergency Rescue Helicopter Service (ERHS).

SJAA operates across the metropolitan, rural and remote areas of the State, with 163 country sub-centres and sub-branches. Paid paramedics operate across the metropolitan area and, assisted by volunteers, staff 10 of the country centres. Over 2,500 volunteers staff the remaining sub-centres and sub-branches. In 2002/03, there were some 28,000 calls attended to in the country, of which the 10 centres serviced more than half with paid paramedics.

In that same year, there were 238 critically ill patients transferred by ambulance from the emergency departments of the outer metropolitan hospitals to the tertiary hospitals. Just under a third of these patients were major trauma victims. A clinical escort was provided in 39 percent of cases; with a doctor alone in 28 percent, a doctor and nurse in a further 7 percent of cases and a nurse alone in 4 percent of cases. The clinical escorts were provided in most cases from the staff of the referring hospital[40]. This ad hoc arrangement presents risks for all concerned, including:

- Depletion of critical staff from the referring hospital.
- Lack of familiarity of staff with the transport environment/equipment.
- Inadequate training and experience of staff escorts.

The RFDS provides a dedicated aero medical retrieval service for the whole of WA beyond a 150-kilometre radius of Perth, including the Indian Ocean Territories. It has a shared responsibility with ERHS for Rottnest Island. It operates 11 turbo-prop fixed wing aircraft from 5 bases in Western Australia, located at Jandakot, Kalgoorlie, Meekatharra, Derby and Port Hedland and carries over 5,000 patients per year.

RFDS operates a state-wide 1800 number, which can be accessed by any health service or member of the community outside the metropolitan area. Approximately 80 percent of its retrieval requests are received from country hospitals (secondary or inter-hospital retrievals), with the remaining 20 percent being from locations without hospitals or medical practitioners (primary retrievals)[40].

Medical practitioners who take comprehensive details, provide advice on pre-flight preparation of the patient, and determine the level of urgency and the crew and equipment required manage all requests for service. In many instances, where patients are seriously ill or injured, the team provides additional resuscitation and stabilisation on arrival in the referring location prior to transport. Around 40 percent of retrievals carry a doctor and flight nurse team, with the balance being conducted by flight nurses alone, under medical direction with written treatment orders and in-flight satellite telephone communication.

Until relatively recently, the typical patient evacuations were from homesteads, mining sites and nursing posts to the nearest regional hospital. With increasing medical specialisation and centralisation, there has been a rapidly growing demand for direct transport to Perth. Currently, there are more than 50 patients per month being transferred to Perth from locations in the Pilbara and Kimberley regions of the State. This is having a significant impact on response times, crew fatigue and maintenance of planes.

Retrieval of a patient from Kununurra to Perth takes around 11.5 hours and, due to regulation of pilot flying hours, this puts the plane and crew out of service for 30 hours. RFDS has looked at a number of options for increasing its capacity to meet the growing demand for its services including the purchase of an additional turbo-prop aircraft or the introduction of a jet aircraft for the long-haul evacuations, leaving the current turbo-prop fleet to service the workload within their regions. Modelling has indicated that the optimal location for the jet aircraft would be Port Hedland.

The ERHS, which is managed under contract by the Fire and Emergency Services Authority (FESA), commenced in August 2003. SJAA are contracted by FESA to coordinate tasking of the helicopter and provide paramedic staff with advanced critical care training. The ERHS operates effectively within a 50 to 200-kilometre radius of Perth, providing three services:

- Primary retrieval of critically injured patients from the site of motor vehicle accidents/trauma.
- Secondary retrieval of critically ill or injured patients from inner country hospitals to tertiary hospitals.
- Search and rescue missions.

In the year to 30 June 2005, the ERHS undertook 190 missions, 125 (65%) of which were primary retrievals, 24 (13%) secondary retrievals and 40 (21%) search and rescue[41]. In broad terms, that equates to two and a half primary retrievals per week and a secondary retrieval each fortnight. This level is considerably lower than was anticipated in the business case prepared by the Department of Health and the ratio of primary to secondary retrievals is the reverse of what was expected based on the experience of other state helicopter emergency medical services.

In December 2004, RFDS started providing medical staffing and clinical coordination for secondary retrievals. RFDS doctors were also used when required for primary retrievals from accident sites. Without additional resources, this proved too difficult for their medical staff and RFDS ceased providing medical retrieval services in April 2005.

The lack of medical staffing and clinical coordination for the ERHS has been consistently identified in the clinical audit process of the service as a major barrier in undertaking secondary retrievals. These audits have shown that:

- In 33 percent of cases, the presence of a critical care physician would have been beneficial.
- In 31 percent of cases, clinical coordination did or would have made a significant difference.
- In 11 percent of cases, extra medical resources (e.g. blood, antivenom, etc) would have helped.
- In 9 percent of cases, the use of the helicopter service could have been avoided with appropriate clinical coordination[40].

Neonatal retrieval is undertaken by the Western Australian Neonatal Transport Service (WANTS) using all the transport platforms as required. Critical care doctors and nurses from Princess Margaret and King Edward Memorial Hospitals staff it. Paediatricians in Derby and Port Hedland are also involved when available for transfers within and from the State's northwest. When the RFDS are involved, it provides the flight-nurses and most consumables. WANTS has been active for many years and has a good record in transporting newborn children to tertiary neonatal care.

There is no centrally coordinated retrieval service for critically ill or injured children in Western Australia, although there are good examples of such services in other States like Queensland, New South Wales and Victoria. As in the case of adults, staff accompany children requiring clinical escorts from the referring hospital, with the attendant risks outlined above[40].

3.3.3 Establishing a Medical Retrieval System

All States and Territories apart from WA have formal systems in place to provide medical critical care expertise for inter-hospital transport in the metropolitan and near rural areas. Apart from Victoria, they also provide this expertise when required for primary (roadside) retrieval. These systems generally have three components; medical direction, clinical coordination and medical staffing.

