

# **Review of Trauma and Emergency Services Victoria 1999**

REPORT OF THE MINISTERIAL TASKFORCE ON TRAUMA  
AND EMERGENCY SERVICES AND THE DEPARTMENT OF HUMAN  
SERVICES WORKING PARTY ON EMERGENCY AND TRAUMA SERVICES

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## Foreword

The impact of trauma, in both human and financial terms, is significant. It has been estimated that for every trauma related death in Australia, there are 47 hospital admissions, 133 emergency department visits, and 1,333 private doctor visits. These figures are staggering in themselves, however the suffering behind these statistics is even more significant.

Victoria is already a national and international leader in trauma prevention and care. The success of injury prevention campaigns in this state is testimony to the commitment and vigour of a number of agencies. The current clinical outcomes for trauma patients are comparable to, and in some aspects better than, international standards.

Despite this, a number of bodies have identified the need for system-wide changes in the management of trauma patients to further reduce the impact of trauma in this State. This is supported by research undertaken over the last five years. In 1997, the Minister for Health, the Hon Rob Knowles MP, established the Ministerial Taskforce on Trauma and Emergency Services to advise the Government on a best practice model responsive to the particular needs of critically ill trauma patients. Victorian Government support for such a system is an example of its commitment to providing specialised, efficient services and improving access to these services.

The Taskforce has been cognisant that health care providers encounter particular challenges in providing care to trauma patients in isolated rural areas. These health care providers are crucial to the outcome of patients injured in these areas and provide care under often difficult conditions. The Taskforce has sought to address these difficulties.

I have been privileged to chair this Taskforce for the Minister. The members of the Taskforce and Working Party have come from the spectrum of professional groups providing care to trauma patients, from institutions involved in education and research in this field, from other provider and consumer groups, and from the Department of Human Services. All have brought a passion for improving trauma care, substantial expertise and enormous generosity with their time.

Planning a complex, integrated trauma system necessarily involves a complex planning process. In the course of this review, there were 24 occasions when the Taskforce or Working Party met. Sixteen papers and reports assisted the Taskforce and Working Party in their deliberations. Seven subgroups provided detailed submissions in focus areas, such as role delineation, education, medical retrieval, neurosurgery, paediatrics, ambulance communications and system monitoring. Consultation with groups, such as the regional Consultative Committees on Emergency and Critical Care, also provided invaluable perspectives on important issues.

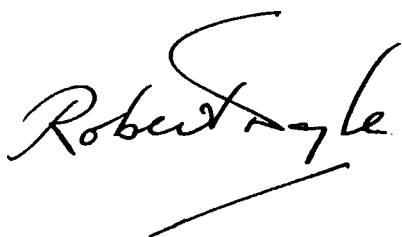
The Taskforce recommendations are made with consideration of the wider spectrum of emergency medical conditions. Developments to the system of care are intended to address the identified deficiencies in trauma management, but it is also acknowledged that some of the benefits will flow on to related emergency patient populations.

The system recommended by the Taskforce and Working Party involves a number of strategies, including:

- The establishment of a process for the prehospital triage and transfer of trauma patients to the most appropriate hospital within an appropriate timeframe. This will involve ambulance bypass of some hospitals.

- The establishment of guidelines for the interhospital transfer of trauma patients. These guidelines establish a standard for ensuring that trauma patients are managed at the most appropriate hospital for the type and severity of injury within an appropriate timeframe.
- The role delineation of health services to provide varied levels of trauma care.
- The designation of health services to fulfil specific roles within the system. In particular, the establishment and designation of Major Trauma Services at The Alfred, the Royal Children's Hospital and the Royal Melbourne Hospital. These hospitals will have a statewide responsibility for trauma care.
- Enhancement of the role of medical retrieval services, in particular, a streamlining of the activation processes.
- Plans for trauma care in rural areas that will be developed by the regional Consultative Committees on Emergency and Critical Care, utilising the framework developed by the Taskforce.
- A process of audit and quality assurance that will provide ongoing monitoring of outcomes from trauma care.

This report provides the blueprint for building a world-class trauma system. It will provide Victorians with the best framework and measures for optimising the management of trauma. I thank the Taskforce, Working Party and others whose contributions have created this document and I commend this report to the Minister for Health, the Hon Rob Knowles MP.



ROBERT DOYLE MP  
Parliamentary Secretary to the Minister for Health  
Chair, Ministerial Taskforce on Trauma and Emergency Services

# Acknowledgements

Many people contributed to the production of this report and have been extremely generous with their time and expertise. The Project Team wishes to thank in particular:

- Members of the Taskforce, Working Party and associated subgroups.
- Members of the regional Consultative Committees on Emergency and Critical Care Services and Rural Workforce Agency Victoria for providing invaluable advice on rural issues and perspectives.
- Specialists who assisted with drafting the specialist trauma transfer guidelines: Mr Rodney Judson, Professor Frank Shann, Dr Simon Young, Associate Professor Jeffrey Rosenfeld, Dr Douglas Brown, Dr Jamie Cooper, Dr Ian Millar, Professor Andrew Kaye, Mr John Laidlaw, Dr Christine Bessell, Mr Elton Edwards and Dr Jenny Dowd.
- Many individuals who gave their time to participate in consultations and other meetings, including Professor Donald Trunkey, Oregon Health Sciences University, Oregon, USA.
- Monash University Accident Research Centre for accident data.
- Ms Ann Tremayne, Consultative Council on Road Traffic Fatalities for data and advice.
- Linda Smart and Dr Ron Manning from NSW Health Department, Dr Tony Burrell, Mike Willis, Dr Andrew Berry, Ian Badham, Trish McDougall and Mr Jim McGrath for sharing their experience in developing a trauma system in NSW.
- Managers and staff of the following branches of the Department of Human Services:
  - Quality Branch, Acute Health
  - Purchasing and Financial Policy Branch, Acute Health
  - Corporate Strategy
  - Public Health and Development
  - Communications Unit, Portfolio Services.
- The Department of Human Services thanks the Metropolitan Ambulance Service; Visual Communication Services, The Alfred; and the Transport Accident Commission for the use of the photographs in the report .

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# List of Acronyms

Acronym	Full Title
AAV	Air Ambulance Victoria
ACEM	Australasian College for Emergency Medicine
ACEP	American College of Emergency Physicians
ACHS	Australian Council on Healthcare Standards
ACS	American College of Surgeons
ANZCA	Australian and New Zealand College of Anaesthetists
APLS	Advanced Paediatric Life Support
ASV	Ambulance Service Victoria
ATLS	Advanced Trauma Life Support
CCECCS	Consultative Committee on Emergency and Critical Care Services
CCRTF	Consultative Council on Road Traffic Fatalities
CT	Computerised Tomography
DRG	Diagnosis Related Groups
EMDS	Epidemiological Minimum Dataset
EMST	Early Management of Severe Trauma
FW	Fixed Wing

HDU	High Dependency Unit
ICD	International Classification of Disease
ICU	Intensive Care Unit
ISS	Injury Severity Score
MAS	Metropolitan Ambulance Service
MEARS	Medical Emergency Adult Retrieval Service
MECCC	Ministerial Emergency and Critical Care Committee
MeTS	Metropolitan Trauma Services
MHCSP	Metropolitan Health Care Services Plan
MSCU	Major Trauma Service Statewide Coordination Unit
MTS	Major Trauma Services
NRTAC	National Road Traffic Advisory Council
NSA	Neurosurgical Society of Australasia
OCECCS	Office of the Coordinator, Emergency and Critical Care Services
OR	Operating Room
PIS	Primary Injury Service
QI	Quality Improvement
RACS	Royal Australasian College of Surgeons
RCH	Royal Children's Hospital
RDAV	Rural Doctors Association of Victoria
RMH	Royal Melbourne Hospital
RTS	Regional Trauma Services
RW	Rotary Wing
RWAV	Rural Workforce Agency Victoria
SPMDS	System Performance Minimum Dataset
STC	State Trauma Committee
TRISS	Trauma Injury Severity Score
TRMDS	Trauma Registry Minimum Dataset
UCS	Urgent Care Services
VIMD	Victorian Inpatient Minimum Dataset
VEMD	Victorian Emergency Minimum Dataset
VSTS	Victorian State Trauma System
WIES	Weighted Inlier Equivalent Separations

# Executive Summary and Recommendations

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# Executive Summary

## Background

Support has grown over recent years for the development of an integrated trauma system in Victoria. There are some indications that major trauma outcomes in Victoria are better than those in North America (Cameron et al., 1995), however research over the last five years has identified a number of system-wide deficiencies adversely impacting on the outcomes for severely injured patients.

A number of studies have drawn attention to this issue. The Consultative Council on Road Traffic Fatalities identified potentially preventable outcomes contributing to death in up to 38 per cent of road traffic fatalities in Victoria (McDermott et al. 1996, McDermott et al., 1998). The Major Trauma Management Study (Danne et al., 1998) identified similar potentially preventable outcomes from all aetiologies of trauma, as well as potentially preventable complications in survivors.

Both of these studies demonstrated recurring deficiencies in trauma management and system response. Problems were identified from the initial response through to definitive treatment, in both metropolitan and rural areas. Examples of these deficiencies were:

- Inadequate availability of prehospital and emergency department advanced life support skills.
- Prolonged times at the scene of accidents.
- Inadequate reception in emergency departments by junior staff and delayed investigation and surgical consultation.
- Triage of patients to hospitals without optimal skills or resources to manage time-critical major trauma patients.
- Delays in, and inadequate medical escort for, rural and metropolitan interhospital transfer of major trauma patients.

Recognising the size and complexity of the task of developing an integrated trauma system across Victoria, the Minister for Health, the Hon Robert Knowles MP, established a review of trauma and emergency services in July 1997. The purpose of the review is to advise Government on an appropriate system-wide structure, arrangements for ongoing monitoring of the accessibility and responsiveness of emergency and trauma services, and education and training issues.

The benefits of creating an integrated trauma and emergency system were foreshadowed in the Metropolitan Health Care Services Plan, released by the Department of Human Services in 1996.

The concept of an integrated trauma system that matches the needs of injured patients to an appropriate level of treatment is formally supported by a number of colleges and organisations, including the Royal Australasian College of Surgeons, the Australasian College for Emergency Medicine, the Consultative Council on Emergency and Critical Care Services, the Australian and New Zealand College of Anaesthetists, Metropolitan Ambulance Service, and the Neurosurgical Society of Australasia.

## Review Process

A Ministerial Taskforce and a Departmental Working Party were established to assist this review: the Ministerial Taskforce on Trauma and Emergency Services and the Working Party on Emergency and Trauma Services. In forming the membership

of these committees, every effort was made to draw on a cross-section of knowledge and expertise across all relevant organisations and constituencies. Members were appointed as individuals rather than as representatives of any particular constituencies or organisations.

The Ministerial Taskforce on Trauma and Emergency Services and the Working Party on Emergency and Trauma Services worked closely together to develop recommendations for the future restructuring of the trauma system.

## **Ministerial Taskforce on Trauma and Emergency Services**

The Ministerial Taskforce on Trauma and Emergency Services (the Taskforce) was initially established to examine Victoria's emergency and trauma services (see Appendix 1). Although trauma services clearly operate within the wider context of emergency services, the Taskforce considered that supporting local and international evidence was strongest for review and reform of the state's trauma services. The primary focus of the Taskforce was, therefore, to advise on an appropriate trauma system structure and components for cohesive operation of a trauma system. The title was selected to reflect the trauma focus within the wider emergency services context.

The Taskforce was chaired by Mr Robert Doyle MP, Parliamentary Secretary to the Minister for Health. In assessing options for developing major trauma services for Victoria, the Department of Human Services commissioned ACIL Consulting Pty Ltd to advise on selected options and report to the Taskforce.

## **Working Party on Emergency and Trauma Services**

A Working Party on Emergency and Trauma Services (the Working Party) had already been established by the Department prior to setting up the Taskforce. Its role was to develop and prioritise pragmatic emergency and trauma system initiatives identified by the Consultative Committee on Road Traffic Fatalities and other relevant bodies (See Appendix 2). The CCRTF in association with representatives of the learned Colleges and Specialist Societies prepared a report advising on recommendations to reduce the identified problems. The Working Party has subsequently recommended a range of strategies in accordance with a best practice model. It established a close working relationship with the Taskforce through a number of joint memberships.

## **Victorian State Trauma System**

### **Target Population**

Major trauma comprises a small proportion of overall emergency cases with an estimated current incidence of 1,000–1,200 cases annually in Victoria, if defined simply as those cases with Injury Severity Score (ISS) > 15 (Cameron et al., 1995). The Major Trauma Management Study identified an additional 30 per cent of major trauma cases using a broader definition, but with an ISS < 15 (Danne et al., 1998). This means that there may be considered to be up to 1,800 major trauma cases per year in Victoria. The principal component of major trauma is road trauma, which has been declining over time (see Appendix 3).

The incidence of major trauma may be relatively low, however this group of patients has high morbidity and mortality and, currently, a high level of preventable problems. These patients constitute the most severely injured subgroup of trauma patients and are 'time-critical', in that their morbidity and mortality increases with the time taken to reach definitive treatment.



Although all trauma patients require efficient, effective treatment, the proposed Victorian State Trauma System is targeted at major trauma patients (Figure 2.3). The Taskforce considered that this is the patient population that will benefit most from better organised and coordinated treatment.

The Taskforce considered that an appropriate definition of major trauma for defining the target population and for application in system evaluation and quality assurance involves the presence of at least one of the following:

- Death after injury.
- Admission to an Intensive Care Unit for more than 24 hours, requiring mechanical ventilation.
- Serious injury to two or more body systems (excluding integumentary).
- Injury Severity Score (ISS) > 15.
- Urgent surgery for intracranial, intrathoracic, or intraabdominal injury, or for fixation of pelvic or spinal fractures.

The Taskforce recognised that such a definition requires retrospective assessment after diagnosis is complete. Clearly, full diagnosis is not always possible during resuscitation and early management. The patient's diagnostic status necessarily evolves over time with each phase of care, as diagnosis in the prehospital is largely limited to physical assessment, and because many serious occult injuries are only revealed with time as clinical features emerge or diagnostic interventions are undertaken.

Undertriage, or failing to identify major trauma cases and activate a system response, potentially results in suboptimal clinical outcomes. Criteria are therefore required which are predictive of major trauma as defined above but which are also clinically applicable prospectively during early phases of care and which recognise the evolutionary nature of the diagnostic status in major trauma patients. The Taskforce has identified such criteria, in order to give optimal inclusion of major trauma patients into the Victorian State Trauma System. These are contained in the Prehospital Major Trauma Criteria (Appendix 7.2) and the Major Trauma Interhospital Transfer Guidelines (Appendix 7.4).

## **Benefits of a Trauma System Approach**

There is now substantial evidence that early, appropriate, definitive management in major trauma results in optimal outcomes. Trauma management systems provide a coordinated and systematic means for delivering trauma patients rapidly to definitive care. Much of this evidence is from the United States where a number of statewide regionalised trauma systems have been in operation for more than 20 years (Cameron et al., 1995).

The key features of established international trauma systems associated with improved major trauma mortality were considered by the Taskforce. The collective published research and authoritative guidelines from professional bodies, both local and international, identify key features associated with optimal clinical outcomes. Generally, these centre around strategies for delivering the right patient to the right hospital by the fastest and safest means, and include:

- Integration, coordination and inclusiveness of providers.
- Designation of hospitals to receive major trauma.
- Concentration of expertise in trauma management.
- Agreed triage and transport protocols.

## **System Features and Optimal Outcomes**

### **Integration, Coordination and Inclusiveness**

Within a trauma system, providers of trauma care are integrated and do not operate in isolation. Such integration includes prehospital and hospital providers as well as within and between trauma hospitals, particularly rural and metropolitan hospitals. Integration requires system providers to operate with the same terminology and approaches, such as standardised triage and clinical protocols, and to have a clear understanding of their role and areas of expertise within the system.

The system should have coordination mechanisms in place that allow rapid delivery of the trauma patient to 'definitive care' to reduce time from injury to definitive treatment. Coordination is, therefore, essential from time of notification of ambulance services through every phase of care.

A sustainable trauma system requires inclusive representation from rural and metropolitan providers in both system planning and maintenance.

### **Designation of Hospitals To Receive Major Trauma**

The stratification of hospitals to designated trauma care roles is important and is based on resource and geographical considerations (Appendix 6). Trauma patients are managed in a service that is appropriate for the level of care indicated by their injuries. Only a very limited number of such services are designated as Major Trauma Services, which provide a 'centre of excellence' in all aspects of trauma management.

### **Concentration of Expertise**

The literature in general supports an inverse relationship between mortality rates and caseload volume, that is mortality rates diminish as clinician experience and institutional caseload increases. Designating a limited number of hospitals to receive major trauma, especially the Major Trauma Services where a large caseload of trauma is managed, effectively concentrates trauma expertise in a few institutions. Concentrating trauma expertise in a few specialist institutions then logically requires the majority of major trauma cases to be delivered to these sites, according to agreed triage and transfer protocols, in order to maximise outcome benefits for patients and maintain clinician skills. Concentration of expertise and volume:outcome issues are discussed further in the section, Major Trauma Services in Victoria—Consideration of Number and Location.

### **Triage and Transport Protocols**

The prehospital and interhospital triage and transfer guidelines (Appendices 7 and 8) are designed to maximise the number of major trauma patients that will be treated in the Major Trauma Service. These guidelines necessarily involve bypass of non-Major Trauma Service hospitals, within defined logistic and safety constraints. Compliance with such agreed guidelines is integral to the efficacy of a trauma system.

### **Structure**

The Victorian State Trauma System endorsed by the Taskforce involves designating a limited number of hospitals to receive major trauma. These trauma services will fit within a tiered structure. Different complexities of trauma care will be provided at each level of the system (Figure 2.4 Integrated Trauma System).

The Taskforce recommends that there be Major Trauma Services at The Alfred, Royal Melbourne Hospital and Royal Children's Hospital which will form the central hub of the integrated system. Available evidence, including international outcome studies, published guidelines and demand projections, while not unequivocal, assisted the Taskforce in the decision that a second adult Major Trauma Service was both sustainable and would address the current system-wide deficiencies in relation to higher level system functions. The Taskforce intends that the necessary clinical infrastructure is in place at the Major Trauma Service prior to the activation of triage and transfer protocols.

The Taskforce envisages that the Victorian State Trauma System will be led by the Major Trauma Services. The Major Trauma Services will treat most of the State's major trauma caseload, either through primary triage or secondary transfer, and will deliver leadership and support to the trauma system as a whole. This will be demonstrated by active involvement in education and performance feedback, implementation of triage policies and clinical protocols, and system monitoring and research (Figure 2.4).

The metropolitan component of the system should comprise (Figure 2.5):

- The Major Trauma Services—two adult and one paediatric.
- A second level of trauma receiving hospitals called Metropolitan Trauma Services. They will receive major trauma unable, for safety or logistic reasons, to be triaged directly to the Major Trauma Services. They will undertake early transfer of such cases to the Major Trauma Services and provide definitive treatment to a very limited number of major trauma cases under defined conditions.
- Primary Injury Services that are appropriate for the treatment of patients with minor injuries. Ambulance services, when transporting major trauma patients, will bypass these hospitals for a higher level service.

The regional component of the trauma system is also led by the Major Trauma Services. The regional Consultative Committees on Emergency and Critical Care Services will undertake a coordinating role in regional trauma management and system activities.

The clinical components of the regional system should then comprise (Fig 2.6):

- Regional Trauma Services located in major regional centres providing regional focus for trauma management.
- Urgent Care Services in small rural communities where higher levels of trauma care are not accessible and they provide initial resuscitation and stabilisation prior to early transfer.
- Primary Injury Services in regional areas include some isolated hospitals that may need to provide initial resuscitation to major trauma cases on occasion. Other Primary Injury Services in areas less isolated may be designated for bypass of all major trauma cases on the advice of the regional Consultative Committee on Emergency and Critical Care Services.

## Regional Issues

In a statewide trauma system, regional and rural trauma care providers share many common needs with their metropolitan counterparts, however some issues they face are different. The Taskforce recognises that:

- Regional designation of hospitals to receive major trauma will require more detailed consideration of regional geographic, resource and demand factors.

- Triage and bypass may be difficult in regions where resources are dispersed.
- Effective and timely referral of major trauma to the Major Trauma Services will depend on a collaborative approach from the Major Trauma Services, a rapid response retrieval system and a reliable and streamlined process for referral.
- Training and skill retention are problematic when exposure to major trauma is sporadic and access to training courses limited by time, distance or money.

These issues are common to a number of other medical and surgical specialties but warrant particular attention in the context of the proposed system and are discussed in the appropriate sections throughout the report.

## **Infrastructure**

### **System Organisation and Management**

The successful development of the Victorian State Trauma System will depend on statewide coordination of a complex integrated service system. An organisational structure has been recommended to provide a central, system-wide, non-institutional focus; coordinate the efforts of all agencies involved in trauma care, and provide means to develop and implement strategies for improving trauma services.

System coordination and development will be assisted by a new committee structure led by an overarching Ministerial Emergency and Critical Care Committee addressing trauma system issues as well as the broader issues affecting emergency services in this State. A State Trauma Committee will act as a subcommittee to the Ministerial Emergency and Critical Care Committee and address trauma system issues exclusively and in detail. These two committees will be assisted in trauma system implementation and planning by a collaborative, cross-campus Major Trauma Service Statewide Coordination Unit with statewide responsibilities, and by enhanced integration of regional Consultative Committees on Emergency and Critical Care Services.

### **Triage and Transfer Protocols**

The Taskforce has endorsed a service model where the application of trauma triage protocols will result in the majority of major trauma patients being managed at Major Trauma Services. Ideally, direct transport to Major Trauma Services would deliver patients from the scene of injury, requiring bypass of other hospitals within defined logistic and safety parameters. Where primary triage to Major Trauma Services will not be possible, patients will be delivered to another level trauma service for resuscitation and stabilisation. Early consultation by receiving trauma services with Major Trauma Services will occur and most patients will undergo timely and appropriate interhospital transfer from both metropolitan and regional trauma services to the Major Trauma Services.

### **Retrieval and Transfer**

The Taskforce has considered the role of Victoria's medical retrieval system. These deliberations are from the perspective of identifying possible mechanisms for delivery of major trauma patients to definitive care in the safest and most expeditious manner. The proposed model focuses on integrating current retrieval services, achieving more timely retrieval and transfer of time-critical patients, and providing high standards of care during transport that match the patient's clinical needs. Recognition has been given to the need to consider fixed wing and rotary wing fleet upgrades.

Specifically, the Taskforce recommends medical staffing and system activation models, data integration between current services, educational strategies regarding the role of retrieval services and an aircraft capacity for the State. The proposed model will undergo wider consultation and development with emergency service system users and stakeholders.

## **Quality Management**

The Taskforce considers that all phases of trauma management require process and outcome evaluation. A quality management structure will incorporate prehospital and hospital components. Opportunities for combined quality improvement processes across facets of the system will also be developed.

Establishment and expansion of specific trauma datasets are endorsed. Data collected will be incorporated in a quality improvement process involving development of quality indicators, processes for monitoring function, peer review, improvement activities and reevaluation. Audit and other quality improvement activities will be undertaken or overseen by the State Trauma Committee and Ministerial Emergency and Critical Care Committee.

## **Education and Training**

The Taskforce considers that efficient and effective trauma management will be dependent on the provision of education and training programs that meet the needs of staff from diverse disciplines. A number of courses in trauma management are already available and the Taskforce considers that these should be integrated wherever possible.

Rural practitioners have particular educational needs. For some rural or regional clinicians, these relate to infrequent exposure to major trauma patients, geographical isolation from high level services and clinical advice, and barriers in accessing continuing and advanced training courses.

The Taskforce recommends strategies to establish a framework for meeting the requirements of trauma care practitioners. The State Trauma Committee, the Major Trauma Service Statewide Coordination Unit and Directors of Trauma Services will be responsible for implementing this framework.

## **Research, Service and Technology Developments**

A number of potentially beneficial developments in diagnostics, treatment modalities and information technology applicable to trauma care have been identified by the Taskforce, though many technologies still require clear evidence for their effectiveness.

Clinical outcomes in major trauma patients will be rigorously evaluated through well-constructed clinical trials. The State Trauma Committee will set priorities for trauma research relevant to, and requiring participation of, all levels and facets of the trauma system.

## **Funding**

Purchasing approaches will incorporate incentives to promote quality outcomes and system efficiency, in line with the Taskforce recommendations. In particular, purchasing approaches will support the agreed triage and transfer protocols delivering the majority of major trauma patients to Major Trauma Services.

The Taskforce recommends developing purchasing options for policy in consultation with other key providers and stakeholders at implementation stage.

The Taskforce notes that the proposed Victorian State Trauma System has some significant resource requirements. These are justifiable when viewed in the context of the high human and financial costs currently associated with potentially preventable outcomes in major trauma patients.

## **Conclusion**

Trauma care and systems have had, and will continue to have, considerable fluidity and scope for debate. The Taskforce recommends system restructuring aimed at integrating trauma care and further improving patient outcomes.

This report sets out the framework for developing the Victorian State Trauma System. It discusses the system and the rationale behind recommended improvements, and identifies priority strategies for implementation.