In New South Wales, all retrieval calls are received by the Medical Retrieval Unit, which is staffed by senior critical care physicians and co-located at St George's Hospital together with the ambulance operations centre. This service is the tasking authority and utilizes road, rotary and fixed wing assets to perform adult, paediatric and neonatal retrievals. Retrieval doctors are provided separately using a variety of employment arrangements.

The Victorian Adult Emergency Retrieval and Coordination Service employs a medical director and critical care physicians as clinical coordinators and retrieval doctors in a similar fashion to New South Wales. South Australia has a similar arrangement with Medflight, which is coordinated through the Royal Adelaide Hospital. Medical and nursing staff from various Adelaide hospitals are employed in the service.

It has been proposed that WA set up a similar integrated retrieval system to those operating in other States, involving the establishment of a central coordination authority and incorporating all modes of transport. While the concepts of a single point of contact for referrals and an integrated system for retrieval have merit, the situation in Western Australia is very different from that existing in other states.

Western Australia is often compared with South Australia because of its population size and distribution. However, there are significant differences between the two States. In a study of Mobile Intensive Care Services in rural South Australia[42] the average radial distances for retrievals from Adelaide for the 4,443 missions undertaken in the 12 years to 1995 was 71 kilometres for road, 122 kilometres for helicopter and 398 kilometres for fixed-wing aircraft missions.

The distances and flight times from Perth to the regional centres are much greater than in South Australia, which essentially precludes the idea of centring specialised medical teams in Perth for the retrieval of critically ill or injured patients from much of country WA. In many cases, the benefits of providing the retrieval team would be more than offset by the time taken for the team to reach the patient.

There are also significant differences with New South Wales and Queensland where there are large regional population centres with sizeable base hospitals that can act as hubs for the retrieval services in their region. Victoria, likewise, has a number of large regional centres, the majority of which are in effective helicopter range of the Major Trauma Centres and other tertiary hospitals in Melbourne.

The RFDS arrangements with its bases strategically distributed in five major regional centres provides an extremely workable model for servicing people living in the country areas of Western Australia and it is difficult to contemplate how there would be any additional benefits derived from combining medical coordination of its services into a single centralised system. What does, however, need to be improved is the communication between RFDS and SJAA to improve coordination of services and prevent any duplicate tasking.

There is currently no system in place in WA to provide medical critical care expertise for inter-hospital transport or assist, when required, in primary retrievals in the metropolitan and near rural areas. Current ad hoc arrangements fall far short of the minimum standards for the transport of critically ill and injured patients that have been recommended jointly by the Colleges that represent emergency physicians, anaesthetists and intensive care physicians. The Department of Health's Critical Care Council and Clinical Senate[43] and the WA Coroner[44] have all recommended the establishment of a coordinated system for medical retrieval.

As outlined above, the essential elements for setting up medical retrieval systems for the metropolitan and near rural areas, the areas covered by road ambulance and helicopter services, are:

- Appointment of a medical director (part-time) who would be responsible for policy, strategy development and clinical governance.
- Establishment of a panel of medical coordinators who would be responsible for coordinating the whole process of retrieval, including tasking of the appropriate mode of transport.
- Establishment of a panel of doctors to undertake retrievals.

Clinical coordinators should be senior specialists with considerable experience both in the retrieval of, and the management of the critically ill. A doctor would be available at all times to provide clinical coordination, although with modern communication systems, it would not be necessary for the doctor to be located at a central site. The retrieval doctors could be specialists, trainee specialists or doctors experienced in retrieval medicine. Retrieval teams would be comprised of a paramedic for all primary retrievals and a doctor when required. A team of doctor and paramedic or doctor and nurse would manage secondary retrievals.

SJAA currently operates as the communication centre for tasking both road and rotary wing retrievals. South Australia, New South Wales and Victoria have set up a central coordinating body for retrievals, separate from the transport providers. These centres provide a single point of contact for retrieval requests and act as the authority for tasking the appropriate transport platform. In South Australia and New South Wales, the centres are coordinated through a tertiary hospital and work closely with the transport providers.

A number of models were considered for provision of an integrated medical retrieval system, including:

- SJAA are funded to provide some or all components of the medical retrieval service.
- RFDS are funded to provide some or all components of the medical retrieval service.
- Tertiary hospital(s) are funded to provide some or all components of the medical retrieval service.
- Separate central coordination centre for retrievals is set up in the Department of Health to provide some or all the components of the medical retrieval service.
- Some combination of the above.

The simplest approach would be for SJAA to be funded to provide all the components of the medical retrieval service since it already handles all communications for service requests for road ambulance and helicopter services. However, SJAA do not have medical flight insurance, essential for coverage of the retrieval doctors.

The model preferred by the Critical Care Council was for the establishment of a Central Coordination Centre for Retrieval (CCCR), managed by the Department of Health (DoH). The function of such a coordinating authority would be to:

- Provide a single point of contact for retrieval requests.
- Provide a spectrum of response, from advice to trauma triage and retrieval.
- Task appropriately skilled and trained retrieval specialists.
- Task mode of transport (ambulance, helicopter).
- Ensure a receiving bed is confirmed.
- Provide an independent standard setting and monitoring function.
- Coordinate retrieval medicine training.
- Provide a clear role in Disaster Preparedness and Management.
- Support outer metropolitan hospitals by coordinating the resources of tertiary institutions and making them available at point of need.
- Report to the Director General and Minister for Health[40].

The Trauma Working Group were of the view that, were this model to be adopted, it would be more appropriate for it to be coordinated through one of the tertiary hospitals as is the case in South Australia.