# Recommendations

## 1.0 Trauma System Structure

The Taskforce recommends:

- 1.1** (p.36) The key characteristics of the Victorian State Trauma System will be:
  - Providers of trauma care integrated into a coordinated statewide trauma care system with comprehensive and inclusive representation from metropolitan and regional and rural providers.
  - Hospitals designated to levels within a tiered trauma system structure providing different complexities of care.
  - Trauma patients treated by a service that is appropriate to the level of care needed.
- 1.2** (p.42) The Major Trauma Services function as the hub of the Victorian State Trauma System, providing definitive care to the majority of major trauma patients, either transported directly to Major Trauma Services or referred from regional and metropolitan hospitals.
- 1.3** (p.43) Other trauma service levels refer major trauma patients to Major Trauma Services while providing resuscitation, stabilisation or definitive care in a limited number of cases, in consultation with the Major Trauma Services.
- 1.4** (p.44) Substantial trauma designation plans for regional hospitals be formulated with the rural trauma system structure and that these be completed on the advice of regional Consultative Committees on Emergency and Critical Care Services and regional hospitals.
- 1.5** (p.43-44) The metropolitan component of the Victorian State Trauma System comprise the Major Trauma Services, a number of Metropolitan Trauma Services, and Primary Injury Services.
- 1.6** (p.39-40) The Alfred and the Royal Melbourne Hospital be designated as the adult Major Trauma Services.
- 1.7** (p.50) The Royal Children's Hospital be designated as the paediatric Major Trauma Service.
- 1.8** (p.44-46) The regional component of the Victorian State Trauma System comprise the Major Trauma Services, the regional Consultative Committees on Emergency and Critical Care Services, Regional Trauma Services, Urgent Care Services, and Primary Injury Services.
- 1.9** (p.44) Primary Injury Services be hospitals not meeting the resuscitative capacity requirements of a Metropolitan Trauma Service in metropolitan areas and of an Urgent Care Service in regional areas. Primary Injury Services be designated not to receive major trauma in metropolitan and some rural areas.
- 1.10** (p.46) Cross-border clinical management strategies be defined by the regional Consultative Committees on Emergency and Critical Care Services in consultation with appropriate interstate bodies.
- 1.11** (p.54-61) Protocols be implemented to support effective functioning of Major Trauma Services, in particular appropriate triage and referral guidelines.
- 1.12** (p.42) Infrastructure be implemented to support minimisation of time to definitive care through:
  - Provision of prompt management by emergency physicians or intensivists and surgeons in Major Trauma Services and Metropolitan Trauma Services (see 'Role Delineation Guidelines', Appendices 4 and 5).
  - Timely availability of key consultant surgeons (see 'Role Delineation Guidelines', Appendices 4 and 5).

## 2.0 System Organisation and Management

The Taskforce recommends:

**2.1** (p.48) The following groups coordinate the Victorian State Trauma System:

- The Ministerial Emergency and Critical Care Committee
- A State Trauma Committee
- A Major Trauma Service Statewide Coordination Unit
- Regional Consultative Committees on Emergency and Critical Care Services.

**2.2** (p.48) A Ministerial Emergency and Critical Care Committee be formed to advise the Minister on the coordination, audit and monitoring, ongoing development and distribution of statewide emergency medical services including, but not limited to, the Victorian State Trauma System.

**2.3** (p.48) The State Trauma Committee be established as the advisory arm of the organisational system providing:

- Policy development
- Leadership in statewide system auditing and quality improvement
- Purchasing strategies
- Best practice advice in a range of areas.

**2.4** (p.A58) Priority activities of the State Trauma Committee will be:

- Confirmation of the rural trauma system structure in consultation with regional Consultative Committees on Emergency and Critical Care Services.
- Development of a model for referral call reception amongst the Major Trauma Services and subsequent referral distribution.
- Advice on a program for collection of extended data items from hospitals providing trauma care, in particular non-Major Trauma Service hospitals, on either an intermittent or case-specific basis.
- Establishment of an education subcommittee to initiate education strategies including, but not limited to, integration of currently available training courses and development of an appropriate model for training multidisciplinary prehospital teams in rural areas.
- Audit of triage of patients in a 'life-threatening situation' to enable future modification to triage guidelines as appropriate.
- Decision on the number and location of Directors of Trauma Services and their role delineation.
- Overseeing the function of Major Trauma Services as 'resource centres' providing advice to providers on training and other issues.

**2.5** (p.A56, P.A58) The State Trauma Committee and the Ministerial Emergency and Critical Care Committee incorporate rural representation and liaise with regional Consultative Committees on Emergency and Critical Care Services regarding rural trauma management issues.

**2.6** (p.49) The Major Trauma Service Statewide Coordination Unit be the implementation arm of the organisational structure.

**2.7** (p.49) Regional Consultative Committees on Emergency and Critical Care Services:

- Be integrated into the Victorian State Trauma System to play an important role in rural areas in regard to system promotion, coordination and implementation in a regional context.



- Revise roles and functions as indicated by the Taskforce and the State Trauma Committee.
- Be appropriately funded to meet their expanded role.

## 3.0 Triage

The Taskforce recommends:

- 3.1** (p.54) Major trauma be identified in the prehospital setting according to specified physiological, anatomical and mechanistic criteria.
- 3.2** (p.55) Triage to a Major Trauma Service where a major trauma patient is less than 30 minutes transport time from a Major Trauma Service.
- 3.3** (p.55) Triage to the highest designated trauma service accessible in 30 minutes where a major trauma patient is more than 30 minutes transport time from a Major Trauma Service.
- 3.4** (p.55) Triage to a designated trauma service accessible in the least amount of time in isolated rural areas that are more than 30 minutes from any trauma service.
- 3.5** (p.57) Where a patient is triaged initially to a non-Major Trauma Service for initial stabilisation, early liaison with the Major Trauma Service occur and consideration be given to appropriate medical retrieval or interhospital transfer to a Major Trauma Service.
- 3.6** (p.57) Where a major trauma patient appears to be in an ‘immediately life-threatening situation’ during transport, the patient be diverted to the nearest designated trauma service for stabilisation, with subsequent transport to a Major Trauma Service at the earliest appropriate time.
- 3.7** (p.57) The triage process for major trauma patients be formally audited with respect to all aspects of its functions and, specifically, with respect to the appropriateness of the prehospital time cut-off for delivery to a Major Trauma Service.
- 3.8** (p.59) Timely and proactive transfer of neurotrauma patients to Major Trauma Services to avoid interhospital transfer under conditions of neurological deterioration.
- 3.9** (p.59) Neurosurgical triage and transfer guidelines for major trauma still apply in rural areas, even where a neurosurgical specialist practises locally, as the management of these patients requires all the appropriate and agreed service supports of a Major Trauma Service.
- 3.10** (p.59) Major trauma (including isolated spinal cord trauma) be triaged to the MTS in the prehospital setting, within the defined safety and logistic constraints (Appendix 7.3).
- 3.11** (p.59) Major trauma (as defined in Appendix 7.4) including a spinal injury be transferred from the first assessing Emergency Department to the MTS. In the presence of neurological deficit, subsequent transfer to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre will occur at the earliest appropriate time, that is once the patient is medically stable.
- 3.12** (p.60) Isolated spinal cord trauma, with a neurological deficit, be transferred to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre at the earliest appropriate time, generally in less than 12 hours, without necessary management at an MTS.
- 3.13** (p.60) Spinal cord trauma with other injuries that do not meet the criteria which define Major Trauma (Appendix 7.4), be transferred to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre at the earliest appropriate time, generally in less than 12 hours.

- 3.14** (p.A29) Surgical stabilisation of the spine, in the presence of neurological deficit, may occur at either the Major Trauma Service or the Austin and Repatriation Medical Centre. This decision will always be made following consultation between the Major Trauma Service and Victorian Spinal Cord Service.
- 3.15** (p.60) All spinal trauma in children will be transferred to, and managed at, the Royal Children's Hospital for acute phase care.
- 3.16** (p.60) All trauma services receiving spinal trauma patients should consult the Victorian Spinal Cord Service early after patient reception to optimise patient outcomes.

## **4.0 Trauma Teams**

The Taskforce recommends:

- 4.1** (p.62) All hospitals designated to receive major trauma patients have a formal trauma team response to the initial reception and management of trauma patients.
- 4.2** (p.62) The composition of the trauma team be sourced from clinicians throughout the hospital (such as surgery, intensive care, anaesthetics and emergency department) in order to provide optimal expertise in filling each role in the team.

## **5.0 Role of Director of Trauma Services**

The Taskforce recommends:

- 5.1** (p.63) All Major, Metropolitan, Regional Trauma Services and Urgent Care Services have a designated person/s to fulfil the role of Director of Trauma Services.

## **6.0 Communications**

The Taskforce recommends:

- 6.1** (p.65) Communication technology and processes be improved to effectively streamline information transfer between care providers, therefore aiding compression of time from injury to definitive care.
- 6.2** (p.58) Wider application of mobile systems for prehospital to hospital communication in the immediate future.
- 6.3** (p.58) Mobile systems be explored in relation to compatibility and potential for interface with the current Ambulance Service Victoria system, logging reliability and handheld capability.
- 6.4** (p.65) Major Trauma Services establish a dedicated phone number for trauma referral and advice, operating with an appropriate default process to ensure immediate clinician contact.
- 6.5** (p.65) The Major Trauma Services trauma contact number provide response by a consultant level clinician (defaulting to the duty senior 'trauma' registrar with authority to admit).
- 6.6** (p.65) Earlier hospital notification by prehospital providers to receiving hospitals be enhanced through:
  - Educational/training strategies to highlight importance of and need for early hospital notification regarding patient condition.
  - Emphasis on the importance of early hospital notification in the sequencing process via the Communications Centre.
- 6.7** (p.65) Standardised, comprehensive transfer documentation capturing data for trauma providers be developed in consultation with the Victorian Ambulance Clinical Information System project and the State Trauma Committee.

## 7.0 Retrieval and Transfer

The Taskforce recommends the following in relation to retrieval of major trauma patients:

### Medical Staffing Model

**7.1.1** (p.71,73) The proposed medical staffing model for the statewide retrieval service be:

- A centrally-based pool of staff who are trained for and frequently undertake retrievals.
- Drawn from a number of hospitals on a roster basis, enabling most stakeholders to participate in the provision of the service.
- Available within a notification time of five minutes enabling an immediate response for rotary wing missions when clinically required.
- Consultant level medical practitioners or Senior Registrar level medical practitioners.
- Sourced from a range of craft groups (for example, emergency physicians, intensivists, anaesthetists, cardiologists) enabling the most appropriate practitioner for the mission.
- Located on a shift-to-shift basis with consideration of access to appropriate transport platform.

**7.1.2** (p.73) Provision be made for training of senior registrars in transport medicine through teaching and experience.

### Regional Retrieval Services

**7.2.1** (p.70-71) Funding be enhanced to rural retrieval services to effectively operate as part of a statewide retrieval system.

**7.2.2** (p.70-71) Regional retrieval services continue to coordinate missions that require treatment at a regional hospital level but, for missions requiring tertiary level care, there be timely liaison with the statewide retrieval system.

**7.2.3** (p.70-71) Simultaneous dispatch of regional and statewide retrieval services be an option on a case-by-case basis to minimise time to definitive care and enhance support available to regional ambulance services and local hospitals.

### Communication and Coordination

**7.3.1** (p.70) A single phone contact number activate retrieval processes.

**7.3.2** (p.70) The referring clinician be able to discuss patient management prior to transfer with a consultant level coordinator, for both regional and central retrieval missions.

**7.3.3** (p.70) The proposed retrieval activation sequence involving a single call to *either* a regional or central Retrieval Coordinator be trialled and audited, with an option to change to a statewide central single number if appropriate.

**7.3.4** (p.71) A statewide focus for the coordination and operation of medical retrieval in Victoria be provided by a Director of Retrieval Services who would assume overarching responsibility for the state wide adult retrieval service.

### Data

**7.4.1** (p.71) A standardised retrieval dataset be developed.

**7.4.2** (p.71) This dataset be linked to the statewide trauma dataset.

## **Education and Promotion of the Role of Retrieval Services**

- 7.5.1** (p.71) Education strategies be developed emphasising:
- The role and profile of retrieval services
  - The need for early activation after patient reception.
- 7.5.2** (p.71) Regional base hospitals take a leadership role with regard to the promotion and education issues of medical retrieval.

## **Transport Platform and Equipment**

- 7.6.1** (p.72) Access to additional rotary wing aircraft is required to ensure retrieval response capacity in time-critical cases.
- 7.6.2** (p.73) Payload capacity and range of any additional rotary wing aircraft be appropriate for the requirements of statewide medical retrieval.
- 7.6.3** (p.73) Review of the location and accessibility of helipads when planning new hospitals and for existing hospitals which will play a substantial role in the transfer of major trauma and other time-critical cases.
- 7.6.4** (p.73) Air Ambulance Victoria operate pressurised fixed wing aircraft, to decrease travel time, improve patient/staff comfort and enable safer transport of neurotrauma patients.

## **Process**

- 7.7.1** (p.73) Wider consultation and development of the proposed model with other system users and stakeholders.
- 7.7.2** (p.73) The Department of Human Services prepare a full proposal and costings on this retrieval service model for evaluation by the Ministerial Emergency and Critical Care Committee.

## **8.0 Quality Management**

The Taskforce recommends:

- 8.1** (p.76) Trauma quality management be developed and implemented at all levels throughout the Victorian State Trauma System.
- 8.2** (p.77) All hospitals treating trauma patients collect Epidemiological Minimum Dataset items, those receiving major trauma collect the additional data items of the Trauma Minimum Dataset and Major Trauma Services collect System Performance Minimum Dataset items. The collection of extra data be implemented as required for specific projects.
- 8.3** (p.77) Audit of process and outcomes of trauma care be established and data used in targeting education and quality improvement programs on a system-wide basis and injury prevention and health promotion campaigns.
- 8.4** (p.79) All hospitals treating trauma patients identify a person responsible for collecting and forwarding data items for review.
- 8.5** (p.77) The collection process be coordinated through the Major Trauma Service Statewide Coordination Unit and the statewide trauma registry maintained by the Major Trauma Service Statewide Coordination Unit.
- 8.6** (p.76) Collection of data items be automated and use existing data sources as much as possible.
- 8.7** (p.76) Exploration of ways to enhance the Victorian Emergency Minimum Dataset and Victorian Inpatient Minimum Dataset data items as the main source for Epidemiological Minimum Dataset trauma monitoring.

- 8.8** (p.77) A single trauma registry using common software, hardware and data definitions be developed to facilitate the collation of data and system performance monitoring across trauma services.
- 8.9** (p.77) Linkage of existing data sources be investigated, including Police Accident database and Ambulance Service Victoria data.
- 8.10** (p.79) Immunity from legal discovery be provided for quality improvement discussions and associated documents.
- 8.11** (p.80) Auditing of regional trauma management activities be undertaken by the regional Consultative Committees on Emergency and Critical Care Services.
- 8.12** (p.79) Preventable outcome studies utilising peer review by a state committee be undertaken for specifically identified tasks, including trauma deaths. System Performance Minimum Dataset data be utilised for this activity.

## **9.0 Education and Training**

The Taskforce recommends:

- 9.1** (p.82) Undergraduate, postgraduate and continuing education needs of all staff involved in trauma care be considered and fulfilled through the Victorian State Trauma System.
- 9.2** (p.83) Cooperative effort between universities, specialist colleges and hospitals in the implementation of education strategies.
- 9.3** (p.60) Major Trauma Services function as 'resource centres' making available consistent, common information about education and training options.
- 9.4** (p.87) Better integration of the large number of training courses currently available for the multiple disciplines engaged in trauma care.
- 9.5** (p.A51) The Director of Trauma Services in each hospital ensure the provision of appropriate strategies to meet the educational needs of hospital staff involved in the care of trauma patients.
- 9.6** (p.83) Team leaders and all senior medical staff managing major trauma be at least qualified in Early Management of Severe Trauma.
- 9.7** (p.85) The statewide introduction of a single, standard training course that is accessible for Victorian nurses involved in trauma care and integrated with other existing training courses.
- 9.8** (A47, 48) Inexperienced medical and nursing staff participating in trauma resuscitation have senior staff supervision.
- 9.9** (p.82) Principles of trauma management be a component of undergraduate medical and nursing education.
- 9.10** (p.88) The educational strategies of the Rural Doctors' Association of Victoria Lives @ Risk Committee and the Rural Workforce Agency Victoria be promoted.
- 9.11** (p.87) Difficulties in participation of general practitioners especially from rural areas, in attending training courses, such as Early Management of Severe Trauma and Advanced Paediatric Life Support be further considered.
- 9.12** (p.60) Regional Consultative Committees on Emergency and Critical Care Services develop and implement trauma education plans for their local area in consultation with the State Trauma Committee.
- 9.13** (p.87) The State Trauma Committee develop an appropriate model for training multidisciplinary prehospital teams in rural areas.
- 9.14** (p.86) Ambulance/MICA paramedics be adequately trained to participate in trauma team management in regional/rural emergency departments as appropriate.

- 9.15** (p.87) Innovative education processes, such as mobile simulators, telemedicine and multidisciplinary training, be developed to maintain the skills for personnel who have rare exposure to trauma and medical emergencies.
- 9.16** (p.88) The role of the Victorian State Trauma System, including public education, is important to the success of injury prevention strategies.
- 9.17** (p.88) Collaboration of the Victorian State Trauma System with other key stakeholders in injury prevention to:
- Support public education
  - Strengthen the measures that provide effective injury prevention
  - Increase the adoption and enforcement of safety legislation or policies
  - Contribute to injury research.

## **10.0 Research, Service and Technology Developments**

The Taskforce recommends:

- 10.1** (p.91) Statewide application of telemedicine in the neurosurgical management of major trauma patients.
- 10.2** (p.91) Integration of telemedicine links.
- 10.3** (p.91) Maturation of clinical information systems.
- 10.4** (p.91) The introduction of digital communication systems.
- 10.5** (p.91) Technological developments that speed diagnosis of critical injuries.
- 10.6** (p.92) Introduction of service and technology developments that have a proven efficacy and value for the health care system.

## **11.0 Funding**

The Taskforce recommends:

- 11.1** (p.94) A tiered strategy for investment prioritising the following key areas:
- System coordination mechanisms, including data collection, analysis and dissemination
  - Targeted trauma education and training
  - Enhanced primary transport and secondary retrieval services
  - Hospital staffing levels that meet role delineation specifications.
- 11.2** (p.93) Purchasing options that support the system improvement strategies recommended by the Taskforce, such as triage and transfer of major trauma patients to Major Trauma Services according to appropriate guidelines.
- 11.3** (p.96) Purchasing options to be further developed with key providers and stakeholders during the implementation stage.



# 1 Setting the Scene

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## Definition of Major Trauma

A definition of major trauma patients describes not only the population at whom the trauma system is targeted, but also provides a standard against which triage decisions can be retrospectively evaluated (Eastman et al 1987). The Taskforce considered that an appropriate definition of major trauma for defining the target population and for application in system evaluation and quality assurance involves the presence of at least one of the following:

- Death after injury.
- Admission to an Intensive Care Unit for more than 24 hours, requiring mechanical ventilation.
- Serious injury to two or more body systems (excluding integumentary).
- Injury Severity Score (ISS) > 15.
- Urgent surgery for intracranial, intrathoracic, or intraabdominal injury, or for fixation of pelvic or spinal fractures.

The Taskforce recognised that such a definition requires retrospective assessment after diagnosis is complete. Clearly, full diagnosis is not always possible during resuscitation and early management. The patient's diagnostic status necessarily evolves over time with each phase of care, as diagnosis in the prehospital setting is largely limited to physical assessment, and because many serious occult injuries are only revealed with time. Patients seemingly uninjured soon after the incident may later be diagnosed with significant injury as clinical features emerge or diagnostic interventions are undertaken.

Undertriage, or failing to identify major trauma cases and activate a system response, potentially results in suboptimal clinical outcomes. Criteria are therefore required which are clinically applicable prospectively during early phases of care, which recognise the evolutionary nature of the diagnostic status in major trauma patients, and which are predictive of major trauma as defined above. The Taskforce has identified such criteria for use at the following points in the continuum of management, in order to give optimal inclusion of major trauma patients into the Victorian State Trauma System:

- **Pre-hospital setting**

These criteria are for triage purposes by ambulance and MICA paramedics. They incorporate current and widely used physiological, anatomical and mechanistic indicators and are contained in the endorsed triage guidelines (Appendix 7.2 - Prehospital Major Trauma Criteria).

- **Emergency Department setting**

These criteria will, in the Victorian Trauma System, identify those patients admitted to non-MTS hospitals whose management, including possible need for transfer, requires discussion with a Major Trauma Service. These criteria contain the same mechanistic indicators as the Prehospital Major Trauma Criteria, an expanded range of physiological and anatomical indicators in line with evolving diagnosis, and include patients whose physiology is deteriorating (Appendix 7.4 - Major Trauma Interhospital Transfer Guidelines).

- **Post discharge**

These criteria are those contained in the definition of major trauma, as full diagnostic data is then available.

## The Scale of the Trauma Problem

Trauma is a leading cause of death and disability in Australia and is a major public health problem. Trauma results in more years of potential life lost to 65 years of age than any other cause. It represents a significant proportion of hospital, emergency care and rehabilitation costs. The Taskforce considers that the capacity to expertly manage time-critical major trauma, which requires rapid system response and collaboration of multiple disciplines, is a positive indicator of the wider emergency system's capacity to manage other groups of time-critical patients.

In Victoria, injury is the leading cause of death in people aged one to 44 years. During childhood, injury accounts for approximately 50 per cent of all deaths. In adolescents and young adults, it accounts for 75 per cent of total deaths (NISU, 1998).

Trauma deaths are only a small proportion of the total trauma cohort. Recognition of the number of deaths from trauma does not account for the full scale of the problem. In Victoria, for every death from injury there are 31 hospital admissions and 144 emergency department visits (Health and Community Services, 1994) .

The cost of treatment of trauma is significant. For the financial year 1991–92, the inpatient hospital costs in Victoria attributable to injury were \$145.9 million. This represents just over 10 per cent of total inpatient costs to the State (Health and Community Services, 1994).

This cost does not include the total costs to the individual and the community that result from trauma. It also does not include economic costs to the State, such as costs from legal expenses, rehabilitation, emergency services and associated insurance costs.

## Causes of Trauma

The most common single cause of trauma in Victoria is motor vehicle crashes (Figure 1.1). Road trauma is still the leading cause of death among people aged under 45 years. In the age group of 15 to 25 years, it accounts for about 40 per cent of all deaths (National Road Traffic Advisory Council (NRTAC) 1993).

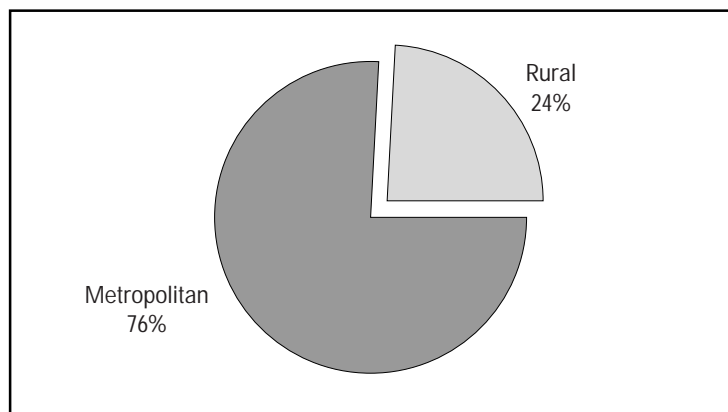
**Figure 1.1: Proportion of Injury-Related Deaths by Cause, Victoria 1996**

Type of Injury	% of Deaths	% of Deaths
Unintentional Injuries	63.8	
Transport		30.9
Poisoning		2.9
Falls		16.8
Fires/Burns/Scalds		2.2
Drowning		3.3
Other Unintentional		7.7
Intentional	36.2	
Suicide		33.4
Violence		2.8
TOTAL	100	100

*Source: Department of Human Services, Public Health and Development Branch, Victorian Burden of Disease Study*

The distribution of trauma patients in Victoria is related to population and geographic factors. While most trauma in Victoria occurs in metropolitan Melbourne (Appendix 3), there is a higher incidence in rural areas (Figure 1.2). In particular, there is a significantly increased rate of trauma from motor vehicle accidents. This relates to the increased loss of life years in rural towns and remote rural areas when compared to metropolitan Melbourne (Figure 1.3). This trend is more marked in males than in females and more marked for traffic accidents than other causes.

**Figure 1.2: Metropolitan/Rural Trauma Distribution, Victoria 1997–98 (n=1550)**

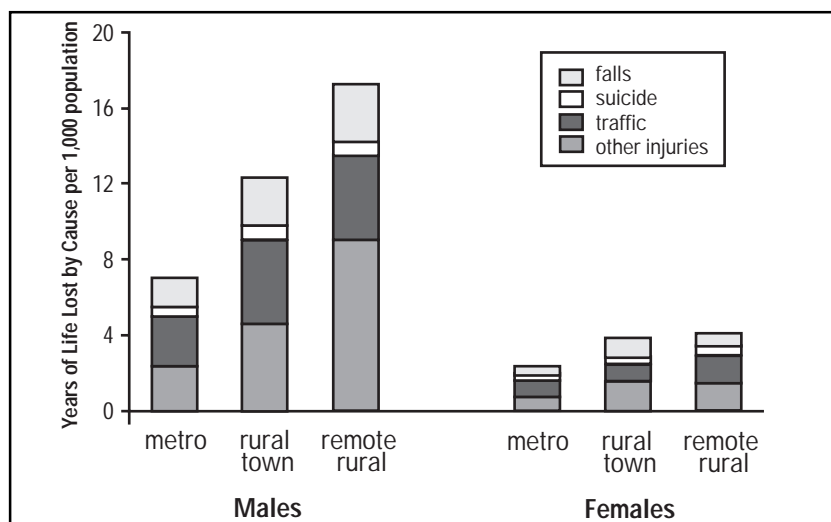


*Includes public separations identified from the VIMD with discharge ICD9 CM codes 800-959.9 and either an admission to ICU or death.*

*Excluding: 840-848, 905-925, 930-939, 958-959, and patients 65 years of age or older whose sole trauma code is an isolated hip fracture (820-820.9)*

This increased rural risk is related to a combination of factors including increased kilometres travelled, more travel at high speed and a greater exposure to roads of a lower standard for any one individual. Alcohol consumption, age of vehicles and seat-belt wearing have also been identified as contributing to higher rural and remote death rates related to motor vehicles (AIHW, 1996). Issues regarding the access to high level emergency medical care also become a factor in the management of this increased rural rate of trauma.