It was felt that there is a pressing need for the introduction of a medical retrieval service for primary and secondary retrievals by the Emergency Rescue Helicopter Service and that this should be addressed as the first stage. Clearly, the Fiona Stanley Hospital would have made the ideal choice for the provision of retrieval staff because of its proximity to Jandakot Airport.

The most practical approach to getting the medical retrieval service implemented in the short term, however, would be to fund SJAA to provide the medical direction (part-time) and medical coordination and RFDS to provide medical retrieval doctors. This would facilitate medical direction and coordination of both non-medical primary and secondary ambulance and helicopter retrievals and primary and secondary medical retrievals by helicopter.

Integration of medical retrieval with the existing RFDS service for rural and remote areas could provide for significant synergies including improved communication and coordination with SJAA and better utilisation of all medical transport assets. Furthermore, RFDS and the ERHS are both located at Jandakot Airport and RFDS already has flight insurance covering its medical staff. RFDS currently has a training position for an emergency physician. The RFDS option would be significantly enhanced by taking on additional critical care physicians/trainees as part of its Perth-based medical retrieval service.

In December 2006, RFDS were funded to provide medical retrieval doctors for secondary retrieval via fixed wing and retrievals within 200kms via the ERHS. This collaboration between RFDS and SJAA has improved coordination between SJAA and RFDS on tasking issues. In addition, discussions with the Commonwealth and the Northern Territory Department of Health have resolved some of the cross border transport issues for critically ill patients in the East Pilbara. Whilst going some way to alleviate the immediate operational issues for secondary retrieval of critically ill and injured patients and providing medical retrieval doctors for the ERHS, this arrangement does not resolve the issues with respect to primary retrieval and the issues of central coordination. The model for an appropriate retrieval system for critically ill and injured patients within the Western Australian context requires further development.

The issues of primary and secondary retrievals of the critically ill and injured by ambulance in the metropolitan area and the development of a specialist children's retrieval service, are more complex issues. Most of the demand for ambulance retrievals in the metropolitan area is for the transfer of patients from outer metropolitan hospitals to tertiary hospitals. Similarly, the greatest demand for medical assistance in primary retrieval is going to be in the areas most distant from the tertiary hospitals. Given that these retrievals are time critical, the most effective strategy would be to provide additional resources, and where necessary training, to the outer metropolitan hospital for provision of the clinical retrieval staff.

Given the relatively small numbers involved, the development of a specialist paediatric medical service for the retrieval of critically ill or injured children is a more challenging proposition and should be addressed in the next stage of development of the medical retrieval service. With the commissioning of the Fiona Stanley Hospital after 2012, the whole issue of medical retrieval, both paediatric and adult, will need to be reviewed.

Initiative 32: Guidelines for the retrieval of critically ill and injured patients will be developed based on the minimum standards jointly endorsed by the Australian and New Zealand College of Anaesthetists, the Royal Australian College of Physicians and the Australasian College for Emergency Medicine.

Initiative 33: RFDS services in the Northwest of the State will be reviewed with the aim of determining the most efficient and cost-effective way in which services can be enhanced to reduce transport times for critically ill and injured patients, staff fatigue and wear and tear on aircraft.

Initiative 34: RFDS will continue to provide primary and secondary retrieval services, including medical coordination, for the rural and remote areas of WA outside a 200-kilometre radius of Perth.

Initiative 35: RFDS and SJAA will ensure that there is an effective communication system and appropriate protocols in place to ensure a high level of coordination between their services.

Initiative 36: In conjunction with FESA, a coordinated system for medical retrieval for primary and secondary retrievals by the Emergency Rescue Helicopter Service will be developed and implemented with:

- SJAA funded to provide a part-time Medical Director and Medical Coordination.
- RFDS funded to provide the retrieval doctors for secondary retrieval.

Initiative 37: Primary and secondary retrieval of critically ill and injured patients in the metropolitan area will be reviewed with the aim of determining whether there is a need for a dedicated service and, if so, what model would be most appropriate and cost-effective.

Initiative 38: A multidisciplinary working group will be formed to examine the feasibility of developing a centrally coordinated retrieval system for children in Western Australia.

Initiative 39: Following the commissioning of the Fiona Stanley Hospital after 2012, medical retrieval services, both adult and paediatric, will be reviewed to determine whether the arrangements in place are/have been effective or whether there is a need for an alternative model.

4. Trauma system support and development

4.1 Trauma Registries

Trauma Registries are a vital component of a trauma system in that they provide a tool for managing patient care at the individual hospital level. Furthermore, when establishing a trauma system, they provide a means whereby the quality of trauma care system-wide can be assessed. This includes the effectiveness of the trauma system for improving patient outcomes across the entire continuum of care from pre-hospital to rehabilitation.

4.1.1 Current situation

While Western Australia has no state-wide trauma registry, there are currently similar trauma registry databases at Royal Perth Hospital, Sir Charles Gairdner Hospital, Fremantle Hospital and Princess Margaret Hospital for Children. These registries are under the administrative umbrella of each hospital's trauma committee and the chair of the committee directs their day to day running.

Without a state-wide trauma registry system and an agreed central point with overall responsibility for trauma registry coordination, it has not been possible to manage an agreed output from the hospitals' trauma registries. Trauma committees in each hospital are subject to individual hospital administrative and budgetary control. The need for increased support for the trauma registries has not been met by the hospitals, and there has been no structure through which these requests could be addressed. As a result, the last four years has seen a significant erosion of the state-wide processes that were implemented and expected as part of the initial Department of Health funding for trauma registries.

4.1.2 WA State Trauma Registry – role and purpose

The TWG strongly supports the formation of a WA State Trauma Registry. Initially, it should be formed by merging an agreed minimum dataset from each of the existing tertiary hospital trauma registries. The scope of the WA State Trauma Registry should then be expanded to include the secondary metropolitan hospitals with emergency departments (Joondalup Health Campus, Swan Districts Health Service, Armadale-Kelmscott Memorial Hospital, Rockingham/Kwinana Hospital and Peel Health Service), followed by the Regional Resource Centres at Broome, Port Hedland, Geraldton, Kalgoorlie, Bunbury and Albany.

Trauma registries and databases are the cornerstone of any trauma system, and will be vital in monitoring the progressive implementation of the proposed State Trauma System. Data from the registries in each tertiary hospitals, and in due course secondary hospitals and regional resource centres, will be the only means by which the performance of the trauma system and the individual services within that system can be evaluated.

In NSW, Victoria, Queensland and South Australia, the establishment of State Trauma Registries has, in each case, followed the introduction of a State Trauma System and has primarily been for the purpose of monitoring the effectiveness of that new system. Clearly, it has been an important priority when implementing a new trauma system to know how the trauma services are performing according to new sets of protocols for trauma patient management. This performance monitoring is aimed at reducing preventable deaths and permanent disability from major trauma. While this will also be a key objective of the WA State Trauma Registry, there is, however, a range of other roles that the registry should fulfil, including:

- Measuring outcomes, including safety and quality improvement activities.
- Improving clinical management by supporting multidisciplinary clinical audit.

- Providing summative information to health managers about the trauma workload and its management.
- Providing confidential comparative statistics to clinicians about institutional performance.
- Benchmarking performance against other Trauma Centres.
- Providing population based statistics on the epidemiology of trauma to aid in the development of injury prevention strategies.
- Assisting in the planning of future trauma service development.

The WA State Trauma Registry should be linked to the St John Ambulance, Royal Flying Doctor Service, Emergency Helicopter Service and Coroner's databases to enable the monitoring of the pre-hospital phase and all trauma deaths. This is necessary in order to have a complete picture of injury and trauma for the State of Western Australia.

4.1.3 Funding and staffing

Clearly, trauma registries are essential for ascertaining the effectiveness of a State Trauma System and providing ongoing monitoring of trauma patient management. However, if they are to be successful, they need to be funded and properly staffed at both the central and trauma service levels.

The current number of trauma registry staff is small and their roles are highly specialized. Consideration was given by the TWG as to whether all the registry staff should report to the WA State Trauma Service. However, it was agreed that the preferred option for addressing the shortcomings of the current arrangements would be for the State Trauma Service to hold the budget for all of the trauma registry positions and to transfer the funds via a contract arrangement with the relevant hospitals. The hospital management would then be responsible for the staffing and timely delivery of agreed outputs.

Each hospital level trauma registry would be expected to produce or contribute towards the following activities:

- Annual report – produced within six months after the end of the calendar year and to include all major and non-major trauma admissions.
- Contribute towards an annual State Trauma Registry Report.
- Provide required information for each hospital to conduct a Trauma Death Audit of all trauma related deaths.
- Provide information for each hospital to conduct an audit and analysis of "missed injuries".
- Data collection must be in real time and up to date with no more than three months in arrears.
- Scientific Research - the state trauma registries will be measured in terms of research output and contribution to the advancement of injury prevention and injury treatment, including rehabilitation.

Ongoing training and education for staff involved in the WA State Trauma Registry is an essential component to ensure data quality assurance. Data entry assistance should be made available for each hospital through the Major Trauma Service rather than from individual hospitals.

The expanded role and additional responsibilities, which flow from establishing the WA State Trauma Registry, need to be resourced and as a consequence the following additional staff are required immediately upon establishing the registry:

- Data Manager with appropriate data management skills, research skills, database experience, as well as managerial and administrative experience. Their role would also include establishing strong support for further development of the WA State Trauma Registry databases, including linkages to EDIS, TOPAS, and other injury databases.
- Trauma Research Nurse to support the registry at the Adult Major Trauma Service. This is required because of the anticipated increase in the number of major trauma presentations. Although the other hospitals will see a drop in the number of major trauma presentations, it is not reasonable to shift trauma registry resources as the other hospitals have been struggling with their own level of work.
- Data entry clerk to work with all hospital trauma registries to assist in data entry duties.

It is expected that these positions be based at the Adult Major Trauma Service. Further resources will be required when WA State Trauma Registry expands to include the metropolitan general hospitals and the Regional Resource Centres.

4.1.4 Management

It is important that the major stakeholders are part of the governance system for the WA State Trauma Registry. This ensures that every stakeholder has a central role in policy development and operational issues. This in turn will encourage their full and active participation in the information collection process and their use of the data.

A collaborative governance model and a supporting committee structure, should be implemented to oversee the implementation and establishment of the WA State Trauma Registry:

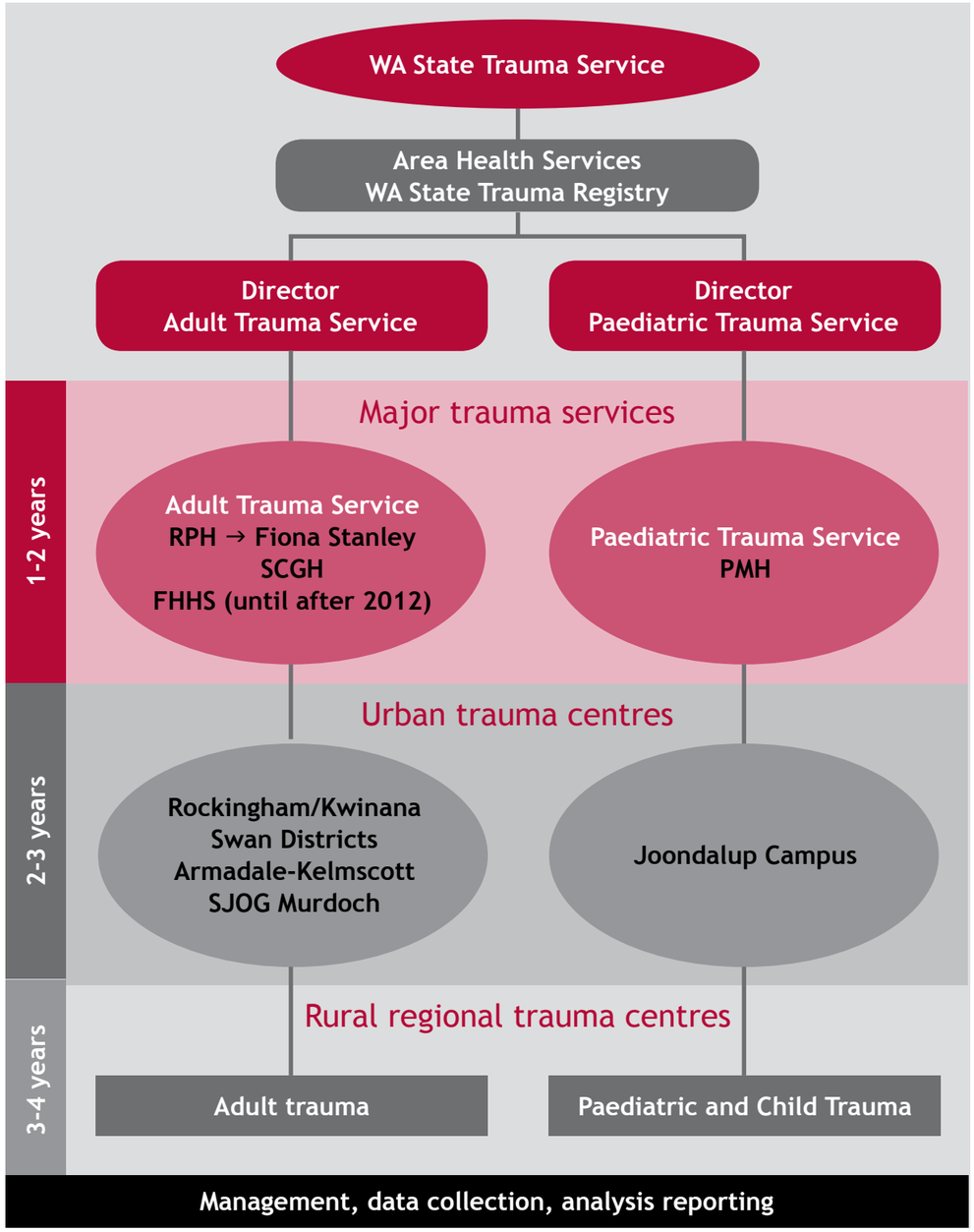
- State Trauma Registry Committee (Trauma Research Nurses from all the tertiary hospitals; Data Manager State Major Trauma Service; Epidemiology Branch Department of Health; and Infohealth technical experts): its role is to ensure the quality and integrity of the data.
- Clinical Data Committee (Trauma Directors; Trauma Research Nurses from all the tertiary hospitals; technical experts and an Executive Officer from the Health Policy and Clinical Reform Division, DoH): its role is to establish the minimal data sets and inform structural change towards a WA State Registry during the Implementation phase.
- Trauma Clinical Evaluation Committee (Trauma Directors; College of Surgeons; RFDS; St John Ambulance; Emergency Rescue Helicopter Service; Injury and Trauma Health Network; WA Country Health Service; Health Policy and Clinical Reform Directorate; Office of Safety and Quality; Health Information Centre): its role is to work on clinical evaluation, trends and clinical issues during implementation and governance.
- Injury and Trauma Health Network Advisory Group; its role will be the policy and planning in partnership and collaboration with the other committees during the implementation phase and ongoing maintenance of the WA State Trauma Registry.

While the day-to-day management and coordination of the WA State Trauma Registry will be the responsibility of the Directors of the Adult and the Paediatric Major Trauma Services, the Department of Health, Epidemiology Branch will be the overall custodian of the data on behalf of the health system. This aligns with the location of the Emergency Department Information System (EDIS) Support function within the State Health Support Division. Data from the WA State Trauma Registry will be protected and approval for access has to be given through processes established by the Epidemiology Branch in consultation with the Directors of the Adult and Paediatric Trauma Services and the Trauma Clinical Evaluation Committee.

Figure 8 below provides a graphic of the possible operational structure of the WA Trauma Registry and Figure 9 provides a graphic of supporting governance structures and committees during implementation and eventually transition to maintenance. Implementation and transition to full maturity of the WA Trauma Registry could be achieved over a 3–4 year phased project.