**Figure 1.3: Years of Life Lost by Injury Cause per 1,000 Population, Victoria 1996**



*Source: Department of Human Services, Public Health and Development Branch, Victorian Burden of Disease Study*

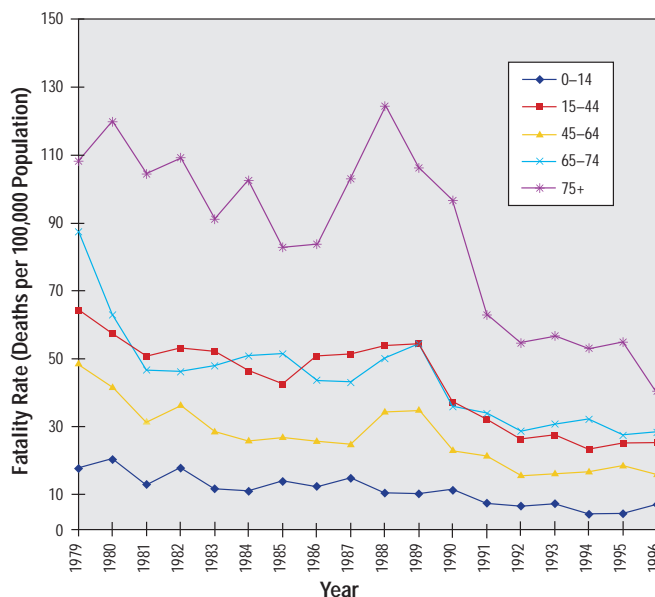
## Trauma Prevention

Trauma prevention programs are a crucial component in a community's strategy to minimise the magnitude of trauma.

Primary prevention strategies that attempt to modify the behavioural and environmental factors that lead to trauma have been important in reducing the magnitude of trauma in Victoria. As such, the medical profession has been at the forefront of developing primary preventative strategies for many aspects of trauma. The intersectional leadership shown by organisations such as the TAC, Victoria Police, VicRoads and the Royal Australasian College of Surgeons (RACS) has made Victoria a world leader in implementing injury prevention strategies, including the use of seat belts and drink driving restrictions, speed cameras, bicycle helmets and workplace safety reforms.

The success of primary prevention programs is evident in the declining rates of trauma death in Victoria over the past 20 years. In particular, deaths from road traffic accidents have declined in all age groups (Figure 1.4).

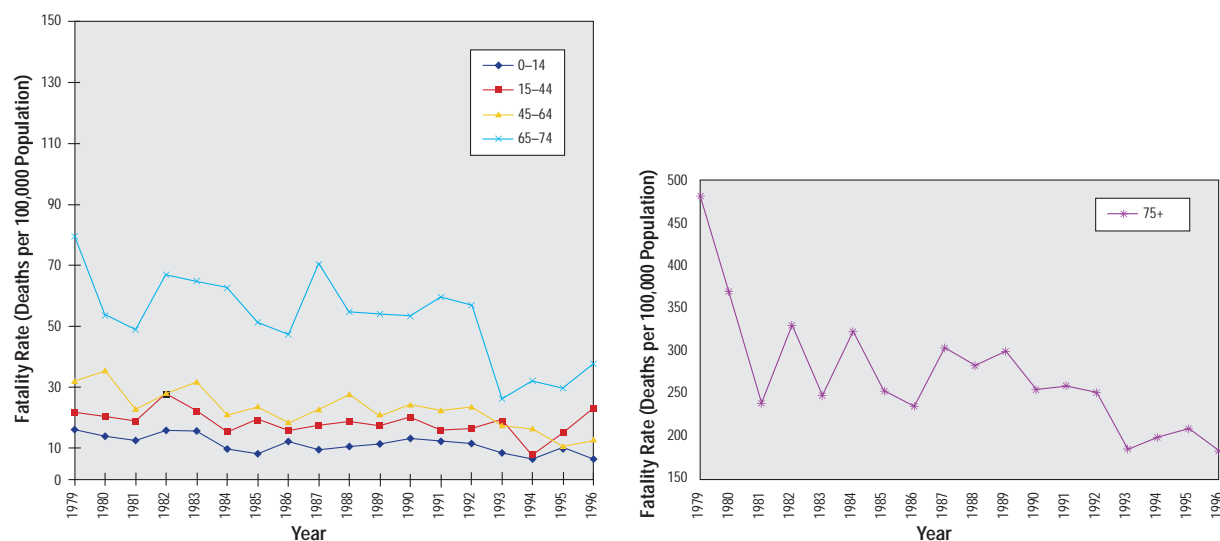
**Figure 1.4: Road Traffic Fatality Rate, Victoria 1979–1996**



Source: Department of Human Services, Public Health and Development Branch, Victorian Burden of Disease Study

Fatality rates for other types of injuries have also shown a similar pattern (Figure 1.5). It is important to note that while the overall number of traumatic deaths in the elderly is decreasing, there is a high rate in this age group as a proportion of the population. This high rate is due, in part, to a reduced physiological capacity of the elderly to recover from trauma.

**Figure 1.5: Other Injury Fatality Rate (Non-RoadTraffic), Victoria 1979–1996**



Source: Department of Human Services, Public Health and Development Branch, Victorian Burden of Disease Study

However, despite the success of preventative programs, it is inevitable that some people will continue to suffer injury. The development of a systems approach to trauma care embraces not only the prevention of injuries but also the timely, efficient and effective management within the health system.

## Trauma Management

The clinical care of trauma patients presents a challenge to treating clinicians and the organisers of health care systems. The complexity and range of injuries requires an organised approach to the process of care. This organised approach to trauma management requires preset plans and protocols to ensure rapid access to care by dedicated personnel at specialised facilities. The early delivery of severely injured patients to a hospital that can speedily provide the most appropriate care improves the chances of survival. Failure to develop an organised system of care places in jeopardy the achievement of optimal outcomes for those who are injured (NRTAC, 1993).

Preventable outcome analysis has been widely used to monitor the management process. Importantly, preventable outcome analyses have led to major changes in trauma systems and consequent reductions in potentially preventable deaths.

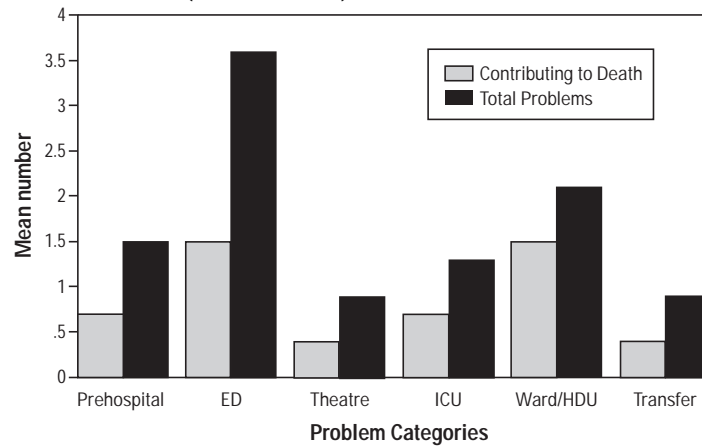
## Trauma Management in Victoria

Valuable research undertaken in Victoria on the system of trauma care has focused on an evaluation of both the processes of care and the organisation of system components.

The Consultative Committee on Road Traffic Fatalities (CCRTF) has provided in-depth clinical and pathological evaluation of the emergency and clinical management of road crash fatalities after the arrival of ambulance services. Established in 1992, the principal objectives of the CCRTF are the identification of organisational and clinical inadequacies, and assessment of the potential avoidability of individual deaths.

The CCRTF has identified a range of management and system problems (Figures 1.6 and 1.7) present in all system settings (McDermott et al., 1996, McDermott et al., 1998).

**Figure 1.6: Mean Number of Problem Categories per Patient per Area of Care and Their Contribution to Death (CCRTF 1996)**



**Fig 1.7: Common Management/System Errors (CCRTF 1997)**

Setting	Management/SystemErrors
<b>Prehospital</b>	<ul style="list-style-type: none"> <li>• No paramedic/delay in arrival of MICA</li> <li>• Prolonged time at scene</li> <li>• No 'scoop and run'</li> <li>• Inadequate documentation/observations</li> <li>• No/delayed intubation or definitive airway management</li> <li>• Inadequate ventilatory resuscitation</li> <li>• No/delayed/inadequate IV access and fluid resuscitation</li> <li>• Failed intubation/IV access</li> <li>• No/delayed chest decompression</li> </ul> <p>These problems largely related to decreased availability of ATLS officers, most commonly in rural areas</p>
<b>Emergency Department</b>	<ul style="list-style-type: none"> <li>• Inappropriate reception by junior staff</li> <li>• Delayed arrival of appropriate consultant</li> <li>• No consultant general surgeon</li> <li>• No/delayed neurosurgical consultation</li> <li>• Inadequate documentation/observations</li> <li>• No/delayed chest decompression</li> <li>• Delayed/inadequate ventilatory resuscitation</li> <li>• Inadequate fluid/blood resuscitation</li> <li>• External haemorrhage control problems</li> <li>• No/delayed CT investigation</li> <li>• Appropriate investigations delayed/unavailable</li> <li>• Infrequent ABG/O<sub>2</sub> monitoring</li> <li>• No CVP/inadequate perfusion monitoring</li> <li>• Inadequate management of hypothermia</li> <li>• Inappropriate drugs/dosage</li> <li>• Delay in despatch to theatre</li> <li>• Delay in interhospital transfer</li> </ul>
<b>Intensive Care Unit, Ward/High Dependency Unit</b>	<ul style="list-style-type: none"> <li>• Insufficient/delayed fluids</li> <li>• Insufficient/delayed blood transfusion</li> <li>• Insufficient/delayed coagulation factors</li> <li>• No JVP/CVP assessment</li> <li>• Inadequate/inappropriate respiratory support</li> <li>• Inadequate respiratory assessment</li> <li>• Inadequate/inappropriate chest injury assessment</li> <li>• Inadequate/inappropriate analgesia</li> <li>• Delayed/inadequate chest drain</li> <li>• Inadequate/delayed abdominal assessment</li> <li>• Delayed/no general surgical consultation</li> <li>• Delayed/no repeat CT brain</li> <li>• No ICP monitoring</li> <li>• Inadequate cerebral perfusion pressure</li> <li>• Delayed/no neurosurgical consultation</li> <li>• No DVT prophylaxis</li> <li>• Fractures not fixed</li> <li>• Delayed transfer to operating theatre</li> <li>• Delayed transfer to ICU</li> </ul>
<b>Transfer</b>	<ul style="list-style-type: none"> <li>• Delayed response of transport</li> <li>• No medical escort/inappropriate escort</li> <li>• Inappropriate form of transport</li> <li>• Inadequate warming</li> </ul>

Source: Adapted from Evaluation of the Emergency and Clinical Management of Road Traffic Fatalities in Victoria 1997. Report of the Consultative Committee on Road Traffic Fatalities in Victoria, 30 September 1998

The complexity of care and range of preventable problems identified in this study, infer that all phases of care, from prehospital to emergency department to ward setting, potentially contribute to suboptimal outcomes.

The Major Trauma Management Study also undertook to provide a preventive outcome analysis of trauma patients. This study identified a range of problems in the management of trauma in Victoria (Danne et al., 1998). This study evaluated the care of survivors as well as deaths from trauma, and studied trauma of all aetiologies, not just road trauma.

Both the CCRTF study and the Major Trauma Management Study identified potentially preventable outcomes in 30–40 per cent of deaths following injury. The Major Trauma Management Study identified potentially preventable outcomes in 40 per cent of survivors suffering significant complications or disability following trauma. The most recent Report of the CCRTF (1998) demonstrated no improvement in trauma system and management problems and identified continuing potentially preventable outcomes in 36 per cent of evaluated road traffic fatalities.

Where similar studies have been conducted overseas, and system changes implemented, the potentially preventable outcome rate has been reduced from similar rates to figures as low as 3 per cent (Cales et al., 1984; Shackford et al., 1986, Davis et al., 1992).

The Major Trauma Management Study identified children, the elderly, the head injured and patients being transferred between facilities as likely to benefit from improvement in the system of care. The ongoing development of an integrated system of trauma care was recommended.

Despite the recognition of these preventable problems in the current management of trauma patients in Victoria, the outcomes from trauma care are generally comparable to international norms. In comparison to similar cohorts in the US and UK, the present system for trauma management is good (Cameron, 1995). This is not to imply that the system cannot be improved, but that changes must focus on strategies to enhance the system as a whole.

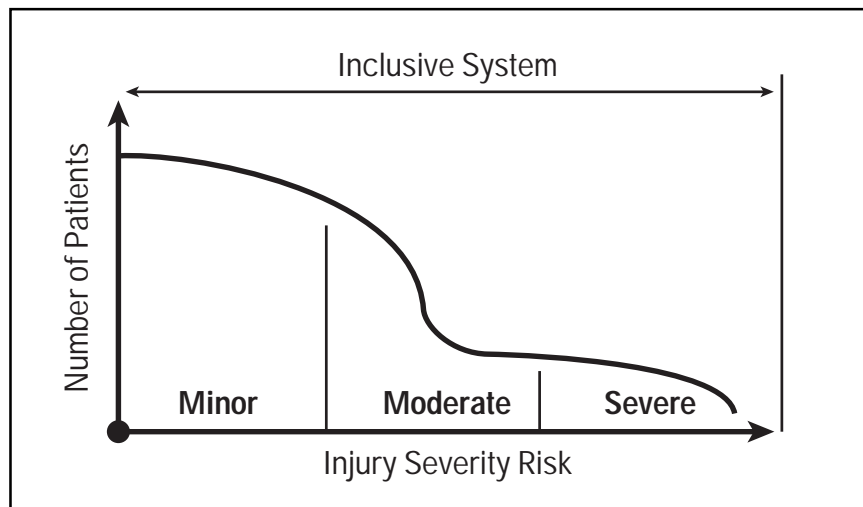
## **Trauma System Development**

Internationally, the development of modern trauma care systems has its origins in the techniques used for caring for injured soldiers on the battlefields of Korea and Vietnam. Rapid access to definitive surgical care and refinement of prehospital care techniques significantly reduced US military casualties in both wars. This experience led to the development of similar systems across the US for the treatment of persons injured in motor vehicle collisions, falls and other incidents (Hackey, 1995).

## **Inclusive System of Care**

A trauma system consists of hospitals, ambulance personnel and other service agencies that have a pre-planned response to caring for the injured patient. The development of an inclusive system of trauma care is a recognition that all trauma patients require optimal care (Figure 1.8). An inclusive system integrates all care providers and serves to meet the needs of all injured patients regardless of severity of injury.

**Figure 1.8: Scope of a Trauma Care System**



The goal of a trauma system is to match a facility's resources with a patient's medical needs so that optimal and cost-effective care is achieved.

Formal trauma systems have three components: a lead public agency with legal authority to establish and enforce trauma system policy; designation of trauma hospitals to provide 24-hour medical services; and prehospital field protocols for identifying critically injured patients who require direct transfer to a designated trauma hospital. Levels of trauma hospitals can be designated within a trauma system.

### System Development in the United States

In the US, there are generally two levels of trauma services in urban areas. Level I trauma centres provide comprehensive trauma services and frequently provide training, research, prevention, coordination of field providers, and leadership in implementing and evaluating the system. Level II trauma centres typically provide a full range of trauma care, but do not usually have teaching, research and leadership functions.

Formal trauma systems typically designate only a small number of hospitals as trauma centres. Hospitals without trauma centres still treat large numbers of trauma patients, since most injuries are minor in nature and require only the routine care provided in most emergency departments. Only a small proportion of trauma patients have injuries severe enough to require specialised resuscitation, diagnostic and treatment services of a trauma centre (Goldfarb, 1996).

The establishment of trauma systems in the US has progressed significantly since the initial system development and research undertaken in California in the 1970s and 1980s (West & Trunkey, 1979; West et al., 1983).

The implementation of a trauma system in Orange County, California, had a significant impact on the quality of trauma care. The proportion of deaths judged to be potentially preventable dropped significantly and was associated with significant increases in patient age and severity of injury for those patients dying of vehicular trauma (Cales, 1984).

The development of a trauma system in Oregon had a significant impact on the survival from trauma in that state. Implementation of the system resulted in an increase in the amount of severely injured patients hospitalised in Level I trauma centres and an increase in the likelihood that they will survive their injuries. The



adjusted mortality rate at designated trauma centres was reduced by one-third as compared to the pre-trauma system rate (Mullins et al., 1994).

Other trauma system evaluations from San Diego present similar positive results (Shackford, 1986; Davis et al., 1992).

## **System Development in Australia**

### **National Road Trauma Advisory Council**

Trauma system development in Australia has included guidelines for the development of trauma systems by the National Road Trauma Advisory Council (NRTAC) Working Party on Trauma Systems. The Report of the NRTAC Working Party describes standards defining the organisational arrangements and resources required for optimal care of the injured patient from time of injury through all phases of care, in urban and rural Australia. In addition, the NRTAC Working Party developed guidelines for assessing hospital facilities, and assessment of outcome of trauma systems. Considerable work in several states preceeded this report.

### **New South Wales**

NSW Health released a state trauma plan in 1991. This plan was established to address an identified potentially preventable death rate among trauma patients (Deane, 1988). This plan established Area Trauma Services in each of the NSW Health regions. Regional Trauma Services were established in each of the rural regions.

A system for prehospital triage and local hospital bypass was introduced in metropolitan Sydney in 1992, and a system of early notification was introduced in rural NSW in 1993 to speed and streamline delivery of major trauma patients to definitive care locations from isolated regions.

Currently there are eight adult and three paediatric MTSs in Sydney, however, not all of these trauma services provide a full range of surgical services.

### **South Australia**

In South Australia, a review of trauma services was commissioned by the South Australia Health Commission. This reported in 1988 and concluded that the development of a trauma system for Adelaide should be based on the principle that there should be a coordinated and integrated clinical service across hospitals. This report led to the designation of two MTS in Adelaide.

### **Trauma Services Not Trauma Centres**

Critical to the development of a trauma system is the process of designation of trauma hospitals. The designation of trauma services is simply a way of coordinating the care of trauma patients within a geographical region, with all levels of hospitals playing a role.

As demonstrated by the CCRTF and the Major Trauma Management Study, trauma care within hospitals requires the dedicated skills of staff across departments and ongoing expertise beyond the emergency reception phase. The concept of the 'trauma centre' as being the location for all trauma care fails to recognise the importance of other phases of management, specifically the prehospital and rehabilitation phases. Additionally, hospitals providing trauma services are not independent units; they have a role within the system that extends beyond clinical management. Education, research, quality management and injury prevention are important roles that must be filled by a trauma system and trauma care providers.

The concept of Major Trauma Services has been promulgated in Australia by the NRTAC Report of the Working Party on Trauma Systems (1993). MTS form the hub of regional networks and carry a major responsibility in regard to the coordination of other trauma services. These services provide total care for every aspect of injury, from prevention through to rehabilitation. They provide 24-hour availability of resources for resuscitation, initial assessment and definitive care of injuries within the expertise of all major surgical disciplines. They are a core function in an integrated trauma system.

## **Conclusion**

There have been significant advances in the prevention of mortality and morbidity from trauma in Victoria. Ongoing reductions in trauma mortality across all age groups combined with a sophisticated prehospital and hospital system, establish Victoria at the forefront of trauma care.

Despite the overall high standards, local studies of trauma care indicate several areas for ongoing improvement in the process of trauma care. The literature and local experience strongly support the development of an integrated trauma system for Victoria. Integral to this is the establishment of an appropriate organisational structure to lead system development, designation of an appropriate number of trauma services, and establishing clear protocols for the prehospital triage and transfer of trauma patients.



# 2 The System

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- Metropolitan and Regional Coordination

# The System

## Recommendations

The Taskforce recommends:

**1.1 (p.36)** The key characteristics of the Victorian State Trauma System will be:

- Providers of trauma care integrated into a coordinated statewide trauma care system with comprehensive and inclusive representation from metropolitan and regional and rural providers.
- Hospitals designated to levels within a tiered trauma system structure providing different complexities of care.
- Trauma patients treated by a service that is appropriate to the level of care needed.

**1.2 (p.42)** The Major Trauma Services function as the hub of the Victorian State Trauma System, providing definitive care to the majority of major trauma patients, either transported directly to Major Trauma Services or referred from regional and metropolitan hospitals.

**1.3 (p.43)** Other trauma service levels refer major trauma patients to Major Trauma Services while providing resuscitation, stabilisation or definitive care in a limited number of cases, in consultation with the Major Trauma Services.

**1.4 (p.44)** Substantial trauma designation plans for regional hospitals be formulated with the rural trauma system structure and that these be completed on the advice of regional Consultative Committees on Emergency and Critical Care Services and regional hospitals.

**1.5 (p.43-44)** The metropolitan component of the Victorian State Trauma System comprise the Major Trauma Services, a number of Metropolitan Trauma Services, and Primary Injury Services.

**1.6 (p.39-40)** The Alfred and the Royal Melbourne Hospital be designated as the adult Major Trauma Services.

**1.7 (p.40)** The Royal Children's Hospital be designated as the paediatric Major Trauma Service.

**1.8 (p.44-46)** The regional component of the Victorian State Trauma System comprise the Major Trauma Services, the regional Consultative Committees on Emergency and Critical Care Services, Regional Trauma Services, Urgent Care Services, and Primary Injury Services.

**1.9 (p.44)** Primary Injury Services be hospitals not meeting the resuscitative capacity requirements of a Metropolitan Trauma Service in metropolitan areas and of an Urgent Care Service in regional areas. Primary Injury Services be designated not to receive major trauma in metropolitan and some rural areas.

**1.10 (p.46)** Cross-border clinical management strategies be defined by the regional Consultative Committees on Emergency and Critical Care Services in consultation with appropriate interstate bodies.

**1.11 (p.54-61)** Protocols be implemented to support effective functioning of Major Trauma Services, in particular appropriate triage and referral guidelines.

**1.12 (p.42)** Infrastructure be implemented to support minimisation of time to definitive care through:

- Provision of prompt management by emergency physicians or intensivists and surgeons in Major Trauma Services and Metropolitan Trauma Services (see 'Role Delineation Guidelines', Appendices 4 and 5).
- Timely availability of key consultant surgeons (see 'Role Delineation Guidelines', Appendices 4 and 5).

# Structure

## Introduction

Current practice in Victoria is for major trauma to be triaged to the closest public hospital emergency department and, therefore, most Victorian public hospitals receive some major trauma patients for definitive management (VIMD, 1998) (Figures 2.1 and 2.2).

Trauma systems internationally have adopted different models for system structure. NRTAC (1993) developed a generic five-level model for Australian trauma systems which the Taskforce used as the basis for creating the most appropriate model for Victoria, in view of population and trauma demographics.

This section describes the trauma system model recommended by the Taskforce, its operating principles and the rationale for adopting this model.

## Target Population

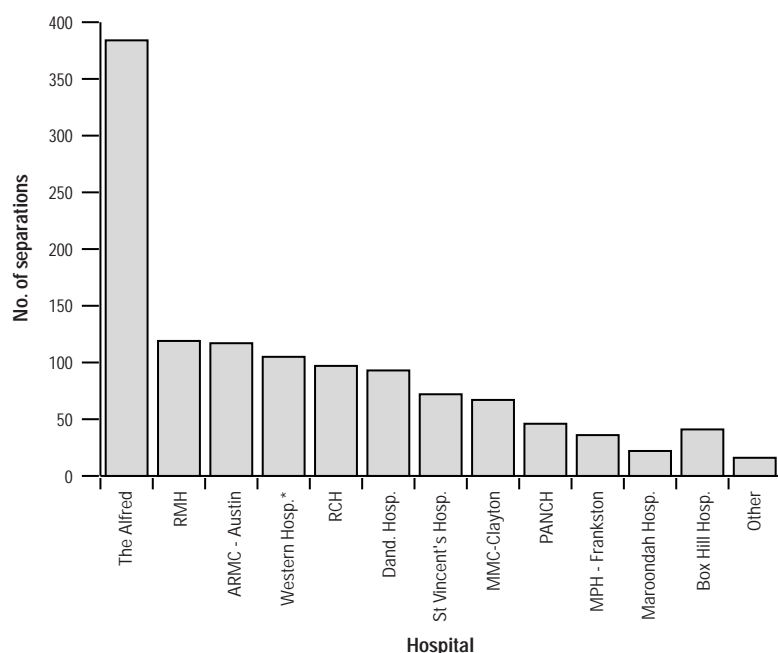
Major trauma constitutes the most severely injured subgroup of trauma patients. The definition of major trauma is discussed in detail in Setting the Scene, Chapter 1.

Major trauma patients comprise a small proportion of emergency cases. Trauma constitutes up to 50 per cent of emergency admissions but only 0.5 per cent of these are major trauma. It is estimated that there are currently between 1,000–1,200 major trauma cases each year in Victoria and, although the incidence is relatively low, major trauma is associated with high mortality and morbidity.

Major trauma patients are time-critical in that their morbidity and mortality increases with the time delay to reaching definitive treatment for injuries and their sequelae. These patients also have a high incidence of potentially preventable problems (McDermott et al. 1996, Danne et al. 1998). Both these studies found that in 30-40 percent of trauma deaths, there were potentially preventable outcomes.

All trauma patients require efficient, effective treatment; however, the primary purpose of any trauma system is to facilitate coordinated efforts in providing optimal care for severely injured patients. The proposed system is, therefore, targeted at this population that will benefit most from improvements in the organisation of treatment for both clinical and cost-effectiveness reasons (see Figure 2.3).

**Figure 2.1: Metropolitan Melbourne Trauma Separations (ICU Admissions and Deaths), 1997–1998 (n=1,218)**

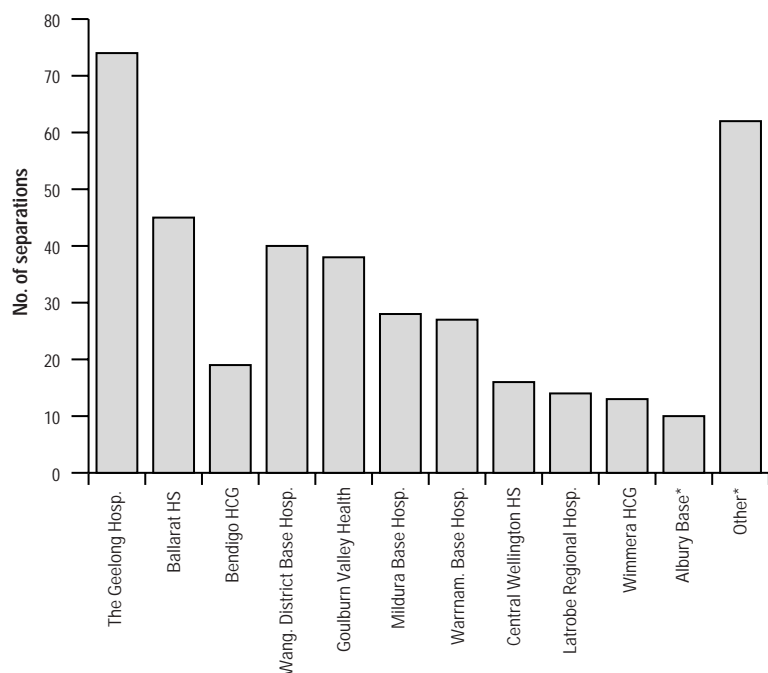


*Includes public separations identified from the VIMD with discharge ICD9 CM codes 800-959.9 and either an admission to ICU or death.*

*Excluding: 840-848, 905-925, 930-939, 958-959, and patients 65 years of age or older whose sole trauma code is an isolated hip fracture (820-820.9)*

*\* NB. Western Hospital includes data from Footscray and Sunshine campus'.*

**Figure 2.2: Rural Trauma Separations (ICU Admissions and Deaths) Victoria 1997–1998 (n=386)**



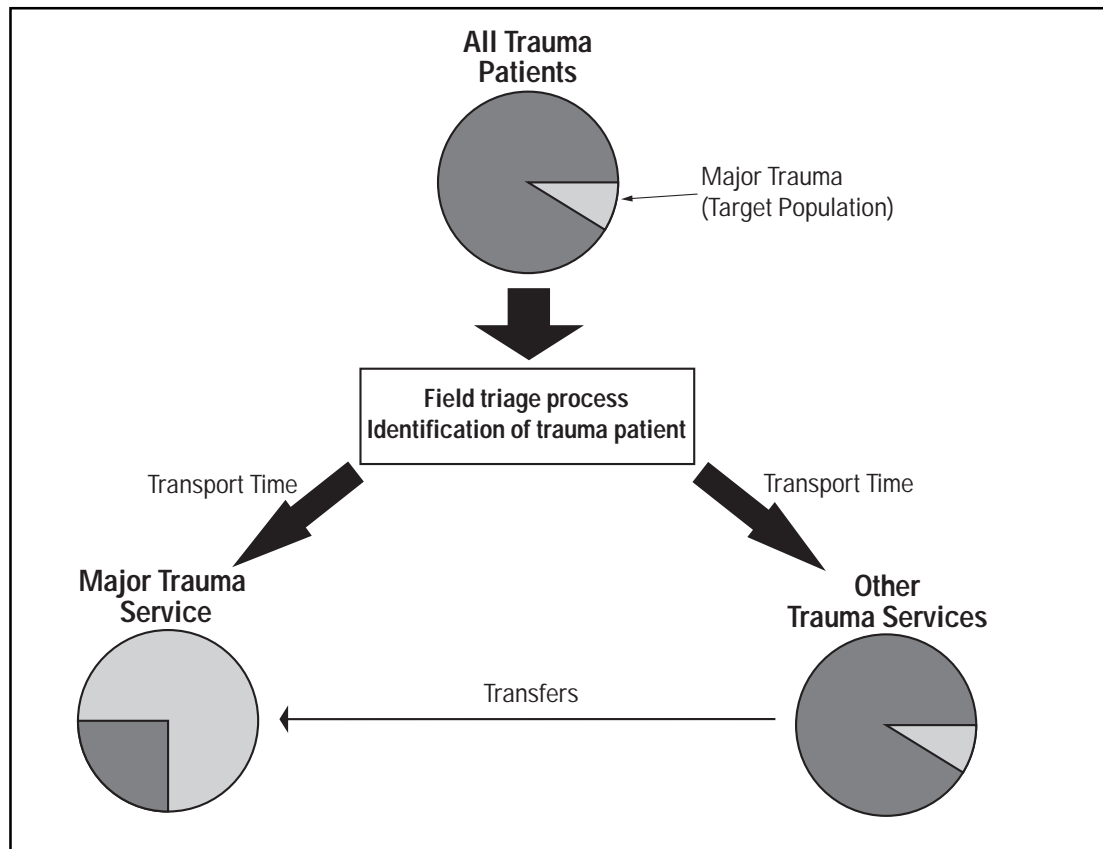
*Includes public separations identified from the VIMD with discharge ICD9 CM codes 800-959.9 and either an admission to ICU or death.*

*Excluding: 840-848, 905-925, 930-939, 958-959, and patients 65 years of age or older whose sole trauma code is an isolated hip fracture (820-820.9)*

*\* NB. 30 hospitals are included in the 'other' category. None of these has more than 10 separations.*

*Separations at Albury Base Hospital include those with Victorian postcodes only.*

**Figure 2.3 Target Population**



## Victorian State Trauma System Structure

The Victorian State Trauma System (VSTS) endorsed by the Taskforce involves designating a limited number of hospitals to receive major trauma. These trauma services will fit within a tiered structure. Different complexities of trauma care will be provided at each level of the system (Figure 2.4 Integrated Trauma System).

The Taskforce recommends that there be MTS at The Alfred, Royal Melbourne Hospital (RMH) and Royal Children's Hospital (RCH) which will form the central hub of the integrated system. Available evidence, including international outcome studies, published guidelines and demand projections, while not unequivocal, assisted the Taskforce in the decision that a second adult MTS was both sustainable and would address the current significant system-wide deficiencies in relation to higher level system functions. The VSTS is lead by the MTS.

The metropolitan component of the system comprises (Figure 2.5):

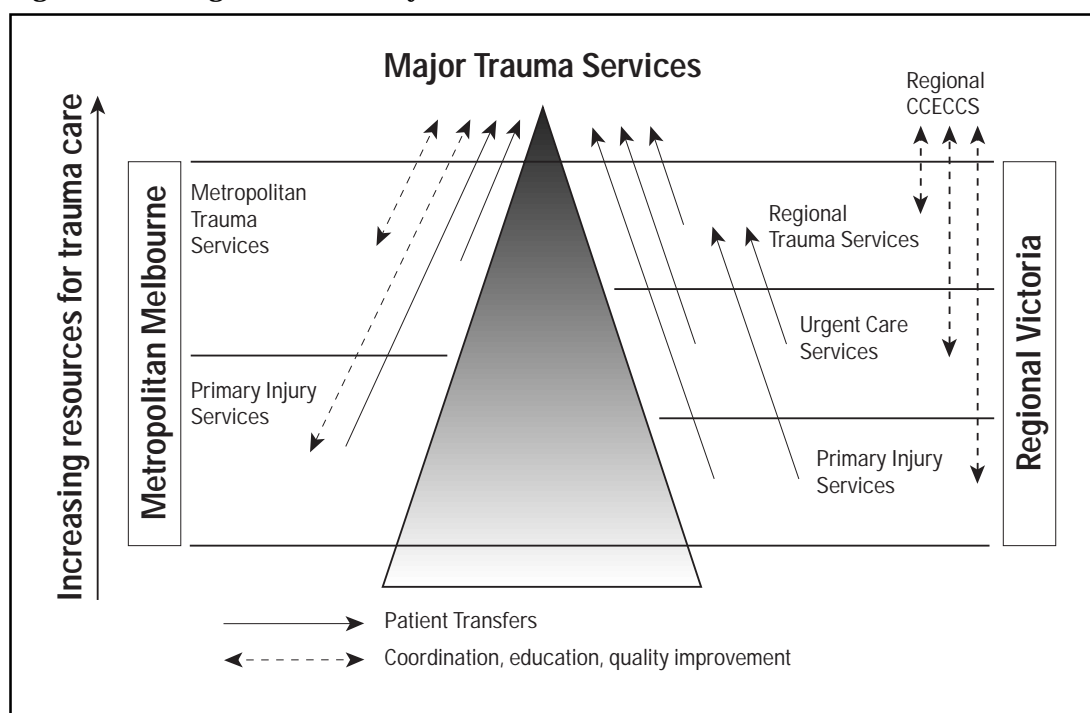
- The MTS—two adult and one paediatric.
- A second level of trauma receiving hospitals called Metropolitan Trauma Services (MeTS). They will receive major trauma unable, for safety or logistic reasons, to be triaged directly to the MTS. They will undertake early transfer of such cases to the MTS and provide definitive treatment to a very limited number of major trauma cases under defined conditions (p.70).
- A number of hospitals designated not to receive major trauma called Primary Injury Services (PIS). Their role is to primarily provide treatment for minor injuries and ailments.



The regional component of the trauma system is also led by the MTSS, however, coordination of trauma system activities at a regional level will be undertaken by the regional CCECCS. The regional component of the system then comprises (Figure 2.6):

- **Regional Trauma Services (RTS)**–Regional Trauma Services would be located in major regional centres and would provide a regional focus in trauma management receiving appropriate trauma referral from the surrounding catchment areas (See p.58)
- **Urgent Care Services (UCS)**–Urgent Care Services would operate in small rural communities where higher levels of trauma care are not accessible and they would provide initial resuscitation and limited stabilisation prior to early transfer.
- **Primary Injury Services (PIS)**–In regional areas, these include hospitals providing limited stabilisation only, as well as a number of hospitals designated for bypass of all major trauma cases.

**Figure 2.4 Integrated Trauma System**



The Taskforce considered that the use of descriptors to separate other hospitals treating specialised subgroups of major trauma, such as burns or paediatrics, would unnecessarily complicate the system model.

## Key Characteristics and Operating Principles

The Taskforce considered features of international trauma systems associated with improved mortality in severely injured patients (West et al., 1985; Shackford et al., 1987; Smith et al., 1990; Champion et al., 1992; Mullins et al., 1994; Davis et al., 1992). Interpretation of the available studies highlighted the difficulties entailed in evaluating systems, particularly emergency systems, involving multiple interventions and care providers. In addition, extrapolating results across heterogeneous systems is problematic.

The Taskforce was assisted in its deliberations by guidelines and recommendations developed by key bodies associated with trauma care and its providers. In the US, the ACS (1993) and American College of Emergency Physicians (ACEP, 1993) released guidelines for trauma systems. In Australia, NRTAC (1993) and Australasian College for Emergency Medicine developed guidelines for Australian trauma systems and, in Victoria, the CCRTF (1997) and the Consultative Council on Emergency and Critical Care Services (CCECCS) produced specific recommendations for local conditions. The Taskforce endorses the following key characteristics and operating principles based on these guidelines and recommendations and the latest available evidence.

Although the level of available empirical evidence for specific system design features is not strong enough to be unequivocal, the Taskforce considered that there were sufficient common characteristics and operating principles underpinning the optimal management of patients within trauma systems to develop an enhanced system for Victoria.

### **Key Characteristics of the Victorian State Trauma System**

- Providers of trauma care be integrated into a coordinated statewide trauma care system with comprehensive and inclusive representation from metropolitan and rural providers.
- Hospitals be designated to levels within a tiered trauma system structure providing different complexities of care.
- Trauma patients be treated by a service that is appropriate to the level of care needed.

### **Operating Principles of the Victorian State Trauma System**

Optimal clinical outcomes for major trauma patients are associated with:

- Minimisation of time to definitive treatment.
- Triage to a specialist trauma hospital that is best able to provide definitive care, rather than to the nearest hospital, within logistic and safety parameters.
- Concentration of expertise.

# Major Trauma Services in Victoria, Consideration of Number and Location

The Major Trauma Services (MTS) play a critical role in the trauma system, and decisions on the number and location of MTS was seen by the Taskforce to be a central consideration in design of the Victorian State Trauma System. Victoria currently has one functioning major trauma referral hospital, The Alfred. The Taskforce considered that caution was appropriate in considering argument for expanding the number of adult MTS. In particular, a balance was required between concentrating expertise and patient volumes in a minimum of sites, and a broader range of access and implementation issues which are considered below.

## Caseloads and Outcomes

The issues of critical caseload is difficult. A review of the relationship between volume and quality of health care showed that while most of the research reports a positive relationship between volume and outcome of care, the trauma evidence is more uncertain, with the validity of some of the research findings suspect because of problems in adjusting for patient-mix and other confounding factors.

The trauma literature, in general, supports the notion of an inverse relationship between patient outcomes and patient volume, that is, that outcomes (typically measured by mortality) improve as clinician experience and caseload increases.

An analysis of prospectively collected data on 8,872 patients from 1992-1996 from 24 trauma centres in Pennsylvania compared high volume and low volume level I and level II centres. Trauma centres with more than 1,000 cases/year had significantly lower mortality rates for head, neck, brain and lung injuries. (Pasquale et al., 1999).

The American College of Surgeons (ACS) initially recommended that, to maintain proficiency, trauma centres see 600-1,000 'seriously injured' patients per year, (ACS, 1986) and that trauma surgeons operate on 50 'severe and urgent' injury patients per year (ACS, 1990). ACS recommendations have been largely based on results of studies which demonstrated an inverse relationship between high procedure volumes in hospitals and decreased in-house mortality rates for a number of major surgical procedures. (Hannan et al., 1989; Phillips & Luft, 1997). Specific trauma data to support this estimate was lacking and the patient definitions unclear.

More recently, US trauma experts have proposed an annual institutional volume of 400 major trauma cases for trauma centres. There is, however, evidence to suggest that the institutional caseload threshold required to maintain skills is substantially lower than previously recommended. In the Chicago trauma system, trauma centres with the lowest mortality rates were seeing, at minimum 110 patients with serious or life-threatening injuries per year, while those with the highest mortality rates were seeing, at most, 75 such cases (Smith et al., 1990). A Canadian study concluded that small institutional volumes did not preclude high quality trauma care (Waddell et al 1990).

In the Australian context, the evaluations undertaken by the CCRTF have demonstrated fewer preventable and potentially preventable problems contributing to death of trauma patients in hospitals with larger numbers than in hospitals with smaller numbers of patients (Cooper, 1998).

The bulk of the evidence for improved outcomes from the establishment of trauma care systems, comes from the evaluation of the system as a whole. All established

trauma systems have a limited number of large volume trauma centres, and so the Taskforce agreed that in the balance of evidence there was support for a limited number of high volume centres in Victoria.

After much deliberation on the available evidence, the Taskforce concluded that there was sufficient evidence for a significant volume-outcome effect in major trauma. There was inconclusive evidence, however for an unequivocal specific minimum caseload volume per institution. The Taskforce therefore, on the basis of the available evidence in the context of the Victorian health system, concluded that a minimum volume of 200 major trauma cases per MTS per year was seen as both supportable and achievable as an appropriate benchmark for optimising clinical outcomes and maintaining clinician skills.

The Taskforce also noted that:

- There was not expected to be an increase in major trauma in the medium and long term.
- The staff and capital infrastructure required to appropriately manage trauma is also required to manage other critical illness. Such capacity is only available, without a substantial injection of capital and recurrent resources, at existing tertiary hospitals.
- The requirement for a MTS to undertake high level system wide functions including education, research and quality improvement, as well as to provide “leadership” requires a high level of institutional commitment at both executive, clinical and services levels (NRTAC, 1993).
- Anecdotal evidence of ‘successful’ trauma system implementations involves a high degree of commitment and cooperation between the government, major hospitals, emergency and retrieval services and academic institutions. Cooperation is necessary to ensure rapid and appropriate triage, by-pass and transfer of patients. In particular, the Taskforce considered that enhancements to trauma information systems, critical care retrieval system and telemedicine were more likely to be successful if jointly promoted and implemented.
- The Taskforce also recognised that a degree of competitiveness between institutions could be healthy, particularly if directed towards the development of quality services and would be considered as a strong impetus that could lead to accelerated implementation of a more effective system.

## MTS Locations

The following major Victorian tertiary hospitals; The Alfred, Austin and Repatriation Medical Centre, Monash Medical Centre, The Royal Melbourne Hospital and the proposed Knox Medical Centre, were considered by the Taskforce as to their suitability as adult MTS sites. The Taskforce was assisted by an in-depth assessment of these services by ACIL based on the criteria for MTS discussed in the section, Role Delineation and Hospital Designation. A report was commissioned as part of this assessment of options for delivering major trauma services in Victoria.

The Alfred, as the current major trauma referral hospital for Victoria, fulfilled all the requirements for a MTS. The Taskforce therefore recommended that it should be designated as one of the two adult MTS for Victoria.

Although the hospitals under consideration, with the exception of Knox Medical Centre (whose service profile was still in development), met the service and service support criteria required of a MTS to greater or lesser degrees, the RMH was found to be most appropriate to take up a MTS role.

There were several reasons for the selection of the RMH as the second adult MTS location:

- The RMH has demonstrated a level of organisational commitment at both an executive and clinician level that is considered essential for the successful development of a MTS (ACS, 1993; NRTAC, 1993).
- The RMH already has a service and staffing profile that approximates the services required by a Major Trauma Service. The recently renovated Emergency Department provides high quality facilities for the reception of trauma patients.
- The neurosurgery service at the RMH is closely affiliated with the service at the Royal Children's Hospital (now designated as the Paediatric Major Trauma Service).
- The RMH has a large non metropolitan referral base with 12% of the RMH inpatient population from non-metropolitan areas.
- The designation of the RMH as a Major Trauma Service is consistent with the strategic direction of North Western Health in promoting the undertaking of specialised services at the hospital.
- The extensive research and educational infrastructure of the hospital, associated with it's links with the University of Melbourne, will facilitate the undertaking of the higher level of system functions required of a Major Trauma Service.
- Collaboration between the RMH/University of Melbourne and The Alfred/Monash University will create a degree of system robustness that is necessary for the success of the trauma system.

Although helicopter access to RMH at the time of review was sub-optimal, helicopter access to the site could be developed. Road access is good and RMH is the proximate major hospital to Melbourne's airports. Geographical proximity to The Alfred was not considered as a major constraint in developing RMH as the second MTS site, especially when considered in light of these factors favouring RMH as the most suitable location of the hospitals considered. The Taskforce therefore recommended that the RMH be designated as the second adult MTS for Victoria.

As the Royal Children's Hospital already functions as Victoria's major paediatric tertiary referral hospital, the Taskforce recommended that, with some enhancements, it should be confirmed as Victoria's paediatric MTS, and designated as such.

# Role Delineation and Hospital Designation

## Role Delineation

The development of a systems approach to trauma care entails a delineation of the varying functional roles that hospitals within each region will play, whether in metropolitan or rural areas. Delineation is required because it is neither appropriate nor feasible for every hospital receiving major trauma to be resourced to the level of a MTS. Hospitals providing appropriate trauma care to the appropriate trauma patients will not do so in isolation, but rather work together through clearly recognised linkages.

Broadly, the success of functional and communication links between the services will be manifested by the speed with which a patient arrives at the level of service most appropriate to the injuries present, and the physiological status of the patient when definitive care of injury commences (NRTAC, 1993).

The Taskforce gave particular attention to clarifying definitions regarding 'access' to specialties, in terms of staff availability and level of expertise. Although these recommendations will have resource implications in some designated hospitals, the Taskforce view was that these criteria were necessary to ensure that care of the most severely injured patients would not be compromised. Although the Metropolitan Trauma Services are likely to see the bulk of less severely injured patients in metropolitan areas, they will also stabilise some of the most severely injured in immediately life-threatening situations, currently deemed inappropriate to bypass hospitals. Staffing and equipment recommendations are made with this in mind (Appendices 4 and 5).

## Hospital Designation

Over time, the proposed hospital designations (Appendix 6) may need to change if hospitals demonstrate a need to provide greater or lesser complexity of trauma care than is implicit in the recommended system structure.

Any changes in designation status will evolve in consultation with the Ministerial Emergency and Critical Care Committee (MECCC) and the relevant hospital or Network, as trauma system designation has resource implications beyond the delivery of trauma care alone. In addition, system audit trends will provide necessary support for evolution of trauma system designation.

New hospitals, such as Berwick, Knox and Sunshine, will be reviewed as to their appropriate role within the VSTS once they are operational. Such review would be undertaken by the STC in conjunction with the MECCC. A similar process could provide for enabling a hospital to opt-out of participating in the system.

Proposed designation of hospitals to various categories of trauma services (that is, the delineation of their roles) has been done with reference to the current availability of clinical services and geographical considerations. A self-reporting survey of Victorian hospitals was undertaken by the Department in 1997 evaluating current compliance to ACHS (1997) criteria for trauma services. This was one reference point for designating trauma services (Appendix 6). The following factors were other important considerations in the designation of hospitals to various levels of the trauma system.

## Geographical Considerations

A number of health care facilities have been designated as Primary Injury Services (PIS). This relates either to significant resource limitations for trauma resuscitation on a 24-hour basis or their close proximity to other higher designated trauma services.

These hospitals will often be bypassed by ambulance services in major trauma cases in preference to other higher designated hospitals. Hospitals designated as PIS may still receive trauma patients who present on foot or by private car. These patients should be rapidly transferred to an appropriate trauma service.

Some hospitals that are designated as PIS may be bypassed, even when their level of service provision is high, because their catchment areas overlap those of MTS. This is most likely to occur in inner Melbourne where Major Trauma Services can be reached within 30 minutes (Appendix 7.3).

In some regional and rural areas, long distances and travelling times between sites with the ability to resuscitate patients preclude bypassing some small isolated hospitals with major trauma. These facilities would be expected to provide only initial resuscitation prior to early transfer. Support for such hospitals will include development of local, multidisciplinary, prehospital teams to pool local expertise and the timely mobilisation of regional and/or state medical retrieval services.

## Resource Considerations—Staffing/Equipment

Consistent standards of services and service supports are necessary to ensure that hospitals meet their functional role within the trauma system. The NRTAC report (1993) provides role delineation and baseline service requirements for trauma services. The Taskforce perceived the need to develop more specificity for some of the service and service support criteria. The Taskforce identified the following focus areas in designating hospitals to levels of trauma care delivery.

- Emergency department capabilities, in particular seniority, experience and availability of medical and nursing staff providing initial resuscitation and stabilisation.
- Access to surgical and other specialties, in particular speed of access.
- Access to diagnostic services, including speed of access.
- Availability of equipment to manage major trauma in the emergency department and hospital.
- Active interest in and dedication to trauma management.

The management of specialised major trauma is discussed later in the section on triage and transfer, however, transfer guidelines take into consideration the differing service capacities and specialties of designated trauma hospitals.

Private hospitals with emergency departments are designated as PIS. This is consistent with the existing Department of Human Services Circular 4/1998, 14/4/98 regarding the role of private hospitals in the management of time-critical patients.

## Major Trauma Services (Appendix 4)

The MTS will provide definitive care to most of the State's major trauma caseload, either through primary triage or secondary transfer, and will deliver leadership and support to the system as a whole. Leadership will be demonstrated by active involvement in education and performance feedback, implementation of triage policies and clinical protocols, and system monitoring and research (Figure 2.4).

In this way, the MTS will function, not as trauma 'centres', confined to the physical walls of their hospitals, but as 'services' driving an integrated system.

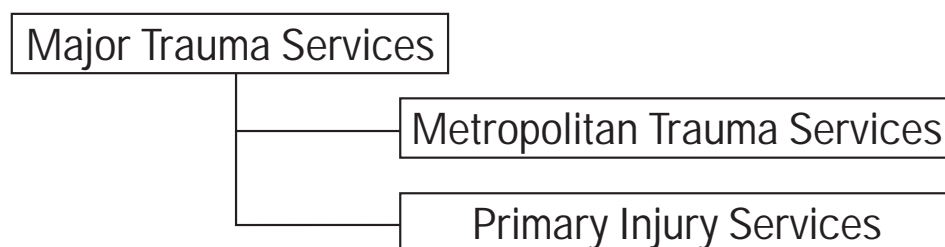
A hospital designated as a MTS would provide:

- A centre of excellence in trauma management.
- The central hub of an integrated system with responsibility for advising trauma services in both metropolitan and regional areas and developing the trauma system.
- Expert care to major trauma patients from resuscitation through acute and post acute phases:
  - from within its catchment area, that is within 30 minutes travelling time, or
  - referred from other trauma services in Victoria, or
  - transported or retrieved by air.
- Clinical advice on stabilisation and other interventions when liaising with non-MTS hospitals.
- Back-up to other MTS for patient reception as required.
- Leadership in education, research, quality improvement and performance monitoring.
- 24-hour trauma reception team, with a 24-hour consultant level trauma team leader and be integrated with equivalent level emergency department services.
- Surgical services functioning with consultant level participation in trauma reception. Surgical consultants should be available within 15–30 minutes maximum and 24 hour on-site registrar cover should be present.
- Support by equivalent level intensive care services (equivalent to ACHS level III) with 24-hour on-site registrar, and operating suites with 24-hour on-site staff.
- Access to neurosurgery and cardiothoracic surgery 24-hour on-site.
- Undergraduate and postgraduate teaching.
- Research in trauma care.