Figure 8. Possible operational structure - WA State Trauma Registry

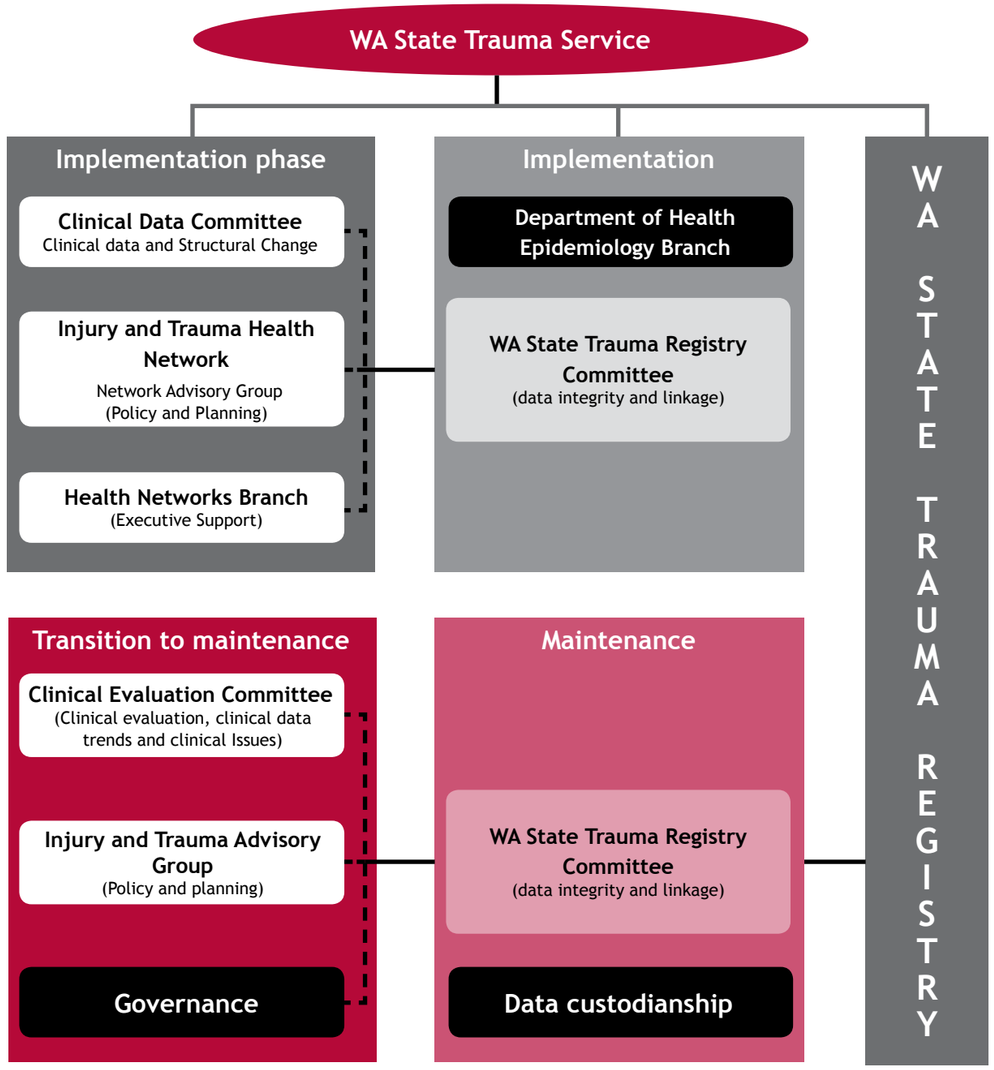
Operational structure



Operational structure

Figure 9. Possible Strategic Governance Structures - WA State Trauma Registry

Strategic governance structures - implementation - Maintenance



Initiative 40: Establish a WA State Trauma Registry under the leadership of the Director Major Trauma Service (Adult). Merging the existing trauma databases at RPH, SCGH, FHHS and PMH will form the WA State Trauma Registry.

Initiative 41: Expand the WA State Trauma Registry to include the general metropolitan hospitals and the Regional Resource Centres. The Directors of the Adult and Paediatric Major Trauma Service (MTS), with assistance from the Injury and Trauma Health Network Support Team, will develop the phased implementation plan.

Initiative 42: Link the WA State Trauma Registry to the St John Ambulance, Royal Flying Doctor Service, Emergency Helicopter Service and the Coroner's databases.

Initiative 43: The Clinical Lead of the Injury and Trauma Network will determine agreed outputs from the State Trauma Registry, in collaboration with the Directors of the Adult and Paediatric MTS and the Trauma Clinical Advisory Committee. The Director of the Adult MTS will ensure these outputs are delivered.

Initiative 44: The Director of the Adult MTS will oversee the establishment of the Data Manager, Trauma Research Nurse and Data Entry Clerk positions at Adult MTS.

Initiative 45: The Clinical Lead of the Injury and Trauma Health Network will establish the State Trauma Registry Committee, Clinical Data and Evaluation Committee and the Clinical Evaluation Committee, including developing the terms of reference and establishing the membership.

Initiative 46: The Injury and Trauma Health Network Support Team will assist the Director of the Adult MTS to develop budget holding and contract arrangements for the trauma registry staffing and performance outputs for the individual teaching hospital based trauma databases.

4.2 WA Trauma Services Advisory Group (WATSAG)

WATSAG (originally known as the State Trauma Advisory Committee) was established in 1994 to provide a forum for a state-wide approach to the provision of acute and rehabilitative trauma services within Western Australia.

WATSAG was established to:

- Evaluate the current level of trauma services and trauma outcomes as identified in the Clinical Health Goals and Targets for Western Australia (1994).
- Advise on development and maintenance of a system of trauma care in Metropolitan and rural/remote Western Australia in the areas of pre-hospital care and transport, acute hospital and rehabilitation care based upon relevant criteria, such as the National Road Trauma Advisory Committee (1993).
- Advise the Deputy Director General – Health on standards of trauma care in Western Australia based on relevant Western Australian data and reports, guidelines and standards of accepted national and international benchmarks.
- Provide reports as required on state-wide roles, facilities, physical and human resources in relation to trauma.
- Maintain and update a database of hospital trauma services within Western Australia and promote its usage.
- Promote research in trauma care in Western Australia and to oversee the activities of the group subgroups/working parties.
- Report on needs for training and education and oversee the activities of the State Trauma Education Committee.

The TWG was of the opinion that the Clinical Lead of the Injury and Trauma Health Network should ensure that the functions of WATSAG are maintained and continued but that WATSAG should be abolished.

Initiative 47: The Clinical Lead of the Injury and Trauma Health Network will abolish WATSAG but ensure that its functions are continued under the auspices of the network.

4.3 Education and training

Fundamental to the success of the WA Trauma System will be the availability of a highly trained workforce, with the skills and knowledge required to provide the level of care appropriate to their delineated role within that system. To have such skilled and motivated personnel requires that the continuum of education and training needs, from undergraduate education, postgraduate/specialist training to continuing education must be addressed.