## Metropolitan Trauma Service Structure

The Taskforce has initially designated nine MeTS, recognising that it may be appropriate to modify this over time, in consultation with the STC, MECCC and networks, and dependant on the audit of performance of the trauma system.

**Figure 2.5: Metropolitan System Structure**





## Metropolitan Trauma Services (Appendix 4)

The MeTS provide a second level of trauma service delivery to the MTS. A MeTS would:

- Stabilise major trauma patients who cannot be transported directly to MTS within the required time limits, prior to their transfer to MTS after early communication.
- Provide definitive care to a very limited number of major trauma patients where a patient's injuries are assessed as not severe enough to warrant transfer, and the referring hospital has the capacity to provide appropriate definitive care, and the MTS is in agreement with non-transfer for that particular patient.
- Be staffed by a 24-hour trauma reception team, with access to a surgical consultant experienced in trauma management on a 24-hour basis.
- Be integrated with an equivalent level emergency service.
- Be supported by equivalent level intensive care services (equivalent to ACHS level II or greater) with 24-hour on-site registrar, and operating suites with 24-hour availability.
- Provide a support role to the MTS in times of high demand.
- Participate in system-wide education, quality and performance monitoring and undertake research.
- Non-clinical functions (data collection and quality management) would be steered by the proposed STC, MTS and the respective Metropolitan Health Care Network.

## Primary Injury Services (Appendix 5)

Consistent with the development of an inclusive trauma system, some hospitals are delineated as a PIS. This relates either to significant resource limitations for trauma resuscitation or their close proximity to a higher designated trauma service. These hospitals are appropriate for the treatment of ambulatory patients with minor injuries and ailments. Some hospitals are designated as PIS even when their level of service provision is high. This is because their catchment areas significantly overlap those of MTS or MeTS.

Major trauma patients when transported by ambulance will bypass these services in preference for other higher designated hospitals. Hospitals designated as a PIS may still occasionally receive major trauma patients who self-present. These patients should be rapidly transferred to an appropriate trauma service.

## Regional Trauma Service Structure

Preliminary consultation with the regional CCECCS has occurred regarding the proposed regional structure of the VSTS. There was a broad consensus that the Taskforce should offer substantive plans for the regional CCECCS to comment on and implement in a regional context. Each region will need to apply the structure and principles of the VSTS with local geography, resources and population while developing a regional plan and contingencies for managing major trauma or other time-critical cases. It is clear from these consultations that the system must be applicable in rural areas and offer improved major trauma management for rural patients if it is to gain rural support and succeed at all.

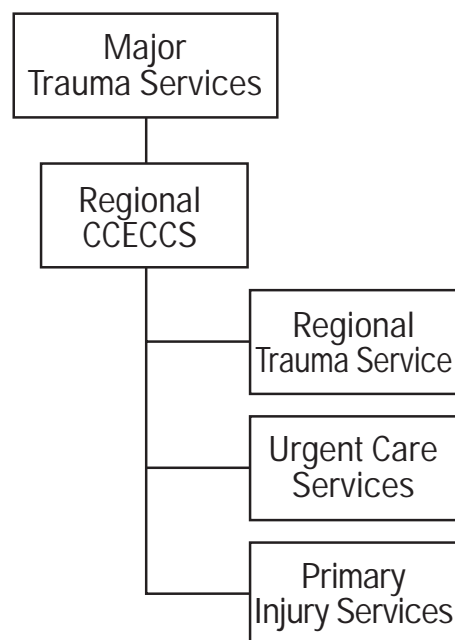
In addition, there was a clear desire for a process to be formulated for more detailed ongoing consultation with regions, such as through CCECCS representation in any future advisory framework on trauma and emergency services. The Taskforce

recommendations support this. All regions supported an expanded role for the regional CCECCS as appropriate and necessary and the Taskforce considered that the Government should make available additional funding support.

There was a range of opinions about the appropriateness of the concept of hospital ‘designation’, especially ‘non-designation’, in rural areas and the feasibility of regional hospital bypass plans. This largely related to long distances between facilities in many areas.

It is the Taskforce’s view that regions, especially in isolated areas, should develop local networks or teams for resuscitating time-critical patients, including major trauma. These teams would pool the resources and provide clear roles for local, skilled individuals of varying disciplines in both the prehospital setting and in isolated hospitals with limited resources.

**Figure 2.6: Regional System Structure**



## **Regional Consultative Committees on Emergency and Critical Care Services**

The Taskforce considers that the regional CCECCS are the most appropriate mechanism for the coordination of trauma care in regional areas. The regional CCECCS will oversee the clinical functioning of the Regional Trauma Services located at the base hospitals and work with these and other trauma services in the region in coordinating system activities, such as education, research or quality improvement.

## **Regional Trauma Services (Appendix 5)**

A hospital designated as a Regional Trauma Service (RTS) would be located in a major regional centre and would provide a regional focus for the management of trauma patients. While the responsibility for regional system development largely sits with the regional CCECCS, the RTS would have a role in receiving appropriate trauma referrals from the surrounding catchment areas. The non-clinical and higher

level functions of the RTS would be steered by the respective regional CCECCS working in collaboration with the MTS.

RTS would:

- Provide resuscitation and stabilisation of major trauma patients prior to their transfer to a MTS, after early communication with the MTS.
- Provide definitive care for a very limited number of major trauma patients where a patient's injuries are assessed as not severe enough to warrant transfer, and the referring hospital has the capacity to provide appropriate definitive care, and the MTS is in agreement with non-transfer for that particular patient.
- Provide definitive care for non-major trauma patients according to availability of local expertise.
- Provide a regional retrieval service where appropriate.
- Be integrated with an emergency service.
- Be supported by an equivalent level intensive care service and operating suites on a 24-hour basis.
- Undertake undergraduate and postgraduate education, research, quality monitoring and performance activities.

### **Urgent Care Services (Appendix 5)**

Urgent Care Services (UCS) will operate in small rural communities where higher levels of trauma care are not accessible.

UCS would:

- Provide an initial resuscitation and a limited stabilisation capacity prior to early transfer of major trauma patients who are outside the catchment area of RTS.
- Provide definitive care to non-major trauma patients according to patient need and available local resources.
- Participate, through its formal links with the RTS/MTS, in some aspects of undergraduate education, research, quality improvement and performance monitoring activities.

### **Primary Injury Services (Appendix 5)**

In regional areas, these include some isolated hospitals that will need to provide limited emergency care on occasions. A number of other PIS would be designated for bypass of all major trauma cases. Whether PIS in each region will stabilise major trauma cases will be decided by the regional CCECCS.

See discussion of Primary Injury Services on page 55.

## **Cross-Border Clinical Management**

The management of trauma patients across state boundaries requires further consideration. In areas close to the Victorian border, the Taskforce considered that it may be more appropriate to transfer a patient interstate rather than to a Victorian hospital. Likewise, it might be more appropriate for patients in some interstate regions to be treated by Victorian hospitals. For example, Albury Hospital provides a retrieval service that covers some of north-east Victoria, patients from Mildura are often transferred to Adelaide for ongoing care, and Echuca treats patients from southern NSW.

Regional CCECCS should develop defined strategies for major trauma referral and transport in border regions in consultation with relevant interstate bodies.

# System Organisation and Management

## Recommendations

The Taskforce recommends:

**2.1** (p.48) The following groups coordinate the Victorian State Trauma System:

- The Ministerial Emergency and Critical Care Committee
- A State Trauma Committee
- A Major Trauma Service Statewide Coordination Unit
- Regional Consultative Committees on Emergency and Critical Care Services.

**2.2** (p.48) A Ministerial Emergency and Critical Care Committee be formed to advise the Minister on the coordination, audit and monitoring, ongoing development and distribution of Statewide emergency medical services including, but not limited to, the Victorian State Trauma System.

**2.3** (p.48) The State Trauma Committee be established as the advisory arm of the organisational system providing:

- Policy development
- Leadership in statewide system auditing and quality improvement
- Purchasing strategies
- Best practice advice in a range of areas.

**2.4** (p.A58) Priority activities of the State Trauma Committee will be:

- Confirmation of the rural trauma system structure in consultation with regional Consultative Committees on Emergency and Critical Care Services.
- Development of a model for referral call reception amongst the Major Trauma Services and subsequent referral distribution.
- Advice on a program for collection of extended data items from hospitals providing trauma care, in particular non-Major Trauma Services hospitals, on either an intermittent or case-specific basis.
- Establishment of an education subcommittee to initiate education strategies including, but not limited to, integration of currently available training courses and development of an appropriate model for training multidisciplinary prehospital teams in rural areas.
- Audit of triage of patients in a 'life-threatening situation' to enable future modification to triage guidelines as appropriate.
- Decision on the number and location of Directors of Trauma Services and their role delineation.
- Overseeing the function of Major Trauma Services as 'resource centres' providing advice to providers on training and other issues.

**2.5** (p.A58) The State Trauma Committee and the Ministerial Emergency and Critical Care Committee incorporate rural representation and liaise with regional Consultative Committees on Emergency and Critical Care Services regarding rural trauma management issues.

**2.6** (p.49) The MTS Statewide Coordination Unit is the implementation arm of the organisational structure.

**2.7** (p.49) Regional Consultative Committees on Emergency and Critical Care Services:

- Be integrated into the Victorian State Trauma System to play an important role in rural areas in regard to system promotion, coordination and implementation in a regional context.
  - Revise roles and functions as indicated by the Taskforce and the State Trauma Committee.
  - Be appropriately funded to meet their expanded role.
- 

## Introduction

The successful redevelopment of trauma services in Victoria will depend on the coordination of what will become a complex integrated service system. A system-wide approach is necessary to provide a central, easily recognised focus for system users, raise the profile of trauma services and enable strategic development of the system over time.

The Taskforce proposes that coordination of trauma services will occur through four arms working cooperatively:

- An overarching Ministerial Emergency and Critical Care Committee (MECCC).
- A State Trauma Committee (STC) acting as a subcommittee of the MECCC and providing a statewide advisory role.
- A collaborative cross-campus MTS Statewide Coordination Unit (MSCU).
- Regional CCECCS undertaking an enhanced integrated role in trauma care coordination.

The functions requiring coordination across the system include:

- Policy and service development
- Performance monitoring and evaluation
- Quality improvement
- Health promotion and public information
- Education and training
- Promotion of data collection
- Monitoring and awareness of research activity
- Liaison with major stakeholders, appropriate agencies and service providers.

## Ministerial Emergency and Critical Care Committee

The Taskforce recommends that a MECCC be formed to provide advice to the Minister on the coordination, audit and monitoring, ongoing development and distribution of statewide emergency medical services including, but not limited to, the VSTS (Appendix 14). Through this body, a balance could be achieved between the different components of the emergency systems and an assessment made of the impact of recommendations from the STC on the emergency system as a whole.

## State Trauma Committee

The Taskforce proposes that the STC be formed as a specialist subcommittee to the overarching MECCC (Appendix 13). The STC would be expertise-based rather than representation-based. It should, however, include representation from other Ministerial committees and the Department, from rural and metropolitan areas, as well as medical and allied health providers. It should be noted that committees, such as Ministerial Advisory Committees, have no executive power, this being the function of the Minister and his Department. While being responsible to the

MECCC, the Taskforce recommends that such a committee have authority to recommend strategies to facilitate optimum care of trauma patients.

Representation from the regional CCECCS on the STC will provide a crucial rural perspective necessary to integrate the trauma system.

The role of the STC in driving trauma system improvement should be looked at from both a system and a process point of view, that is from both the horizontal as well as the vertical perspective. The STC will be integral to the development of strategic direction in quality, monitoring, education and research.

## **MTS Statewide Coordination Unit**

The Taskforce proposes that the MSCU will be established as a cross-campus collaborative group between the three MTSs (Appendix 15). The MSCU will have a small management executive drawn from the MTSs and the Department and will provide representation to the STC. It will be physically located at a MTS and will report under a service agreement to the Department and on a day-to-day basis to the MTS management executive. The MSCU will function as the implementation arm for trauma system development activities, specifically involving:

- Provision of advice, information and data to inform decision making by the STC.
- Collection and collation of trauma system performance data from Victorian trauma care providers, including the ongoing development of a trauma registry, in collaboration with the Department.
- Collaboration with regional CCECCS regarding education, quality improvement, and research activities.
- Implementation of clinical indicators for monitoring trauma care.
- Coordination of and participation in educational and training programs on a statewide basis to enhance trauma management.
- Coordination of and participation in research activities.
- Development of their role in injury prevention activities.
- Liaison with the Department and other trauma care providers.

## **Metropolitan and Regional Coordination**

### **Metropolitan**

The MTS will be responsible for coordinating the operational delivery of trauma services across the metropolitan area. This will involve identifying and addressing issues relating to the transport, reception and treatment of major trauma cases and involvement in planning changes to MeTS in conjunction with the STC.

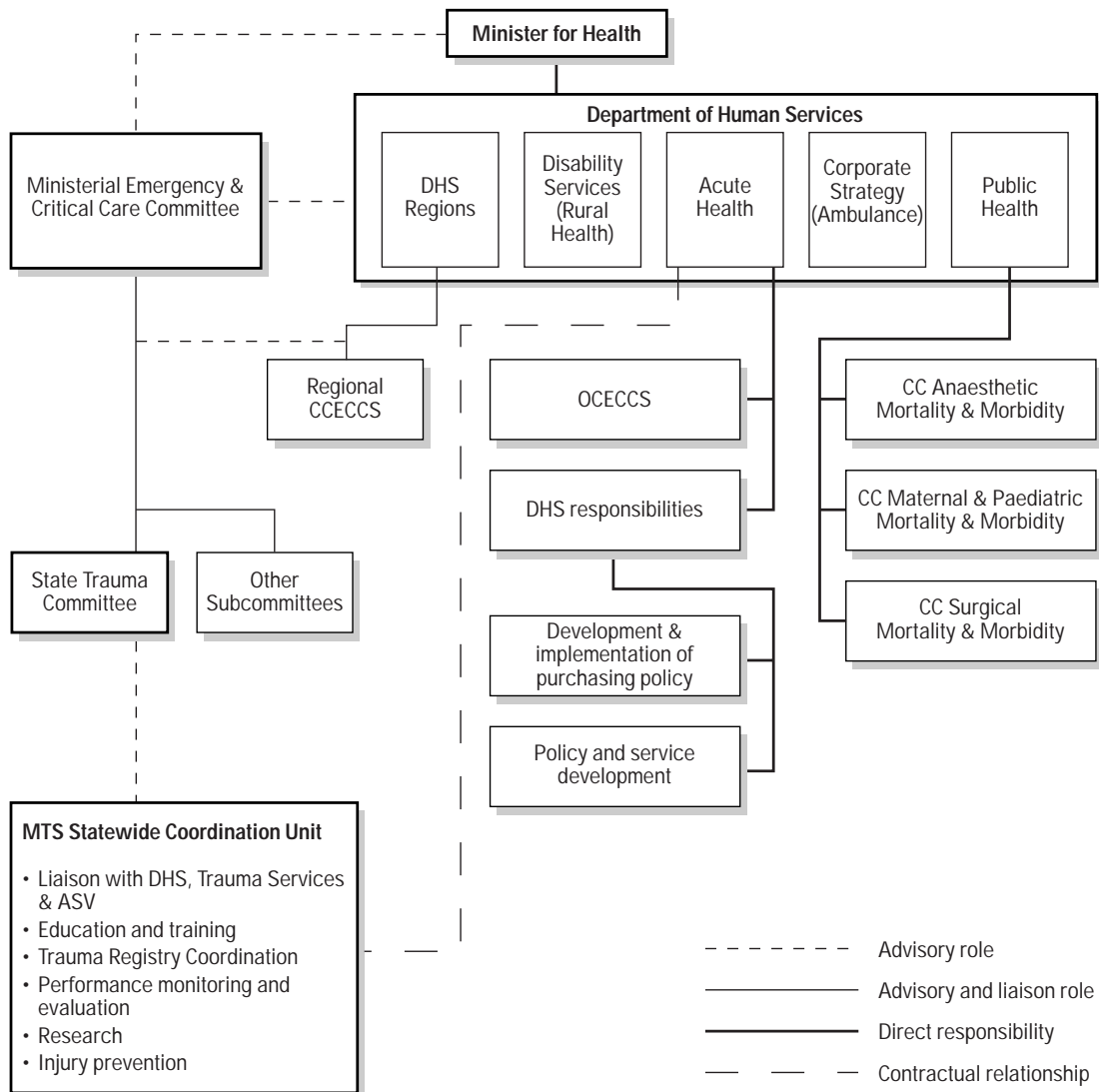
### **Regional**

The Taskforce recognises that the regional CCECCS will be essential forums for promoting and implementing the proposed trauma system. These multidisciplinary committees currently play an important role in planning, developing, coordinating, monitoring and advising on emergency and critical care services in rural areas. Regional CCECCS also develop necessary activities, such as education programs, to support these services (Appendix 17).

The regional CCECCS are, therefore, well placed to consider the regional application of the proposed trauma system and its underlying principles relevant to the initial reception, treatment and continuity of care of time critical trauma patients.

Their structure and coverage needs to be explored in relation to the regional RTS located at the base hospitals. A collaborative relationship between both will be necessary and auditing of the regional CCECCS will be an important quality activity.

**Figure 2.7: Recommended Organisational Framework for Emergency and Critical Care Services in Victoria: Trauma Services**



# 3 System Support and Development

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# Clinical Framework

## 3.0 Triage and Transfer

### Recommendations

In relation to triage of major trauma patients, the Taskforce recommends:

- 3.1** (p.54) Major trauma be identified in the prehospital setting according to specified physiological, anatomical and mechanistic criteria.
- 3.2** (p.55) Triage to a Major Trauma Service where a major trauma patient is less than 30 minutes transport time from a Major Trauma Service.
- 3.3** (p.55) Triage to the highest designated trauma service accessible in 30 minutes where a major trauma patient is more than 30 minutes transport time from a Major Trauma Service.
- 3.4** (p.55) Triage to a designated trauma service accessible in the least amount of time in isolated rural areas that are more than 30 minutes from any trauma service.
- 3.5** (p.57) Where a patient is triaged initially to a non-Major Trauma Service for initial stabilisation, early liaison with the Major Trauma Service occur and consideration be given to appropriate medical retrieval or interhospital transfer to a Major Trauma Service.
- 3.6** (p.57) Where a major trauma patient appears to be in an 'immediately life-threatening situation' during transport, the patient be diverted to the nearest designated trauma service for stabilisation, with subsequent transport to a Major Trauma Service at the earliest appropriate time.
- 3.7** (p.57) The triage process for major trauma patients be formally audited with respect to all aspects of its functions, and specifically with respect to the appropriateness of the prehospital time cut-off for delivery to Major Trauma Services.
- 3.8** (p.59) Timely and proactive transfer of neurotrauma patients to Major Trauma Services to avoid interhospital transfer under conditions of neurological deterioration.
- 3.9** (p.59) Neurosurgical triage and transfer guidelines for major trauma still apply in rural areas, even where a neurosurgical specialist practises locally, as the management of these patients requires all the appropriate and agreed service supports of a Major Trauma Service.
- 3.10** (p.59) Major trauma (including isolated spinal cord trauma) be triaged to the Major Trauma Service in the prehospital setting, within the defined safety and logistic constraints (Appendix 7.3).
- 3.11** (p.59) Major trauma (as defined in Appendix 7.4) including a spinal injury be transferred from the first assessing Emergency Department to the Major Trauma Service. In the presence of neurological deficit, subsequent transfer to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre will occur at the earliest appropriate time, that is once the patient is medically stable.
- 3.12** (p.60) Isolated spinal cord trauma, with a neurological deficit, be transferred to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre at the earliest appropriate time, generally in less than 12 hours, without necessary management at a Major Trauma Service.
- 3.13** (p.60) Spinal cord trauma with other injuries that do not meet the criteria which

define Major Trauma (Appendix 7.4), be transferred to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre at the earliest appropriate time, generally in less than 12 hours.

- 3.14** (p.A29) Surgical stabilisation of the spine, in the presence of neurological deficit, may occur at either the Major Trauma Service or the Austin and Repatriation Medical Centre. This decision will always be made following consultation between the Major Trauma Service and Victorian Spinal Cord Service.
  - 3.15** (p.60) All spinal trauma in children will be transferred to, and managed at, the Royal Children's Hospital for acute phase care.
  - 3.16** (p.60) All trauma services receiving spinal trauma patients should consult the Victorian Spinal Cord Service early after patient reception to optimise patient outcomes.
- 

## Introduction

For a trauma system to function effectively, major trauma patients must be identified in the field and then transported to specialist trauma facilities able to manage them. Trauma triage refers to the process of sorting patients according to the kind of injury, severity of the injury and facilities available. The ideal triage method would be applied quickly and easily under field conditions, give consistent results among different observers, and have a high rate of accuracy (Eastman, 1987).

The goal of a triage system is to consistently get the right patient to the right hospital in the right amount of time. In Victoria, this effectively means getting as many major trauma patients as possible into hospitals with specialist trauma skills in the least amount of time.

The level of care available at the destination has a significant impact on outcome (Sampalis et al., 1997; Cooper et al., 1998). It is therefore optimal to access the highest level trauma service possible within logistic and safety parameters. The Taskforce and Working Party considered at length the balance to be struck between destination and transport time.

The Taskforce endorses the triage and transfer guidelines (Appendices 7.1–7.4) developed by the Working Party. For each guideline, more detailed accompanying explanatory notes will be developed during industry consultation in the implementation phase. Triage and transfer guidelines aim to achieve definitional and interpretive consistency. These recommended triage guidelines will be subject to substantial and continuing audit by the STC and MECCC.

## Triage Model

The Working Party selected the ACEP (1993) model trauma triage guidelines for local adaptation. This model has been applied to large populations nationally and is based on the identification of major trauma according to physiological, anatomical and mechanistic criteria. As these guidelines are similar to those already in use by ASV for identifying time-critical trauma patients, there is local support for their continued use.

Expertise in trauma management is difficult to develop and maintain, in part related to its relatively low incidence. Improved clinical outcomes are associated with some degree of concentration of experience. Major trauma management is, therefore, considered a specialised activity, much like burns or spinal care. This is the basis for proposing a triage model that mandates primary triage or secondary transfer to MTS for most major trauma patients.

## Triage Destination and Transport Times

Transport time is determined with consideration of the 'golden hour' in trauma care (Petri, 1995). Given average activation and scene times, the Working Party considered that initially the 30-minute transport time would deliver most patients to an appropriate hospital within an hour of injury. This recognises that some flexibility in the 30-minute transport time is permissible if this means delivering a major trauma patient directly to a MTS, as definitive treatment in a MTS is one of the goals of the VSTS. Paediatric patients currently experience longer prehospital transport times, often up to 60 minutes. Physiological response to injury in children often permits this and so allows transport direct to the RCH.

There is evidence from some studies that the 'safe' prehospital transport time in adults may be up to 60 minutes. This is in the context of a system which delivers a high level of paramedic skill, and in which hospital designation has been achieved, and patients are delivered to appropriate hospitals for their level of injury (Petri et al., 1995; Feero et al. 1995). The Working Party determined it would be best to work with 30 minutes transport time cut-off in the initial phase and to closely monitor the triage process. Any future changes to lengthen or shorten transport cut-off time would be on the basis of audit data and on the advice of the STC. The Working Party has, therefore, recommended the following approach for prehospital triage of major trauma patients (see Figure 3.1).

Where a major trauma patient is less than 30 minutes transport time from a MTS, the patient should be transported to that service bypassing other hospitals. The aim is to minimise the time from injury to definitive treatment (Eastman, 1987). This is best achieved by primary triage of major trauma patients from the scene of injury to a MTS and by avoiding subsequent need for acute interhospital transfer whenever possible (Trunkey, 1983; Cales, 1985; Sampalis, 1993).

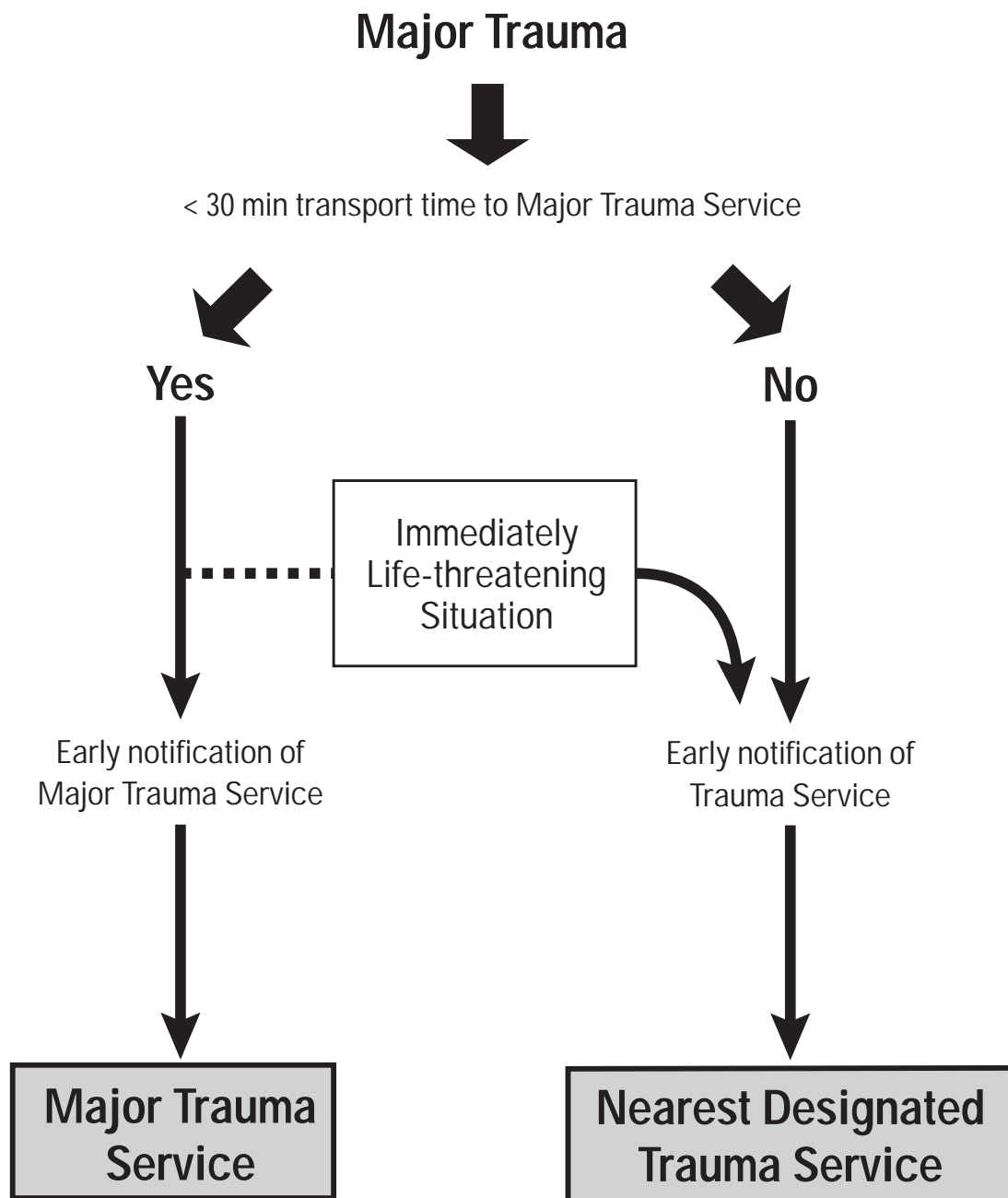
Where a major trauma patient is more than 30 minutes transport time from a MTS, the patient should be transported to the highest designated trauma service accessible within 30 minutes.

Where, in the ambulance paramedic's judgement, a major trauma patient's condition deteriorates to being an 'immediately life-threatening situation', the patient should be transported to the nearest designated trauma service for stabilisation, with subsequent transport to a MTS at the earliest appropriate time. Continued high standards of ambulance and MICA paramedic training is, therefore, essential to support informed and prudent decision making.

Transport time by road will vary according to time of day, traffic conditions and distance. The 30 minutes that determines triage destination refers to the estimated time from patient loading to arrival at the receiving trauma service. The 30 minutes should be flexible where a small increment added to the transport time means that the patient is delivered to a site that can provide definitive care. Small additional increments in transport time invariably result in less delay to definitive care than organising the process of secondary transfer (Sampalis et al., 1997).

Clearly, in some outer metropolitan and most rural areas, patients will be more than 30 minutes from a MTS, or possibly any trauma designated hospital. In such situations, the patient is transported to the highest designated trauma service available in the least amount of time. Early liaison with the MTS is required. If appropriate, medical retrieval or interhospital transfer to a MTS needs to be activated early after initial assessment and resuscitation.

**Figure 3.1 Triage Destination Guidelines (Appendix 7.3)**



### Overtriage

Overtriage is the transport of patients with minimal injuries to a high level trauma service or MTS on a presumption that the patient is seriously injured (Esposito et al., 1995). At present, all prehospital triage criteria have limitations in identifying and predicting trauma severity. Overtriage, however, may stress the economic resources of the MTS and create frustration and resistance amongst other hospital providers.

A degree of overtriage is unavoidable and necessary to consistently detect serious injuries (Eastman, 1987). The ACS (1993) suggests the need for a 50 per cent overtriage rate to maintain a 10 per cent undertriage rate and avoid delivery of patients with occult serious injury to other than MTS. Triaging physiologically stable trauma patients where only mechanistic criteria are present has a high potential for

overtriage, although of the mechanistic criteria, prolonged extrication and a fatality in the same vehicle yield the greatest predictive value.

The presence of any one of the physiologic or anatomic abnormalities included in the Prehospital Major Trauma Criteria (Appendix 7.2) constitutes major trauma for the purpose of primary triage. The presence of only high-risk mechanism of injury or co-morbid factor places the patient *at risk of* major trauma. This group of patients should be triaged to a designated trauma service for assessment but whether this needs to be a MTS or other trauma service will remain at the discretion of the attending ambulance officer. This needs to be so because:

- Excessive, and ultimately unnecessary, overtriage may result if physiologically stable patients with only mechanism of injury or co-morbid factors are automatically triaged as major trauma and delivered to a MTS from the scene.
- Prehospital consultation with an inhospital trauma consultant is currently not technically reliable and would probably not add significant benefit in triaging this subgroup of patients.

### **Triaging the Patient in an 'Immediately Life-Threatening Situation'**

The Taskforce and Working Party gave close consideration to the most appropriate triage strategy for patients who severely deteriorate at the scene or during transport. There is some evidence to suggest that this group of patients have greatest need for the rapid response and skilled trauma resuscitation provided at MTS (Sampalis et al., 1997) and transport should, therefore, continue to the MTS. The Taskforce and Working Party, however, endorse that where a major trauma patient is in an immediately life-threatening situation, the patient should be taken to the nearest designated trauma service for stabilisation with subsequent transfer to a MTS at the earliest appropriate time. The Taskforce and Working Party agree that ambulance and MICA paramedics must be allowed to default from hospital bypass in circumstances of an immediately life-threatening situation during transport.

Instances of an immediately life-threatening situation might involve failed airway control, tension pneumothorax, exsanguination, cardiac arrest or other circumstances in which the patient appears to be 'dying'. It was the Working Party's view that the provision of solely objective criteria for ambulance diversion in such circumstances was unworkable because:

- Decisions about imminent and life-threatening deterioration necessarily involve both a subjective component and objective criteria.
- Both paramedic levels provide trauma care during a critical phase post-injury. Decisions to divert before arriving at a MTS entail consideration of the differing skill levels of MICA and ambulance paramedics. Most, but not necessarily all, major trauma will be attended by a MICA paramedic. This is so at least in the short term and more so in metropolitan areas.
- There needed to be some allowance for avoiding clearly preventable prehospital morbidity, such as resulting from failed airway control. The Taskforce accept this despite recognising that improved outcomes have been demonstrated in transporting patients directly to a MTS with the staff, expertise and equipment to rapidly manage life-threatening conditions in trauma patients (Sampalis, 1997).

Audit of this patient group should be a priority for the STC to enable future change in triage guidelines, if appropriate, and to support educational strategies and foster compliance with recommended triage guidelines, especially for ASV.

## Early Hospital Notification

The Taskforce and Working Party advise that early notification from the field to the receiving hospital regarding numbers, time of arrival, patient condition and any deterioration, maximises preparation time in the receiving hospital and streamlines resuscitation and stabilisation following patient reception.

Effective and reliable direct field to hospital consultation is technically possible at present, although the resources to facilitate this are limited and there is an issue of timing implementation with other communication initiatives, such as mobile data terminals. Consistent reliability of mobile systems also cannot be guaranteed at present. Earlier notification through sequencing priority at ASV's Communication Centre is possible.

## Early Liaison and Interhospital Transfer to Major Trauma Services

To minimise time to definitive care and reduce current delays in activating interhospital transfer, the Taskforce endorses early liaison. A target time for the receiving trauma service to contact MTS is recommended at 15–30 minutes. Although monitoring compliance with this performance indicator will be problematic, this demonstrates the expectation of early contact and forms a baseline for subsequent review and adjustment.

After patient reception in a trauma designated emergency department, the presence of one of the stated physiological or anatomical criteria mandates early liaison with a MTS (Appendix 7.4). Improved communications technology at the MTS will ensure the immediate availability of a consultant with trauma expertise for advice regarding clinical management or need for transfer.

The success of timely referral of major trauma and liaison with the MTS will depend on reliable, one call, consultant level access at the MTS. Traditional referral patterns from some rural to metropolitan hospitals may not conform with proposed referral to a MTS, nor with the principles upon which the trauma system is based.

Specialist Trauma Transfer Guidelines (Appendix 8) have been developed for specialist trauma conditions to guide transfer to a MTS, where the MTS has a concentration of relevant expertise within the context of trauma management and/or is the state provider of that specialty. These guidelines incorporate specific aspects of management in the prehospital and emergency department setting and indications for transfer to the appropriate MTS for the following specialist conditions: neurotrauma, spinal trauma, paediatric trauma, obstetric trauma, burns, musculoskeletal trauma or barotrauma. These guidelines have been developed using published guidelines in consultation with specialists in each of the relevant fields. Timely transfer will be dependant, in part, on clinicians at receiving hospitals limiting diagnostic testing and interventions to those necessary for stabilisation prior to transport.

Although the probable need for interhospital transfer is indicated within developed guidelines, the Working Party and Taskforce opted to avoid an exhaustive list of injuries requiring transfer, instead relying on consultation to clarify transfer need. Consultation will occur after a detailed medical assessment and may allow for the non-transfer of major trauma in the following circumstances:

- The patient's injuries are assessed as not severe enough to warrant transfer and
- The referring hospital has the capacity to provide appropriate definitive treatment

and

- The MTS is in agreement with non-transfer in a particular case.

## **Specialist Trauma Care**

### **Neurotrauma**

The Taskforce considered several issues relating to the management of neurotrauma because the acute nature of these injuries requires definitive care with minimal delay, and because few of the proposed designated trauma services are currently able to provide a full-time neurosurgical presence within the hospital.

### **Staffing**

The Taskforce has recommended minimum staffing standards for specialist neurosurgical support at MTS and MeTS. A 24-hour in-house neurosurgical registrar at MTS was considered appropriate because formulating the 'hierarchy of care' at patient reception would be more efficient and integrated by having a neurosurgical presence to assess the nuances of the patient's neurological condition on arrival. Also, patient groups other than major trauma, such as cerebral haemorrhage, require immediate intervention upon arrival in the emergency department.

### **Referral**

Neurotrauma patients requiring critical care support should be managed only in hospitals with a neurosurgical unit and neurosurgical support. There was agreement that interhospital transfer under conditions of neurosurgical deterioration was to be avoided whenever possible by timely and proactive transfer of such patients to a MTS.

Interhospital referral links already in existence with The Alfred, RMH and RCH should be strengthened, and the process and timeliness of neurosurgical referral needs to be reviewed and streamlined.

### **Telemedicine**

The application of telemedicine has significant potential benefit in the management of neurotrauma, enabling prompt diagnosis and intervention in patients referred from metropolitan and rural hospitals and for patients already under the care of a neurosurgeon at a MTS.

The Taskforce considers that coordination between facilities in the introduction and application of this technology is essential and currently lacking. Telemedicine is discussed in more detail in the section 'Research, Service and Technology Developments'.

### **Spinal Trauma**

The Taskforce and Working Party have given consideration to the crucial role that the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre has in the management of spinal trauma in Victoria. The Taskforce and Working Party recommends that the following applies to the triage and transfer of spinal trauma (Appendix 8.2):

In the prehospital setting:

- All major trauma (including isolated spinal trauma) should be triaged to the MTS, within safety and logistic constraints.



In interhospital transfer:

- Major trauma which includes a spinal cord injury should be transferred to the MTS. In the presence of spinal cord deficit, subsequent transfer to the Victorian Spinal Cord Service will occur once the patient is medically stable.
- Isolated spinal cord trauma, with a neurological deficit, should be transferred to the Victorian Spinal Cord Service at A&RMC at the earliest appropriate time, usually in less than 12 hours.
- Early consultation by all trauma services receiving spinal cord trauma patients with A&RMC should occur to optimise patient outcomes. Stronger links between MTS and the Victorian Spinal Cord Service, such as through dual appointments of consultant medical staff or establishment of liaison nursing or allied health positions based at the A&RMC, will enhance optimal reception and care of patients with acute spinal injury.
- All spinal cord trauma in children should be transferred to, and managed at, the RCH during the acute phase.

### **Paediatric Trauma**

The relatively small number of paediatric presentations, the concentration of the necessary specialist skills, clinical supports and an already established paediatric intensive care retrieval service (Pearson et al., 1997; Hall et al., 1996) support a centralised model for a paediatric MTS. This should be located at the RCH.

Currently, air transport is frequently utilised for primary paediatric retrieval from the scene. Most paediatric major trauma in Melbourne is transported directly to the RCH, whether by road or air and sometimes with longer transport times than adults, as the physiological response to trauma in children frequently permits transport times up to 60 minutes.

The proposed model will see a continuation of all paediatric major trauma being triaged to the paediatric MTS for initial resuscitative care if possible and/or definitive treatment. Emergency departments in metropolitan Melbourne and rural Victoria will continue to provide initial stabilisation and resuscitation to paediatric major trauma patients where required, as well as support and treatment for non-major paediatric trauma. Specific hospitals have been designated as paediatric MeTS where there is a degree of concentration of paediatric expertise. Guidelines for transferring paediatric major trauma to RCH have been endorsed by the Taskforce (Appendix 8.4).

The RCH will also be responsible for coordinating paediatric trauma education, training and research, as well as quality management throughout Victoria in conjunction with the adult MTS.

### **Burns**

Specialised burns units providing optimal care for severely burned patients are situated at The Alfred (adult) and RCH (paediatric). Trauma services at any level may receive patients with major burns plus traumatic injury for resuscitation and stabilisation and should be familiar with the burns trauma transfer guidelines. Early communication and transfer should be undertaken as appropriate (Appendix 8.6).

### **Barotrauma**

Barotrauma can only be definitively treated at a hyperbaric facility. Iatrogenic, diving related, and other barotrauma necessitates treatment in a hospital-based recompression facility. The Alfred provides hyperbaric services for Victoria.

Other hospitals receiving or managing barotrauma patients should consult early, initiate treatment and transfer according to recommended guidelines (Appendix 8.3).

### **Microsurgery**

The Taskforce and Working Party have given consideration to the crucial role that St Vincent's Hospital has in the management of injuries requiring microsurgery. In this respect, the Taskforce considers that St Vincent's Hospital should continue to have a leading role in the management of injuries requiring microsurgery.

With regard to **prehospital transfer**: All major trauma should be triaged to the MTS (according to Appendix 7).

With regard to **interhospital transfer**:

- Multiple trauma, incorporating the need for microsurgery, should be referred and transferred to the MTS.
- Isolated injuries requiring microsurgery should be referred and transferred according to established referral patterns; this would include St Vincent's Hospital in many cases.

The Taskforce considers that the colocation of Major Trauma Services with specialist facilities and services for trauma care is an issue that requires ongoing monitoring.

### **Triage and Transfer Guidelines**

The following is a brief description of the triage and transport guidelines developed by the Working Party.

#### **Setting for Triage Guidelines in the Trauma System (Appendix 7.1)**

This guideline places the trauma triage and transfer guidelines within the context of the bigger picture of prehospital emergency transport and transfers. The guidelines concern themselves with *major trauma*. Non-trauma and non-major trauma admissions should be managed according to current guidelines.

#### **Prehospital Major Trauma Criteria (Appendix 7.2)**

This guideline uses physiological, anatomical and mechanistic criteria to identify major trauma patients in the prehospital setting. Proposed major trauma triage criteria conform closely with currently-used ASV criteria for time-critical trauma. This will aid integration and utilisation of these prehospital trauma triage guidelines.

#### **Destination Decision (Appendix 7.3)**

This guideline describes the process used by prehospital personnel in deciding on the triage destination for major trauma patients.

#### **Major Trauma Interhospital Transfer Guidelines (Appendix 7.4)**

This guideline describes the criteria and process for interhospital transfer of major trauma upon emergency department reception.

#### **Specialist Transfer Guidelines (Appendices 8.1-8.7)**

These guidelines describe specific aspects of management in the prehospital and emergency department settings and give indications for transfer to an appropriate MTS for the following specialist conditions:

- Neurotrauma
- Spinal trauma
- Barotrauma
- Paediatric trauma
- Obstetric trauma
- Burns
- Musculoskeletal trauma.

## Consultation Process

The triage and transfer guidelines will undergo a wider consultation process with stakeholders and key providers in the implementation phase. Greater levels of detail in definition and application will be developed and included. After implementation, triage guidelines will be subject to performance measurement and continuous improvement.

## Clinical Management

### Trauma Teams: Recommendations

In relation to the trauma team approach to trauma care, the Taskforce recommends:

- 4.1 (p.62) All hospitals designated to receive major trauma patients have a formal trauma team response to the initial reception and management of trauma patients.
- 4.2 (p.62) The composition of the trauma team be sourced from clinicians throughout the hospital (such as surgery, intensive care, anaesthetics and emergency department) in order to provide optimal expertise in filling each role in the team.

The multidisciplinary trauma team approach to trauma resuscitation and stabilisation is one recommended by several bodies (ACS, 1993; NRTAC, 1993). All hospitals designated to receive trauma patients must have a formal organised response to the initial reception and management of trauma patients. The establishment of a trauma team is crucial to this. Clarifying the roles and responsibilities of each member of the team enables an optimally coordinated approach during resuscitation, when many tasks must be carried out simultaneously.

Trauma team members should comprise the most skilled clinicians available to fulfil each role within the team. Clinicians should, therefore, be sourced from throughout the hospital, such as from ICU, anaesthetics and the emergency department, to provide optimal expertise in trauma resuscitation.

The practice of allocating the various roles of the trauma team to particular 'craft groups' may restrict the development of skills and the subsequent adaptability of team members. Ambulance paramedics should play an active role in the trauma team within rural or regional hospitals where availability of experienced and skilled hospital staff may be limited. Ambulance paramedics should receive appropriate training, to participate competently in such a role where required.

Generic trauma team guidelines (Appendix 11) provide the *minimum* standards for major trauma reception. Trauma team guidelines will need to be modified to suit local circumstances, especially in smaller hospitals.

At a MTS, members of the trauma team should be available for trauma team response within five minutes of the call. The team leader should be a consultant level medical officer and must be available within the hospital 24 hours a day. The team leader could be of a range of disciplines (general surgeon, emergency physician, anaesthetist, intensivist) but should be EMST qualified.

The rapid availability of key consultant surgeons must be guaranteed at MTS. While the continual presence in the hospital is not practical, there is a need for the on-call surgeons participating in trauma team resuscitations to be available within 15 minutes ideally and within a maximum of 30 minutes. This may inhibit those surgeons undertaking private surgical sessions while on call at a MTS.

Efficient operation of a trauma team is contingent on early activation to ensure that the team is assembled on arrival of the patient. Early activation is, in turn, dependent on early notification by prehospital providers.

## **Role of Director of Trauma Services: Recommendations**

In relation to the role of Director of Trauma Services, the Taskforce recommends:

The Taskforce recommends:

- 5.1** (p.63) All Major, Metropolitan, Regional Trauma Services and Urgent Care Services have a designated person/s to fulfil the role of Director of Trauma Services.
- 

The Director of Trauma Services (Appendix 12) will be a pivotal position in the operational delivery of trauma services. This role will provide the link between the statewide coordinating bodies, such as the STC and the clinicians involved in trauma care delivery and will set expectations for those hospitals managing trauma. In general terms, those undertaking this role will be responsible for:

- Management and organisation of the multidisciplinary trauma staff (including the trauma team) and establishing clear lines of responsibility for patient and staff management, including:
  - Development and implementation of guidelines and procedures.
  - Ensuring appropriate numbers of adequately trained staff and maintenance of skills.
- Leading a multidisciplinary, representative hospital committee.
- Ensuring the collection of trauma registry data and the development and implementation of other quality improvement initiatives, including internal case review, and forwarding such data for STC review.

The role should be filled at each hospital that receives major trauma patients, with the exception of PIS. It may be appropriate for the role to be filled by more than one person. The extent to which the role is dedicated to one person will vary depending on the volume of trauma at each institution.

# Communications

## Recommendations

In relation to communication issues, the Taskforce recommends:

- 6.1** (p.65) Communication technology and processes be improved to effectively streamline information transfer between care providers, therefore aiding compression of time from injury to definitive care.
  - 6.2** (p.58) Wider application of mobile systems for prehospital to hospital communication in the immediate future.
  - 6.3** (p.58) Mobile systems be explored in relation to compatibility and potential for interface with the current Ambulance Service Victoria system, logging reliability and handheld capability.
  - 6.4** (p.65) Major Trauma Services establish a dedicated phone number for trauma referral and advice, operating with an appropriate default process to ensure immediate clinician contact.
  - 6.5** (p.65) The Major Trauma Services trauma contact number provide response by a consultant level clinician (defaulting to the duty senior 'trauma' registrar with authority to admit).
  - 6.6** (p.65) Earlier hospital notification by prehospital providers to receiving hospitals be enhanced through:
    - Educational/training strategies to highlight importance of and need for early hospital notification regarding patient condition.
    - Emphasis on the importance of early hospital notification in the sequencing process via the Communications Centre.
  - 6.7** (p.65) Standardised, comprehensive transfer documentation capturing data for trauma providers be developed in consultation with the Victorian Ambulance Clinical Information System project and the State Trauma Committee.
- 

## Introduction

Research already undertaken has highlighted deficiencies with the current Victorian communication process and system and has considered components of the optimal system and improvement strategies (CCRTF, 1997; NRTAC, 1993). There are five key communication time points in the management of major trauma and other time-critical patients. These are:

- Prehospital provider link for early hospital notification.
- Trauma team alert and notification.
- Prehospital provider and trauma team hand-over upon reception.
- Trauma team and intrafacility communication, for example with OR/ICU/HDU.
- Interfacility communication regarding referral and transfer to a MTS.

The purpose of improving communication at these key time points is to streamline information transfer, in turn aiding compression of time from injury to definitive care.

The Taskforce is mindful of the current saturation of available ambulance communications channels and is aware of the development of digital communication systems that will increase available channels in the near future.

## **Principles**

The following principles will underpin future improvements to the communication system in both the prehospital and interhospital phases.

### **Simplicity**

Currently, a clinician managing the patient may be required to make several calls to activate a transfer, or several sequential calls occur involving 'too many hands'. Both result in delays. The current communication system does not encourage the referring hospital clinician to liaise directly with the receiving senior clinician or consultant. Instead, clinical information often passes through unnecessary 'hand-overs' as the patient moves to definitive care. One call is all that should be required by the hospital clinician immediately managing the patient to activate a trauma system response.

### **Speed**

The current communication system involves multiple links. Every sequence—before, between and within hospitals—adds time to the process of care (McDermott, 1997). Prehospital notification currently proceeds sequentially through ASV dispatch to the receiving hospital. An interactive notification system that allows direct field-to-hospital communication is desirable but not technically possible at this time.

Replication of data for transfer of the patient by both hospital and prehospital providers adds to links and time in delivering the patient to a definitive care location. Standardised, comprehensive transfer documentation capturing data for prehospital and hospital providers should be developed in consultation with the Victorian Ambulance Clinical Information System project and the STC.

### **Reliability**

The communication system must be reliable and be perceived to be so. Dedicated phone lines in trauma designated emergency departments and at any other key communication points are required (CCRTF, 1997).

Ambulance personnel operate under the obligation to avoid unnecessary delays in delivering a time-critical patient to definitive care. Timely prehospital notification calls to the receiving hospital allow for valuable preparation time in the emergency department, however compliance with notification will largely depend on the technical and human reliability of the communication system.

### **Seniority**

Medical consultation in the prehospital setting is currently provided by consultant level physicians employed by ASV. Clinical consultation by ambulance personnel in the prehospital setting is infrequent. Medical advice for paramedics undertaking interhospital transfer is supplemented by the small pool of coordinators at the Office of the Coordinator, Emergency and Critical Care Services (OCECCS). In the future it may be possible for prehospital providers to seek advice from a trauma consultant at a MTS regarding clinical management and triage destination in marginal cases.

Interhospital transfer communications, especially in rural areas, may be initially managed by inexperienced and junior physicians, resulting in inappropriate and/or multiple information hand-over before reaching senior staff. This may result in inappropriate designation of transfer priority.

**Security**

Medico-legal and internal auditing considerations for ASV require triage and clinical management discussions between field personnel and others to be securely recorded and retained. This should continue in any communication system improvements.

# Retrieval and Transfer

## Recommendations

In relation to medical retrieval of major trauma patients, the Taskforce recommends:

### Medical Staffing Model

**7.1.1** (p.71, 73) The proposed medical staffing model for the statewide retrieval service be:

- A centrally-based pool of staff who are trained for and frequently undertake retrievals.
- Drawn from a number of hospitals on a roster basis, enabling most stakeholders to participate in the provision of the service.
- Available within a notification time of five minutes enabling an immediate response for rotary wing missions when clinically required.
- Consultant level medical practitioners or Senior Registrar level medical practitioners.
- Sourced from a range of craft groups (for example, emergency physicians, intensivists, anaesthetists, cardiologists) enabling the most appropriate practitioner for the mission.
- Located on a shift-to-shift basis with consideration of access to appropriate transport platform.

**7.1.2** (p.73) Provision be made for training of senior registrars in transport medicine through teaching and experience.

### Regional Retrieval Services

**7.2.1** (p.70, 71) Enhance funding to rural retrieval services to effectively operate as part of a statewide retrieval system.

**7.2.2** (p.70, 71) Regional retrieval services continue to coordinate missions that require treatment at a regional hospital level but, for missions requiring tertiary level care, there be timely liaison with the statewide retrieval service.

**7.2.3** (p.70, 71) Simultaneous dispatch of regional and statewide retrieval services be an option on a case-by-case basis to minimise time to definitive care and enhance support available to regional ambulance services and local hospitals.

### Communication and Coordination

**7.3.1** (p.70) A single phone contact number activate retrieval processes.

**7.3.2** (p.70) The referring clinician be able to discuss patient management prior to transfer with a consultant level coordinator, for both regional and central retrieval missions.

**7.3.3** (p.70) The proposed retrieval activation sequence involving a single call to *either* a regional or central Retrieval Coordinator be trialled and audited, with an option to change to a statewide central single number if appropriate.