A detailed examination of current undergraduate and postgraduate medical, nursing, allied health and pre-hospital care provider education and training was beyond the resources and time constraints of the TWG. However, its importance in providing a skilled workforce was fully recognised. It is clear that a co-operative effort between the universities, TAFE Colleges, professional bodies, hospitals and pre-hospital trauma care providers is required to ensure that appropriate education and training in trauma care occurs. The development of an Injury and Trauma Workforce Education and Training Framework would be a first step in ensuring that current gaps and future training needs are identified and addressed.

The Major Adult and Paediatric Trauma Services (MTS) will have a leading role to play in trauma care education. This includes practitioners in the pre-hospital, metropolitan hospital and rural and remote areas. The MTS role in trauma care education is to be considered in its broadest meaning and will encompass advice on clinical management, feedback and debriefing, peer review and clinical audit in addition to delivering formal training programs. The MTS will develop and provide innovative models of approaches such as the use of mobile simulators, telemedicine and multidisciplinary training. This is particularly important for the rural and remote workforce and those who have rare exposure to trauma.

To strengthen the education and training resources available to the MTS and to enable the MTS to take on a state-wide education role, consideration should be given to aligning the resources of Western Australian Trauma Education Committee (WATEC) offices based at SCGH hospital with the Adult MTS. The target groups for education and training would include medical specialists in surgery, emergency medicine, anaesthetics and intensive care, nurses, general practitioners, allied health and pre-hospital personnel who are responsible for providing trauma care.

The TWG was aware of the concerns raised about possible deskilling as a consequence of having one adult trauma service at RPH. Professor Deane noted in his report on Trauma Services that:

> *"Fears and realities regarding professional deskilling (particularly medical and nursing) need to be addressed. Education initiatives aimed at skill maintenance need to be offered from the MTS or more broadly structured trauma education unit. These initiatives need to be resourced adequately by the Department of Health. These concerns regarding deskilling are felt, at the present time, most acutely by the staff at Fremantle Hospital and SCGH in the*

event that the adult MTS is designated at RPH. On-the-job rotations should be encouraged and facilitated, especially within the discipline of OT nursing, ED nursing, ICU nursing, ED doctors and ICU doctors. Such rotations can facilitate new training, skill maintenance and mutual understanding of skills, resources and limitations." p21[31]

The MTS and the Injury and Trauma Health Network will be responsible for implementing strategies to address issues of possible deskilling, including facilitating access (across a range of disciplines) to appropriate clinical rotations at the MTS at RPH and PMH.

4.3.1 Rural and remote education

The particular needs of the rural workforce need to be considered. When developing education and training for the trauma care workforce in country regions, the MTS in collaboration with the Western Australian Trauma Education Committee should obtain input from rural and remote practitioners to ensure that it is meeting their needs.

The TWG is aware of the workings of the Western Australian Trauma Education Committee (WATEC) and its conduct of the Western Trauma Course (formerly know as the Western Region Rural Trauma Course). The Western Trauma Course is a one-day multidisciplinary trauma course, which provides rural healthcare professionals with ready access to education and training, as well as re-training and re-skilling for rural and remote practitioners.

The TWG supports the Western Trauma Course and recommends the continued delivery of this course to the rural and remote workforce by the Western Australian Trauma Education Committee. The continued conduct of the Western Trauma Course ensures a process is in place for all rural healthcare workers working in the rural emergency care setting to have access to a standardised trauma-training course. It is the only one-day multidisciplinary course that is specifically aimed to meet the needs of rural and remote health care professionals involved in trauma management, considering such issues as sparse population, limited medical facilities, staffing and the longer transport times.

The MTS, in partnership with WA Country Health Services, will be responsible for promoting clinical practice exchanges between metropolitan trauma services and rural regions. In providing education and training to rural practitioners, the MTS, in collaboration with WATEC should consider maximising its use of video conferencing, especially for clinical feedback and clinical audit.

This is not to suggest that the importance of face-to-face contact be minimised. The MTS, in collaboration with WATEC, will need to continue to develop innovative approaches to providing this service to country practitioners and will also have to take into account the high turnover of clinical staff in country regions.

The Western Australian Trauma Education Committee (WATEC), in collaboration with the MTS, should be the body responsible for the provision of accessible trauma education and skills training, as well as being a resource to WA healthcare workers in regards to all trauma-related education in WA, Australia and internationally.

4.3.2 Western Australian Trauma Education Committee (WATEC)

WATEC (previously known as the State Trauma Education Committee (STEC) and the Training Sub-Committee) was first formed as a sub-committee of the State Trauma Advisory Committee in 1994 to address the Clinical Health Goals and Targets set out by the Health Department of Western Australia. WATEC was established to:

- Develop, deliver and evaluate training programmes to be conducted throughout WA, providing educational opportunities to all staff receiving and managing trauma patients in WA.
- Continue to establish the infrastructure to meet the trauma training needs of all healthcare professionals throughout WA.
- Continue to evaluate and reassess the Clinical Health Goals and Targets set out by the Health Department of Western Australia, and strive towards accomplishing the achievable goals.
- Address future education and training issues and recommendations made by the Health Reform Implementation Taskforce - Trauma Working Group in relation to trauma care.
- Advise or direct on trauma management training and up-skilling.
- Review the delivery of trauma training within WA.
- Provide trauma training founded on evidence based practice.
- Secure accreditation with relevant professional bodies to provide continuing Medical or Nursing Credentialing.

The TWG strongly supports the continuation of this education and training reference group and considers it should be the foundation of the working group of the Injury and Trauma Health Network. This group would evaluate and develop a WA Injury and Trauma Education Training Framework which will consider the educational and training needs for injury prevention, pre-hospital care, acute treatment, rehabilitation and long term care.