**7.3.4** (p.71) A statewide focus for the coordination and operation of medical retrieval in Victoria be provided by a Director of Retrieval Services who would assume overarching responsibility for the statewide adult retrieval service.



## Data

7.4.1 (p.71) A standardised retrieval dataset be developed.

7.4.2 (p.71) This dataset be linked to the statewide trauma dataset.

## Education and Promotion of the Role of Retrieval Services

7.5.1 (p.71) Education strategies be developed emphasising:

- The role and profile of retrieval services
- The need for early activation after patient reception.

7.5.2 (p.71) Regional base hospitals take a leadership role with regard to the promotion and education issues of medical retrieval.

## Transport Platform and Equipment

7.6.1 (p.72) Access to additional rotary wing aircraft is required to ensure retrieval response capacity in time-critical cases.

7.6.2 (p.73) Payload capacity and range of any additional rotary wing aircraft be appropriate for the requirements of statewide medical retrieval.

7.6.3 (p.73) Review of the location and accessibility of helipads when planning new hospitals and for existing hospitals which will play a substantial role in the transfer of major trauma and other time-critical cases.

7.6.4 (p.73) Air Ambulance Victoria operate pressurised fixed wing aircraft, to decrease travel time, improve patient/staff comfort and enable safer transport of neurotrauma patients.

## Process

7.7.1 (p.73) Wider consultation and development of the proposed model with other system users and stakeholders.

7.7.2 (p.73) The Department of Human Services prepare a full proposal and costings on this retrieval service model for evaluation by the Ministerial Emergency and Critical Care Committee.

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## Introduction

The Taskforce has considered strategies for redevelopment of the State's retrieval system as part of the terms of reference to 'provide advice on the effective coordination and management of emergency patients between health care facilities'. The recommendations in this section relate to the principles relevant to trauma retrieval. The Taskforce recognises that trauma retrieval is a small proportion of the overall retrieval workload in this State. The retrieval requirements of other patient groups will, therefore, need to be considered through a wider consultation process before the retrieval service redevelopment is finalised.

For its deliberations, the Taskforce defined retrieval as 'the transfer, including medical retrieval, of time-critical emergency patients (trauma and non-trauma) in rural and metropolitan Victoria'. Retrieval system requirements across Victoria were explored in assessing possible mechanisms of delivery of major trauma patients to definitive care in the most expeditious manner. This was necessary because, although the Medical Emergency Adult Retrieval Service (MEARS) provides a quality service for critically ill interhospital transfers, it does not have an immediate response capacity necessary for patients with time-critical injuries. The CCRTF (1997) previously recommended that:

‘the current system of inter-hospital transfer, transfer and retrieval should be enhanced. A need is perceived to improve the responsiveness and capability of this system particularly in regard to optimisation of team-mix in transfer care.’

## Principles

The Taskforce agreed that the following principles are an appropriate and necessary foundation for retrieval service redevelopment:

- Current and future retrieval services are integrated to provide a retrieval system for Victoria.
- Retrieval missions are coordinated in a timely and efficient manner.
- Skills of the escort personnel should be matched to the acuity of the patient, such that they are able to respond to most clinical scenarios within the constraint of the transport platform.
- Transport platform chosen for a retrieval mission must take into consideration the clinical condition of the patient, transport logistics, and limitations of the respective platform.
- Interhospital transfer of major trauma patients is a critical phase of care that must be undertaken with an escort who is trained and experienced in the transport of critically ill patients.
- The standard of care during interhospital transport must be equivalent or better than at the referring hospital.

## Current and Projected Demand

There are four regional retrieval services and three statewide retrieval services in Victoria. In addition, there is a retrieval service at Albury (NSW) which services a large part of north-east Victoria and a retrieval service from Adelaide servicing Mildura and surrounding areas.

In 1996–97, the Victorian retrieval services collectively undertook 1, 760 missions (Appendix 9). All operate independently. Poorly integrated retrieval data collection limits current and projected retrieval workload estimations.

There is widespread consensus, however, that there are a number of transfers, probably of the order of 100–200 cases annually, currently occurring with less than optimal escort arrangements and in a poorly coordinated and untimely manner. The CCRTF (1997) identified a small number of instances of inappropriate escort in the 50 reviewed trauma cases in 1996–97. The Taskforce also noted anecdotal evidence that some patients inappropriately bypass the formal retrieval system, utilising ambulance services with often inadequate medical escort.

The Taskforce has made recommendations for triage and transfer that will result in increased transfer of major trauma patients to MTS. It is anticipated that there will be an increase in adult transfers from metropolitan hospitals to the adult MTS. Currently, there is an expectation that larger hospitals have the means to provide an experienced escort from within their own staffing establishment. This is not always appropriate and a central retrieval service could offer skilled medical escort for ground transport of trauma patients as required and in conjunction with ASV.

Projecting demand for retrieval services from rural areas is problematic. It is likely that there will be a number of additional major trauma transfers from rural hospitals to the MTS under the proposed trauma system and, with this, greater scope for retrieval from regional centres. Currently, approximately 80 per cent of major trauma is transferred from rural hospitals to tertiary metropolitan hospitals (VIMD, 1997).

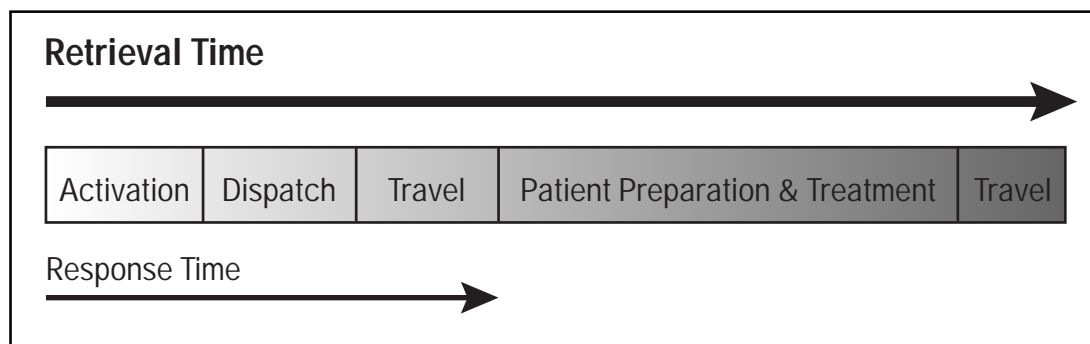
## Coordination and Communication

One of the aims of a trauma system is to minimise the time between patient injury and definitive care. Crucial to the success of a retrieval mission in achieving this is effective coordination and dispatch of the retrieval team (Figure 3.2). Effective coordination should provide the following key functions:

- Single point of communication and dispatch.
- Medical control providing expert and timely clinical advice.
- Capacity to utilise and task the most suitable transport platform.
- Crew mix determined by mission.

Currently, a single call can be made to the OCECCS to organise retrieval and interhospital transfers. It is common, though, for a referral to be made separately to a clinician selected hospital and then, additionally, to the retrieval team/ambulance service.

**Figure 3.2 Response Components of a Retrieval Service**



The Taskforce has recommended a Retrieval Activation Sequence (Appendix 10) to streamline communication and relieve the referring clinician of the need to make multiple contacts. The referring clinician needs to be able to discuss patient management prior to transfer with a consultant level coordinator, for both regional and central retrieval missions. This involves single regional and metropolitan 1800 contact numbers. Regional coordinator contact would, in most regional retrievals, be the appropriate first contact. Exceptions to this might be defined patient groups with a clear need for direct metropolitan referral and, therefore, central contact, such as paediatrics, neonates and neurotrauma.

The destination MTS will depend to some extent on the transport platform, be it road or air. When both adult MTS have equal rotary wing capability, then some form of regional or temporal distribution of patients will be necessary. This is to be addressed by the STC.

Regional retrieval services are always dispatched at a local level. There appears to be little interaction between regional and statewide adult retrieval services with regard to coordination of retrieval missions, nor does dual dispatch currently occur to assist compression of time to definitive care.

## Regional Retrieval Services

Both central and regional services are required for an effective statewide retrieval system. Regional retrieval services provide a valuable service in the management of seriously ill and injured patients in Victoria. Regional autonomy needs to be recognised and is crucial to system success.

Improving regional retrieval requires faster, more appropriate direction of patient movement to definitive care locations, such as through the proposed major trauma transfer guidelines. The regional role of the smaller rural hospitals in managing critically ill patients, including major trauma, needs to be clarified. It is appropriate and necessary for such hospitals to initially stabilise major trauma patients, however definitive care should be provided at MTS.

With the exception of one regional retrieval service, there is no funding allocation for the services. Such funding would support medical escort and clinical management advice to time-critical patients within their region and would require provision of performance data to a central body.

## **Data**

There is currently no common database that collects standardised comprehensive data on all retrieval missions in Victoria. Such a database would assist dramatically in health policy and service planning in Victoria.

A statewide focus for the coordination and operation of all medical retrievals in Victoria would be provided by a Director of Retrieval Services who would assume overarching responsibility for the statewide adult retrieval service.

## **Education and Promotion of the Role of Retrieval Services**

MEARS data (1996–98) identified that the time delay between patient arrival at the sending hospital and referral to a MEARS physician was longer than two hours in 15 of 22 major trauma patients. Prolonged activation times are related to:

- Lack of recognition of severity of illness/injury by referring clinician.
- Overestimation of the capability of the receiving hospital/clinician.
- Lack of awareness of the role and function of MEARS and OCECCS.
- A perception in rural areas that the MEARS service will often not be able to meet the need for timely response in retrieval of time-critical trauma patients. The current limitations in immediate response for such patients relate to staffing and aircraft factors.

## **Medical Staffing Models**

The Taskforce considered the following factors in proposing a medical staffing model for a redeveloped statewide retrieval system.

### **Expert Clinicians**

The interhospital transfer of major trauma patients is a crucial phase of patient care that should be undertaken with an escort who is trained and experienced in the transport of critically ill patients. Standards for the transport of critically ill patients have been established by the Faculty of Intensive Care, ANZCA, and ACEM. An important principle is that the standard of care during interhospital transport is equivalent to or better than at the referring hospital.

The personnel engaging in transport of critically ill patients should be selected for the transport role, be trained in the various aspects of patient transport and be regularly involved in this activity. Ability to communicate effectively and to function as part of the team is essential (ANZCA and ACEM).

The availability of expert clinicians is essential for the provision of clinical management advice, case coordination and being able to task a crew. Paramedical, nursing and medical staff could be appropriate crew members. The current staffing

arrangements of NETS and PETS include predominantly senior registrars and ICU nurses supported by consultants and paramedics as required. All other retrieval services utilise consultant physicians (usually in emergency medicine).

The provision of good clinical advice to referring hospitals is crucial to system user satisfaction and clinical outcomes. This is currently problematic in interhospital transfer, especially after business hours and weekends when consultant coverage in hospitals is limited.

### **Location**

There appear to be some service and cost efficiencies in co-location of a retrieval service's staffing and equipment at either a hospital or airport site. This can provide rapid access to staff and/or transport platforms. However, the benefits of this need to be weighed against significant concerns about 'slip-streaming' or the movement of high acuity, non-trauma patients to the MTS hospitals or the hospital where the retrieval service is located. This may detract from system ownership and potentially contribute to skill dilution and decay, difficulties in retaining and recruiting staff, and decreased training and patient care standards in hospitals losing significant high acuity, non-trauma caseload.

### **Impartiality**

There is a need for the service to provide an impartial operation to all hospitals within the system if there is to be a sense of system ownership. A service that operates from a hospital should not preferentially retrieve patients to that hospital. The service operator should have a management/advisory board representing the key stakeholders of the service. The goal is to maximise major player and broad base involvement.

### **Bed Finding Capacity**

Currently, the central coordination of MEARS missions through the OCECCS enables the patients to be allocated a critical care bed. This capacity is vital to optimal mission coordination.

This feature is of increased importance when the retrieval service operates in a multi-hospital system.

### **Transport Platforms and Equipment**

Although nearly everywhere in Victoria is accessible by some form of aircraft, this is not always appropriate owing to the technical limitations of an aircraft and the clinical care needs of the patient, together with consideration of total transport times and alternative vehicles.

Minimal evidence exists upon which to evaluate the utility and functionality of RW aircraft retrieval. This relates to a current lack of integration of retrieval data between services and, possibly, perceptions about timely response of air retrieval. Anecdotal evidence suggests that currently some patients suitable for air retrieval are being filtered out by not being referred, and are subsequently being transported by road.

The Taskforce advocates that many of the current road and FW retrieval missions would be more appropriately undertaken by RW craft. There is widespread consensus amongst the Taskforce and wider emergency services that a need exists for improved immediate response capacity for time-critical patients, including major trauma. Evidence for the need for additional RW capacity is largely based on anecdotal reports, case series and system provider opinion. In spite of this, the

Taskforce considers that primary retrieval by RW craft has the potential to decrease time to definitive care in major trauma cases, especially in the 50-200 kilometre radius of a MTS. Such primary retrieval would then reduce the need for secondary transfer of critically ill major trauma cases with its attendant risks.

The Taskforce also considers that the payload capacity and range of any supplementary RW aircraft must be appropriate to service the requirements of statewide medical retrieval. The Taskforce recognises that RW requirements will be further evaluated during proposal development in early 1999 and all supporting data will be examined.

The Taskforce supports Air Ambulance Victoria operating pressurised FW aircraft to decrease travel time, improve patient/staff comfort, and enable safer transport of neurotrauma patients.

System responsiveness is also affected by current platform incompatibility, such that patient stretchers are not compatible in all vehicles. The ability to place a patient on a stretcher from which they will not be removed until arrival at destination, must be considered a best practice model. The patient stretcher would need to be compatible across transport platforms (FW, RW, road vehicle). Solutions to the problems of stretcher incompatibility require investigation.

Access to and egress from helipads in close proximity to facilities designated as having a trauma role are essential components of system performance.

## Process

The proposed model requires wider consultation and development with other system users and stakeholders. The Department of Human Services will engage a consultancy to prepare a full proposal and costings on this retrieval service model for evaluation by the STC early in 1999.

**Figure 3.3 Proposed Retrieval Service Model**

Service components	Method of fulfilling components
<b>Primary focus of service</b>	<ul style="list-style-type: none"> <li>• The interhospital transfer of critical care patients.</li> <li>• Prehospital missions in exceptional circumstances (ie. Medical Displan, surgical or difficult extraction).</li> </ul>
<b>Staff type, number and qualifications</b>	<ul style="list-style-type: none"> <li>• Consultant medical staff of appropriate training (Emerg, Anae, ICU etc).</li> <li>• Capable of having a limited number of training positions for appropriate medical registrars.</li> <li>• Up to 24 staff required to supply a 3 oncall capability.</li> </ul>
<b>Staff location</b>	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> oncall: onsite at a metropolitan hospital 24hr/day.</li> <li>• 2<sup>nd</sup> oncall: 30 min oncall availability in metropolitan Melb.</li> <li>• 3<sup>rd</sup> oncall: 30 min oncall availability in metropolitan Melb.</li> </ul>
<b>Road ambulance access</b>	<ul style="list-style-type: none"> <li>• Vehicle supplied from ASV resources as required (location).</li> <li>• Road crew determined by patient acuity.</li> </ul>
<b>FW &amp; RW ambulance access (location)</b>	<ul style="list-style-type: none"> <li>• FW: located at Essendon airport (operated by AAV).</li> <li>• RW: located at Essendon and Moorabbin airports (operated and staffed by AAV).</li> <li>• There is a need for an additional RW aircraft to support the service: <ul style="list-style-type: none"> <li>– For rapid response capability it would pick up 1<sup>st</sup> oncall retrievalist from hospital site.</li> <li>– The aircraft will be utilised to perform prehospital or interhospital missions as required.</li> </ul> </li> </ul>

<b>Process for mission coordination</b>	<ul style="list-style-type: none"> <li>• Retrieval missions to be coordinated and dispatched by the OCECCS.</li> </ul>
<b>Speed of dispatch</b>	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> oncall retrievalist available within 5 min of request</li> <li>• Staff for FW missions to be located to enable the dispatch within 30 min of request.</li> </ul>
<b>Process for ensuring independence to hospitals</b>	<ul style="list-style-type: none"> <li>• Retrieval missions coordinated and dispatched by OCECCS.</li> <li>• Patient destination is not determined by the location of the retrievalist.</li> </ul>
<b>Access to bed finding</b>	<ul style="list-style-type: none"> <li>• Through the OCECCS.</li> </ul>
<b>Source of critical care advice</b>	<ul style="list-style-type: none"> <li>• Through the OCECCS.</li> </ul>
<b>Management structure of service</b>	<ul style="list-style-type: none"> <li>• A broadly based management committee to be established.</li> <li>• A Director of Retrieval Services to be appointed to provide operational management.</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>• The effective implementation of this model is contingent on the prior implementation of: <ul style="list-style-type: none"> <li>* funding for the operation of regional retrieval services.</li> <li>* coordinated and centralised data collection from all retrieval services.</li> <li>* appointment of a Director of Retrieval Services to provide operational management.</li> <li>* improved 24hr access to AAV resources.</li> <li>* availability of appropriate RW aircraft resources to enable a rapid dispatch capability.</li> </ul> </li> </ul>

# Quality Management

## Recommendations

In relation to quality management, the Taskforce recommends:

- 8.1** (p.76) Trauma quality management be developed and implemented at all levels throughout the Victorian State Trauma System.
  - 8.2** (p.77) All hospitals treating trauma patients collect Epidemiological Minimum Dataset items, those receiving major trauma collect the additional data items of the Trauma Minimum Dataset and Major Trauma Services collect System Performance Minimum Dataset items. The collection of extra data be implemented as required for specific projects.
  - 8.3** (p.77) Audit of process and outcomes of trauma care be established and data used in targeting education and quality improvement programs on a system-wide basis and injury prevention and health promotion campaigns.
  - 8.4** (p.79) All hospitals treating trauma patients identify a person responsible for collecting and forwarding data items for review.
  - 8.5** (p.77) The collection process be coordinated through the MTS Statewide Coordination Unit and the statewide trauma registry be maintained by the MTS Statewide Coordination Unit.
  - 8.6** (p.76) Collection of data items be automated and use existing data sources as much as possible.
  - 8.7** (p.76) Exploration of ways to enhance the Victorian Emergency Minimum Dataset and Victorian Inpatient Minimum Dataset data items as the main source for Epidemiological Minimum Dataset trauma monitoring.
  - 8.8** (p.77) A single trauma registry using common software, hardware and data definitions be developed to facilitate the collation of data and system performance monitoring across trauma services
  - 8.9** (p.77) Linkage of existing data sources be investigated, including Police Accident database and Ambulance Service Victoria data.
  - 8.10** (p.79) Immunity from legal discovery be provided for quality improvement discussions and associated documents.
  - 8.11** (p.80) Auditing of regional trauma management activities be undertaken by the regional Consultative Committees on Emergency and Critical Care Services.
  - 8.12** (p.79) Preventable outcome studies utilising peer review by a state committee be undertaken for specifically identified tasks, including trauma deaths. System Performance Minimum Dataset data utilised for this activity.
- 

## Introduction

The management process of the trauma patient is complex, involving both the prehospital and inhospital phases and many medical disciplines, as well as nursing, paramedical and allied health support services. Quality trauma care requires involvement of all levels of the system in monitoring the relationship and process of care. This necessarily requires strategies to assess both clinical outcomes at the individual hospital level and wider system performance. Accountability for quality of trauma care is fundamental to providing optimal patient outcomes.

The multidimensional nature of an integrated trauma system dictates that a well-ordered quality management process be established. This allows for understanding



of areas where activities can be undertaken for better prevention of trauma and the efficacy of management processes, as well as assessment of the appropriateness of outcome from injury.

Major Australian and overseas bodies including NHMRC, ACEM, RACS, NRTAC, ACHS, ACEP and ACS have endorsed ongoing evaluation of the quality of patient care provided by trauma systems and trauma hospitals (McDermott, 1994). This chapter discusses the necessary elements of quality improvement programs for the proposed trauma system in Victoria.

## **Clinical Monitoring**

### **Trauma Datasets**

The hospital trauma registry underpins data collection for trauma quality improvement programs. As both system and hospital monitoring share many common data fields (such as demographics, mechanism of injury, triage, prehospital and in-hospital care and outcome), the trauma registry should be the ideal single point for data collection.

In general, trauma registries for Victoria should:

- Be computer-based and utilise single, standard software.
- Provide a standardised minimum dataset for hospitals or standardised datasets for different levels of hospitals providing trauma care.
- Be flexible enough to provide data for both continuous and periodic audits.
- Incorporate multiple data sources from the phases of trauma care, for example ambulance, hospital care, hospital separations.
- Aim to build on or integrate existing routinely collected data such as ambulance, VIMD, VEMD.
- Be compatible with other relevant datasets to enable the easy transfer and analysis of data.
- Be adequately resourced (ACEP, 1993).

It is optimal that data linkages be established between the datasets collecting epidemiological data on patients with a wide range of injury severity for injury surveillance and for system and hospital monitoring (RACS, 1993). These datasets should be established with recognition of commencement of the Victorian Ambulance Clinical Information System Project and should be created and maintained so as to ensure confidentiality of patient data. The MSCU should maintain the statewide trauma registry in Victoria.

The development of trauma registries for Victoria will initially require as priorities:

- Definition of trauma patients.
- Decisions as to which data fields are to be collected and at which hospitals.
- Investigation and resolution of a range of other technical issues including accuracy of VIMD/VEMD, ICD9-AIS conversion, and impact of ICD10 introduction.

The Taskforce proposes that three levels of data be collected to enable trauma system monitoring along the spectrum of injury. It is neither appropriate nor feasible to require all hospitals receiving major trauma patients, even infrequently, to collect the same complexity of trauma system data.

The Taskforce proposes that the data collection system comprise the basic building blocks of the EMDS and TRMDS. All hospitals treating trauma patients will collect

EMDS data items and those receiving major trauma collect the additional items of the TRMDS. Major Trauma Services, ASV and other hospitals receiving a critical caseload of major trauma will collect extended data relating to the process of acute care and outcome data including, but not limited to, mortality data. This data will comprise the System Performance Minimum Data Set (SPMDS). These levels of data collection are recommended by the RACS Committee on Trauma (RACS, 1993).

Under the RAPID project, the Department is developing a data warehouse to replace VIMD and Psychiatric Records Information System Manager (PRISM) systems, and to provide central collection of VEMD, ambulance, waiting list and health service cost data.

Links with other relevant data sources such as the Transport Accident Commission (TAC) and Coroner datasets should be a future priority for improved monitoring and evaluation of Victoria's trauma system.

### **Clinical Indicators (Audit Filters)**

Clinical indicators act as screens or filters for the identification of potential patient care and process problems, both at a system and hospital level. Indicators examine parameters such as the timeliness, appropriateness and effectiveness of care across the trauma care continuum. Examples of such indicators include:

- Ambulance scene time more than 20 minutes if the patient is not trapped.
- Patient requiring emergency laparotomy which is not performed within two hours of arrival at hospital.
- Patient requiring reintubation within 48 hours of extubation.
- All trauma deaths (ACS, 1993).

Indicator values falling outside predetermined thresholds require in-depth case or system review, as appropriate. The MSCU in conjunction with the STC will develop appropriate clinical indicators, in addition to any current and future statutory clinical indicators.

Specific trauma indicators have been proposed by accrediting organisations such as the Joint Commission on Accreditation of Healthcare Organisations and ACHS, and recommended by ACS and ACEP for trauma quality improvement programs. However, caution should be exercised in implementing trauma indicators. There is little data available on the validity of trauma indicators in identifying patients at increased risk of adverse outcomes or quality of care problems.

A small number of US studies have assessed some ACS indicators in well-established trauma systems and found many to be costly to collect, with limited or no yield for quality of care problems or adverse outcomes. However, some indicators have been shown to have reasonable yields for quality of care problems ranging from 13.8–27 per cent, and for prediction of adverse outcomes. These include unexpected deaths, ICU length of stay more than twice the average, trauma surgeon response, major surgery performed more than 24 hours after admission and femur fracture without fixation. If accuracy of indicator data collection is assured, these indicators will be of value in the quality improvement process (Nayduch et al., 1994; Rhodes et al., 1990).

### **Outcome Review—Survival Probability**

The large databases of the US Major Trauma Outcome Study and National Trauma Registry of the ACS have established norms for survival probabilities of trauma patients with which trauma outcomes for patient groups can be compared. These

norms, relating injury severity to probability of survival, were based on the Trauma Injury Severity Score (TRISS) methodology (ACS, 1993).

The TRISS methodology is probably one of the most widely accepted trauma evaluation instruments in current use (Kelly & Epstein, 1997). Comparison with outcome norms identifies patients with unexpected outcomes (unexpected survivors and deaths) whose cases should be subjected to peer review (Karmy-Jones et al., 1992). However, the methodology has limitations.

A number of modifications of the methodology have evolved in an attempt to answer these limitations, including A Severity Characterization of Trauma (ASCOT), which matches TRISS's reliability of prediction for blunt injury and exceeds it for penetrating injury (Champion et al., 1990). Further evaluation of these tools is ongoing.

Currently, TRISS methodology provides a reliable standardised tool for comparing trauma outcomes by hospitals or systems against defined outcome norms. The limitations of TRISS and ISS mean they are not appropriate to use in comparing quality of care between providers or hospitals (Rutledge, 1996).

TRISS is used both for comparison of mortality rates of large trauma populations and as a screening tool for identifying potentially unexpected fatalities for peer group evaluation (Boyd CR et al., 1987). However, it has well-known deficiencies concerning individual patient assessment: failure to allow for co-morbidity; failure to allow for the quality of pre-hospital management; measurement limited to one injury per body region; its database has disproportionately few cases with severe injury; and it fails to control for increasing age over 54 years. These limitations are evident in a recent evaluation of 544 major trauma patients (Demetriadis et al., 1998). Survival status (alive or dead) predicted by TRISS misclassified the true status in 34 per cent of patients aged 54 years or more and in 29 per cent of those requiring intensive care. In a recent Sydney study of 2,205 trauma patients both TRISS and ASCOT had only 25 per cent predictive value in identifying avoidable deaths (Sugrue et al., 1996).