Initiative 48: The Western Australian Trauma Education Committee will develop a WA Injury and Trauma Education and Training Framework, under the auspices of the Clinical Lead and Network Advisory Group of the Injury and Trauma Health Network with support from the network secretariat. This framework will encompass the trauma education and training needs of injury prevention practitioners, pre-hospital personnel, the relevant medical specialties, general practice, nursing, allied health and will include the special needs of the rural and remote workforce.

Initiative 49: The Clinical Lead of the Injury and Trauma Health Network will investigate aligning the resources of the Western Australian Trauma Education Committee to the Adult MTS to support its statewide education and training role.

Initiative 50: The Adult and Paediatric MTS will develop and implement a range of strategies to enhance the trauma care skills of the workforce, including facilitating clinical rotations, developing innovative models of education and training and supporting rural and remote personnel who manage trauma care.

Initiative 51: The Director of the Adult and the Paediatric MTS are to develop clearly articulated approaches to ensuring that the workforce in services impacted on by the establishment of the Trauma System are provided with opportunities to maintain their major trauma care skills.

4.4 Workforce

The development of a state-wide trauma system and the implementation of the initiatives proposed by the TWG will have considerable implications for the workforce. While full implementation of the initiatives will take many years, including the development of services at the metropolitan general hospitals and the building of the Fiona Stanley Hospital, it is important that workforce planning commence as soon as possible.

The Injury and Trauma Health Network will take responsibility for workforce planning for trauma care and will establish a Trauma Workforce Working Party reporting through the network Clinical Lead to the Executive Director, Health Policy and Clinical Reform.

Initiative 52: The Clinical Lead of the Injury and Trauma Health Network will be responsible for developing the terms of reference, membership and specified outputs for the Trauma Workforce Working Party.

Appendix 1

Terms of Reference: Trauma Working Group

The terms of reference of the TWG were to:

1. Review the current state trauma plan and make recommendations on revisions of the plan to support the implementation of recommendation 33.
2. Meet with West Australian Trauma Services Advisory Group (WATSAG), review the current WATSAG action plan and brief WATSAG on the role and function of the TWG.
3. Meet with the WACHS to review and develop a trauma plan for regional and remote Western Australia. Special consideration will be given to developing the role of the new Major Trauma Services providing support to hospitals and health services in non-metropolitan Western Australia and to detailing the roles of all health services in the state as trauma service providers.
4. Review committee structures currently providing policy and operational support for trauma care in Western Australia and recommend on future committee structure to support the implementation of recommendation 33 and the state trauma plan. The new structure will address the need for ongoing policy development, operational support, evaluation and education in trauma care.
5. Recommend the steps needed to establish Princess Margaret Hospital as a Major Trauma Service (MTS) for paediatric patients - this to include a review of the facilities, staffing and planning for the hospital's role within the WA State Trauma System.
6. Following the announcement by the Minister of Health that RPH will be the adult Major Trauma Service the TWG will recommend steps needed to establish Royal Perth Hospital as the adult Major Trauma Service – this to include a review of the facilities, staffing and planning for the role. Specific recommendations will be made about arrangements through to late 2006 whilst RPH redevelopments are being completed.
7. Meet with the staff of Princess Margaret Hospital and RPH to discuss the care of adolescent trauma patients and develop recommendations on this matter to be included in the State Trauma Plan.
8. Meet with the staff of KEMH and RPH to discuss the care of injured pregnant women and develop recommendations on this matter to be included in the State Trauma Plan.
9. Examine the delivery of special services required to support trauma care including spinal injuries, burns, trauma needing hyperbaric therapy and services for reconstructive microsurgery.
10. With the HRIT, develop the service model for trauma services in the metropolitan area. Special consideration to be given to the development of the trauma services at Rockingham and Kwinana District Hospital to ensure that the infrastructure and planning for the new hospital address the provision of these services including a helicopter landing pad.
11. Examine and recommend on the pre-hospital care of trauma patients. This review to address pre-hospital triage, policy on ambulance transfer, the development of paramedic services and medical pre-hospital services for trauma and the roles of RFDS, medical emergency helicopter and St John's Ambulance as providers of pre-hospital care for trauma patients.
12. Recommend on the communication policy and communication facilities needed to ensure the effective working of the new trauma proposals. This review to include consideration of the role for telehealth in support of the trauma plan and to advise on the best communication technology to support the integrated trauma plan.

13. Review current Trauma Registries and recommend on the development of a state trauma registry. The recommendations will specifically address the need for regular review to underpin future policy changes and evaluate the impact of changes in the delivery of trauma services.

14. To examine current education programmes and facilities for training in trauma care in Western Australia and recommend future directions to ensure greater coordination and integration of trauma training for all health professionals. The TWG will meet with clinicians currently providing these services as many of these services are provided under the auspices of organisations not directly linked to the government of Western Australia.

15. To review the state disaster plan and consider the necessary changes to the disaster plan and the opportunities created by the implementation of recommendation 33 and a new state trauma plan. To ensure that any rebuilding or refurbishment of hospitals and health services undertaken as part of implementing recommendation 33 also consider the delivery of disaster care.

16. Workforce Working Party

    The TWG will also establish a working party to specifically address workforce issues raised by recommendation 33. Current workforce behaviour and distribution is an impediment to the successful implementation of recommendation 33. Full implementation of the recommendation will take many years, especially the development of services at the four secondary hospitals.

    Workforce planning for trauma care will need to consider a range of issues including integration with non-trauma services, integration between different sites within health regions, training of health professionals, remuneration and infrastructure to name a few.

    Special consideration will be given to workforce matters in the surgical disciplines of orthopaedics, plastic surgery and general surgery. Other disciplines to be considered include anaesthesia, emergency medicine, radiology and intensive care.

This structure is spelled out within the document and recommendations.

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