The current view is that all trauma deaths need peer group review rather than relying on TRISS or ASCOT probability analysis to identify "unexpected" death for review (Danne et al., 1998; Demetriadis et al., 1998; Sugrue et al., 1996).

The best use for a TRISS analysis is in longitudinal studies within one organisation, to give a simple mathematical way of checking outcomes on an ongoing basis, where many other factors are constant.

## **Quality Enhancement**

### **Trauma System and Trauma Hospital Quality Programs**

System and hospital quality improvement programs, while having many similarities, must necessarily differ in their overall focus. System quality improvement will focus on the components of trauma systems and their interactions with each other, while individual hospitals will focus on the care provided to individual patients by individual practitioners (ACEP, 1993).

The essential components for implementation and ongoing support for trauma quality improvement programs, whether at a system or hospital level, are also applicable to both small and rural hospitals, though the scale of monitoring will necessarily be reduced. These essential components are:

- Organisational structure with authority to undertake ongoing evaluation of the quality of trauma patient care and to change policies, procedures and guidelines

as required. At the system level, such authority would appropriately rest with the STC, and at the hospital level, with a designated surgeon or physician, such as the Director of Trauma Services. Administrative support is required at both levels.

- Development and implementation of processes for monitoring and evaluating the quality of trauma patient care. These should be standardised across the trauma system, probably by the STC, and entail defining:
  - Trauma patient population to be monitored.
  - Adverse events and outcomes to be monitored (such as mortality, complications, functional outcomes).
  - Clinical indicators or audit filters to monitor components of the continuum of trauma care.
  - The process of systematic multidisciplinary peer review to evaluate individual cases or problem areas identified by the monitoring processes (at the system level this is appropriately undertaken by the STC and, at the hospital level, by a specifically designated peer review committee).
  - Systematic processes for the collection, evaluation and analysis of data to evaluate these processes/adverse events/outcomes.
  - Frequency of data collection and reporting and the mechanisms for comparing these with state or national norms.
- Implementation of corrective action to address problems identified by the monitoring or peer review processes, although quality improvement discussions and associated documents should have immunity from legal discovery.
- Evaluation of the effect of corrective action, and resetting objectives where required (ACEP, 1993; ACS, 1993; RACS, 1993).

In addition, hospital-based programs for trauma patients need to be closely integrated with hospitals' general quality improvement programs and those of the departments involved in trauma patient care, such as emergency departments. Trauma quality improvement programs will, therefore, be integrated with activities such as clinical risk identification and management, critical incident monitoring, education programs and patient satisfaction surveys, both within and across departments.

### **Multidisciplinary Peer Review Process**

The peer review process has a long established history in trauma and surgical audit, particularly at the hospital level. Standards for the composition, responsibilities and functions of peer review committees are well described, as are criteria for judgements of the appropriateness of care and preventability of death (ACS, 1993).

The multidisciplinary peer review process has been criticised, particularly at the level of preventable death studies, because of the failure to use standardised methodology, resulting in poor reliability of preventable judgements and inability to make comparisons between studies (McKenzie et al., 1992; Wilson et al., 1992).

However, studies such as those conducted by the CCRTF, have shown that with the use of a standardised methodology, including provision of comprehensive information for review, prior training and standardisation of reviewers, and explicit criteria for judgements of preventable death, high inter-panel and interrater agreements can be achieved (McDermott et al., 1997).

There is debate as to how preventable outcome studies should be used to monitor quality and outcomes of trauma care. Preventable outcome analyses are reported to have led to major adjustments in trauma systems and subsequent reductions in

mortality rates. However, the validity of these ‘before-after’ studies has been questioned because of their inherent bias towards favourable outcomes for trauma services or systems and their specific biases due to non-blinding of panel members, stratified randomisation of patients, and the use of minority decisions by panels (Roy, 1987).

In addition, the methodology may be inefficient in defining problems with quality of trauma care. For example, where an institution provides excellent care and trauma deaths are rare, the resulting small denominator could mean a high preventable death rate when compared with other institutions, with exhaustive case review providing low yield for quality of care problems (Kelly & Epstein, 1997). The major focus should not be on estimating a preventable death percentage, but rather on identifying the errors and inadequacies which could have been awarded including those contributing or favouring the patients’ death rather than survival, that is, adverse events.

The peer review process utilising multidisciplinary review is necessarily an intensive and costly exercise and, at the system level, is most efficiently used as a periodic rather than a continuous audit tool, examining a range of system problem areas rather than focusing on a single category of deaths or complications. It should be utilised to study deaths from all types of trauma (in addition to road trauma), and to study adverse outcomes in survivors, as performed in the Major Trauma Management Study (Danne et al., 1998).

The ongoing multidisciplinary evaluations undertaken by the CCRTF since 1992 on more than 500 patients have shown little change in the common receiving problems contributing to death and have identified the system inadequacies and clinical deficiencies prevalent in Victoria. These findings have allowed the Taskforce to make evidence-based recommendations and so produce a report differing from the more generalised NRTAC report.

## **System Performance and Enhancement**

System performance review and the development of strategies will occur on two levels:

### **Statewide**

The STC will be responsible for overseeing monitoring of Victoria’s trauma quality improvement programs at the system level. The STC should clarify responsibilities in all important aspects of system monitoring to promote efficiency and avoid duplication. Currently, some of these functions relating to the monitoring of quality of trauma and emergency care, including access, are performed by a number of government and non-government agencies.

### **Local**

Trauma quality improvement programs will be overseen at the urban hospital level by the MTS Statewide Coordination Management Committee and, at the regional level, by the regional CCECCS in conjunction with the RTS.

# Education and Training

## Recommendations

In relation to education and training, the Taskforce recommends:

- 9.1** (p.82) Undergraduate, postgraduate and continuing education needs of all staff involved in trauma care be considered and fulfilled through the Victorian State Trauma System.
- 9.2** (p.83) Cooperative effort between universities, specialist colleges and hospitals in the implementation of education strategies.
- 9.3** (p.60) Major Trauma Services function as 'resource centres' making available consistent, common information about education and training options.
- 9.4** (p.87) Better integration of the large number of training courses currently available for the multiple disciplines engaged in trauma care.
- 9.5** (A51) The Director of Trauma Services in each hospital ensure the provision of appropriate strategies to meet the educational needs of hospital staff involved in the care of trauma patients.
- 9.6** (p.83) Team leaders and all senior medical staff managing major trauma be at least qualified in Early Management of Severe Trauma.
- 9.7** (p.85) The statewide introduction of a single, standard training course that is locally accessible for Victorian nurses involved in trauma care and integrated with other existing training courses.
- 9.8** (A 47, 48) Inexperienced medical and nursing staff participating in trauma resuscitation have senior staff supervision.
- 9.9** (p.82) Principles of trauma management be a component of undergraduate medical and nursing education.
- 9.10** (p.83) The educational strategies of the Rural Doctors' Association of Victoria Lives @ Risk Committee and the Rural Workforce Agency - Victoria be promoted.
- 9.11** (p.87) Difficulties in participation of general practitioners, especially from rural areas, in attending training courses, such as Early Management of Severe Trauma and Advanced Paediatric Life Support, be further considered.
- 9.12** (p.60) Regional Consultative Committees on Emergency and Critical Care Services develop and implement trauma education plans for their local area in consultation with the State Trauma Committee.
- 9.13** (p.87) The State Trauma Committee develop an appropriate model for training multidisciplinary prehospital teams in rural areas.
- 9.14** (p. 86) Ambulance/Mobile Intensive Care Ambulance paramedics are adequately trained to participate in trauma team management in regional/rural emergency departments as appropriate.
- 9.15** (p.87) Innovative education processes, such as mobile simulators, telemedicine and multidisciplinary training be developed to maintain the skills for personnel who have rare exposure to trauma and medical emergencies.
- 9.16** (p.88) The role of the Victorian State Trauma System, including public education, is important to the success of injury prevention strategies.
- 9.17** (p.88) Collaboration of the Victorian State Trauma System with other key stakeholders in injury prevention to:

- Support public education
  - Strengthen the measures that provide effective injury prevention
  - Increase the adoption and enforcement of safety legislation or policies
  - Contribute to injury research.
- 

## Introduction

The education and training requirements of a trauma and emergency system must reflect the system in which it operates and ensure efficient and effective trauma management and continuous quality improvement.

The education system must account for the continuum of needs from undergraduate education, postgraduate/specialist training through to continuing education programs for skill maintenance and knowledge improvement. Education strategies need to encompass training in trauma management, including advanced life support skills for the various disciplines involved in managing major trauma.

Servicing these educational needs will, in part, address system deficiencies identified in previous research (McDermott et al., 1996; Danne et al., 1998). The education processes inherent in the system need to ensure two key features:

1. There should be opportunities for quality training in trauma care within the system.

Achieving and maintaining the skills necessary for expert trauma care requires not only training but exposure to time-critical trauma cases. The system should allow for training opportunities for the various health professionals involved in trauma care. It is envisaged that the MTS will have the largest clinical caseload of major trauma patients. Training programs provided by the MTS should give opportunities for advanced training in medical, nursing and other health specialties. These opportunities can incorporate traditional clinical rotations as well as innovative distance education programs utilising other education methodologies.

2. There should be motivated and dedicated personnel available to undertake trauma care.

The care of a major trauma patient is a 24-hour-a-day commitment. Institutions designated as major, metropolitan or regional trauma services should be able to guarantee the continued availability of specialist staff, especially experienced surgical staff. There is a limited availability of sub-specialty surgical staff who can provide both the experience and the motivation to undertake the rigours of major trauma care.

This chapter discusses educational strategies related to trauma management currently in place in Victoria and outlines areas for improvement.

## System Guidelines

The relative immaturity of the trauma system concept, especially in Australia, means that there is a lack of guidelines to help drive the education of the system. While considering this, it is important to place the education services aimed at trauma care in the perspective of their component of overall emergency care.

## **The Model Trauma Care System Plan (US)**

*The Model Trauma Care System Plan* (1992) published by the US Department of Health and Human Services provides a sound approach to education and training of the system. Of note are the following recommendations:

- A well-planned needs assessment that identifies current resource levels and availability is an essential prerequisite to developing further educational activities (p. 19).
- Quality management programs for monitoring courses and instructor certification/re-certification should be established (p. 19).
- Educational programs may be particularly important in facilities that do not receive a high volume of trauma patients (p. 20).

## **National Road Trauma Advisory Council (NRTAC)**

The NRTAC *Report of the Working Party on Trauma Systems* (1993) recommends that a training program should be an integral component of an overall quality management program. In addition it recommends that:

- There should be developed clinical training posts with a trauma emphasis. Such posts may allow the rotation of advanced trainees or the appointment of clinical fellows.
- Formal trauma care education programs should be developed and offered to:
  - Specialists in surgery, emergency medicine, anaesthetics and intensive care
  - Nurses
  - Allied health personnel
  - General practitioners.
- Continuing education for both medical and nursing staff in rural areas has to be addressed as a special issue. To some extent, this could be done through staff working temporarily with MTS. This would, however, require the support for locums, travel and accommodation (p. 70).

## **Australian Council of Healthcare Standards Guidelines**

The ACHS guidelines are based on information from the NRTAC Report of the Working Party on Trauma Systems (1993).

Some comments pertinent to the area of trauma education and training include:

- Major and regional trauma services contribute to training in trauma management for medical, nursing and paramedical staff, particularly in rural regions.
- It is expected that medical practitioners who may be involved, even rarely, in the management of severe trauma undertake the EMST course of the RACS, or equivalent.
- Medical specialty trainees attached to trauma services are closely supervised by senior staff of the specialty (ACHS, 1997, p. 7).

## **Gaps in System Guidelines**

The ACHS document provides a guide to the minimum standards that can be expected by some of the practitioners within the system. There is no guidance for capacity building of the system and the roles that the various trauma system components play in developing and promoting the system.

The NRTAC guidelines provide more direct guidance on how to operate an education program. In particular, they emphasise the roles that various components of the trauma system play in the education plan. This approach is attractive and needs further evaluation before implementing in Victoria.



## **Role of Director of Trauma Services**

The emerging role of the Director of Trauma Services in Victoria, whether it be on a Network or hospital basis, should have responsibilities for all staff, not just medical, involved in trauma care at a trauma service. The focus of the position must include integrating the trauma service into the wider emergency system. As such, there will be a significant role in coordinating education programs, both within the hospital and with other agencies involved in trauma care.

## **Medical Education**

### **Undergraduate**

Undergraduate medical education is provided in Victoria by the University of Melbourne and Monash University. Principles in the management of trauma patients are delivered through structured workshops and tutorials and the quantity and quality of this instruction is likely to be variable.

### **Postgraduate**

The EMST course has been offered in Australia since 1988 by the RACS. The course is adapted from the Advanced Trauma Life Support (ATLS) course initially developed in the US and now conducted in more than 16 countries.

Training in ATLS aims to assist relatively inexperienced medical officers to handle complicated clinical situations in a controlled setting (Drummond, 1993). It teaches 'one safe system of assessing and managing victims of trauma in the first hour' (Gwinnutt, Driscoll, 1996). 'The course is a combined educational format of lectures associated with lifesaving skills and practical laboratory experiences' (Collicott, 1992, p. 749). Assessment of the impact of ATLS on patient outcome is difficult to assess since results of outcome studies are often confounded by external factors including the standard and responsiveness of prehospital care.

An EMST qualification is now seen as the minimum standard qualification of the trauma team leader, a prerequisite for admission into many advanced training programs and a compulsory component for registrars in the Rural Training Stream. Neither the ACEM nor the Royal Australasian College of General Practitioners (RACGP) has successful completion of the EMST as a prerequisite for registration, although the majority of fellows of the ACEM have completed the course. Despite the lack of evidence that ATLS improves patient outcome, it is seen as a legal standard of care for trauma patients in the USA. No such legislation is in place in Australia.

An Advanced Paediatric Life Support (APLS) course has recently been established in Australia. APLS (Australia) is a not-for-profit organisation established with the aim of providing practical courses to medical and nursing personnel in the immediate assessment and treatment of the acutely ill and injured child.

### **Advanced Training**

Advanced medical training programs are conducted through the medical colleges. Many medical disciplines have a crucial role in the care of trauma and emergency patients including, but not limited to, surgery, emergency medicine, anaesthesia and intensive care.

The RACS training in surgery is through a combination of supervised workplace experience in the full spectrum of patient management as well as academic pursuits. RACS is thus independent of universities and government in determining

professional standards. Emphasis is constantly placed on the quality of the training, more than on the nature of the qualification, notwithstanding the importance of the latter.

The Fellowship of RACS is an 'exit' qualification, a mark of completed training, guaranteeing to the community an appropriately qualified surgeon. Further post-fellowship training may be undertaken either locally or overseas.

### **Gaps in Education Programs**

There appears to be a need for a standard curriculum for the orientation and postgraduate training of medical interns in trauma and emergency management. The current method of in-house orientation, while adequate, is likely to be highly influenced by the priorities and specialties of the particular hospital.

EMST courses are available across Australia, however, there is a need to increase the availability of these courses for rural practitioners and address some of the barriers that limit the availability of rural GPs to attend these courses. The development of the APLS course is an encouraging sign in developing advanced skills in the treatment of paediatric emergencies, but addressing some of the barriers to attendance would optimise the success of this training.

Currently, there is no advanced surgical training in trauma. One of the important factors in developing an advanced training program in trauma surgery will be ensuring an adequate experience level for trainees. There has been ongoing controversy in defining the level of exposure that is necessary to obtain and maintain expertise with trauma care. The low incidence of trauma in Australia makes this problematic.

## **Nursing Education**

### **Undergraduate**

Undergraduate nurses typically have minimal exposure to, and emphasis on, the initial management of the trauma and emergency patient. There are usually some brief clinical placements to emergency departments and other critical care areas during the latter stages of undergraduate nursing education. The principles of resuscitation and acute trauma and emergency care are covered but the development of competence in this area is usually not an objective.

### **Postgraduate**

Postgraduate nursing training is variable, depending on the institution involved. The standard graduate year involves a structured education program with additional tutoring by nurse educators, some rotation through various clinical areas and the completion of some academic work.

Most specialist clinical areas have the support of nurse educators who are primarily responsible for the orientation and development of knowledge and skill levels of new nursing staff.

There are many private and professional agencies that conduct continuing education programs for registered nurses, often concerning advanced skills and techniques. For example, an offspring of the ATLS educational format is the Trauma Nursing Core Course (TNCC) developed in America by the Emergency Nurses Association for national and international dissemination as a means of identifying standards of nursing care based on current knowledge relating to trauma.

In Australia, it is organised and conducted by the Emergency Nurses Association in NSW on license from the US. In each state of Australia there is a coordinator who directly deals with NSW to organise courses. All nurses dealing with trauma patients are encouraged to attend this course, however current access to such courses for Victorian nurses is severely limited and is being addressed by the Victorian Emergency Nurses Association in the near future. The Taskforce endorses the statewide introduction of a single, standard training course that is locally accessible for Victorian nurses involved in trauma resuscitation and care.

### **Advanced Training**

In line with the move of undergraduate nursing training into the tertiary education sector, most advanced training courses are now conducted in conjunction with a hospital and a university. Commonly, these courses are conducted over a 12-month period, with the students employed by the hospital and attending the academic program at the university. Successful completion of a postgraduate course is generally seen as a minimum standard for advanced practice in a critical care area.

### **Gaps in Education Programs**

For many years there has been an inadequate supply of qualified and experienced critical care, emergency and perioperative nurses in Victoria. This has caused many problems for the health care system, especially with limitations on ICU bed availability. There is an ongoing demand in most hospitals for nurses with critical care skills and qualifications, and some academic institutions are unable to fill all the training places available.

Nurses with advanced skills contribute significantly to the efficient and effective treatment of emergency and trauma patients. However, the Review of Emergency and Critical Care Services in Victoria (1994) recognised that education needs were an issue and recommended:

- All hospitals providing an emergency medical service should ensure access to clinical teaching support for their emergency nurses.
- Hospitals should provide clinical teaching support in critical care units to assist with the orientation of new staff, in-service education and ongoing clinical support for all staff.
- Hospitals should recognise the need for extensive orientation and supervision of non-certificated staff and budget for sufficient supernumerary orientation time (Health and Community Services 1994, pp. 12, 37).

### **Prehospital Care Providers**

The education and training of ambulance officers is crucial to the efficient operation of the trauma system and optimal patient outcomes. Ambulance paramedics are trained in basic life support through a three-year Associate Diploma of Health Science to enable primary intervention in the prehospital setting. The availability of adequate supervision for students and recent graduate ambulance officers is a necessary requirement when considering placements.

A MICA paramedic has an additional year of postgraduate training in a range of advanced life support techniques, including endotracheal intubation, intravenous infusion, drug therapy, relief of tension pneumothorax and cardiac monitoring.

The progressive introduction of paramedics across Victoria is a welcome development in introducing advanced prehospital skills to rural Victoria. Appropriate mechanisms need to be developed to ensure that high skill levels are maintained.

## **Continuing Education and Professional Recertification**

‘Professional recertification is a process that stipulates continuing education as a means of maintaining professional competence’ (Victorian Department of Health and Community Services Vol. 1, 1995, p. 12). The Committee on Quality made the recommendation that all health care professionals should recertify and quality should be mandated as part of this process. This should be essential for all practitioners involved in trauma care, regardless of the setting. The ACEM is implementing a compulsory program of CME.

Continuing education programs should be developed and implemented in any organisation that treats trauma patients. This can include case reviews and audits of performance in clinical management. The development of local trauma committees can facilitate the involvement of the multidisciplinary trauma care team.

## **Rural Education**

All staff providing trauma care management in rural areas need appropriate education and skills in initial resuscitation, stabilisation and continuing care prior to transfer to definitive care. The educational requirements of rural practitioners are similar to those of clinicians elsewhere in the system. However, there are some unique needs for clinicians in some areas, relating to infrequent exposure to trauma and emergency patients; geographical isolation from high level services and clinical advice in some areas; limited access to advanced training courses; and significant financial burdens in participating in advanced training courses.

The Taskforce recognises that rural GPs encounter additional financial difficulty in undertaking skills training through loss of income and locum cover charges, and recommends that strategies be developed to assist with skills training.

Training is vital to improve and maintain trauma management skills in rural areas, especially in light of some concerns about potential deskilling. These concerns result from triage and transfer of, albeit small, additional numbers of major trauma patients from each region to the MTS. Educational strategies might include:

- Mobile simulator/training aids.
- Telehealth/telemedicine.
- Combined team training to maximise the capacity to respond to time-critical patients, especially in isolated areas. Teams involve GPs, ambulance personnel and nurses. The nurse practitioner model currently under review may have significant impact and provide opportunities for isolated rural areas. The STC should develop an appropriate model of combined team training.

## **Participating Agencies**

Collaboration between participating agencies is crucial to the development of a cohesive emergency and trauma education plan in rural areas that meets clinician needs and avoids duplication of programs. The formation of regional CCECCS in Victoria is an important step in the process of coordinating rural education programs, but these bodies need to continue to liaise with other key organisations.

Several groups currently address, organise or promote education programs for rural practitioners. These include the Divisions of General Practice, the Coordinating Unit for Rural Health Education in Victoria Inc (CURHEV), RWAV, RDAV and its Lives @ Risk subcommittee.

The Taskforce supports the recommendations of the Lives @ Risk subcommittee (1998) that:

- A GP Opt-in System should be established for rural GPs who wish to be on call for emergencies, and who will have identified themselves for this role and as having up-to-date specialist emergency/life support skills, such as EMST, APLS, ELS.
- Rural GPs should be trained in skills and guidelines for providing emergency support in individual and group response settings and with ambulance services.
- Rural GPs should be equipped to provide emergency services in their clinics or as first responders; to supplement the response kits of ambulance services; and for there to be emergency response kits with agreed minimum contents in identified locations.
- Opt-in GPs should have access to communication systems that will work in remote or 'dead' areas and GPs should be included in the ambulance guidelines for call.

## **Public Education and Injury Prevention**

*Safety First* is a key achievement of *Taking Injury Prevention Forward*. This program, launched in 1995, aims to reduce the incidence, severity and cost to the community of road crashes. It has targeted priority areas identified by research data and adopted an innovative spectrum of prevention strategies ranging through integrated education, enforcement, promotion and engineering strategies, to produce progressive falls in Victoria's road toll which are the envy of other Australian States and most other nations (Health and Community Services, 1995).

The RACS provides an outstanding example of the leadership and advocacy role that professional bodies can achieve in injury prevention through its collaborative work in road trauma across the areas of education and public awareness, research and evaluation.

The Victorian State Trauma System and participating hospitals will have major opportunities to use their community standing and expertise to promote public awareness about general and targeted injury prevention strategies, either as part of statewide strategies or local community efforts (NHPA, 1998; NRTAC, 1993; ACS, 1993).

# Research, Service and Technology Developments

## Recommendations

In relation to research, service and technology developments, the Taskforce recommends:

- 10.1** (p.91) Statewide application of telemedicine in the neurosurgical management of major trauma patients.
  - 10.2** (p.91) Integration of telemedicine links.
  - 10.3** (p.91) Maturation of clinical information systems.
  - 10.4** (p.91) The introduction of digital communication systems.
  - 10.5** (p.91) Technological developments that speed diagnosis of critical injuries.
  - 10.6** (p.92) Introduction of service and technology developments that have a proven efficacy and value for the health care system.
- 

## Introduction

In an environment of ever-increasing expensive technologies, limited health care funding and lack of available evidence about the effectiveness of many current technologies, health technology evaluation has become a major priority for the Australian health care system. Lack of support for evaluation leaves consumers exposed to unnecessary risks and continues the pattern of wastage of valuable resources.

Similarly, evaluation of clinical practices that may not necessarily involve new technology continues to provide the foundation for rational and justifiable changes to clinical practice. This chapter discusses the areas for ongoing research relevant to trauma care, the technologies likely to impact on trauma care in the future and recommendations for priorities in their introduction.

## Research

### Injury Prevention Research and Funding

The World Health Organisation (WHO, 1996) advises that research in injury prevention is best directed to those areas of high burden of disease and, if evidence is equivocal or lacking, a strategy of applied research and evaluation is advisable. The National Health Priorities Areas report (NHPA, 1998) indicates that there is a clear need to improve the availability of sound evidence for injury prevention interventions (AIHW, 1988).

The low levels of public research funding for injury research are currently the subject of investigation by the Strategic Research Development Committee of the NHMRC. Most research expenditure occurs in the well-organised and administratively distinct areas of road and occupational safety, and there are low levels of funding for the remaining 40 per cent of injuries causing death and disability (AIHW, 1988).

### Clinical Practice

The Taskforce has proposed the introduction of an integrated trauma system for Victoria with the aim of addressing identified system and management deficiencies (McDermott, 1997; Danne, 1998). This will entail significant changes to how and where major trauma patients are managed. Clearly improved outcomes in this

patient group are anticipated and need to be rigorously evaluated through well-constructed clinical trials and quality assessment measures.

The STC will set priorities and plans for such research and all levels of the trauma system will participate. The Taskforce has flagged the triage of major trauma patients in a 'life-threatening situation' as a priority research area.

### **Service and Technology Developments**

Appropriate use of health technologies depends on providers adopting an evidence-basis for practice. An enormous amount of work is currently being conducted by bodies such as the Cochrane Collaboration to assemble evidence about all categories of clinical practice, including appropriate use of technologies. New service and technology developments introduced to support Victoria's trauma system should be evaluated through research, where feasible.

### **Service and Technology Developments**

Health technologies are defined as 'any method used by health professionals to promote health, prevent and treat disease, and improve rehabilitation and long term care' (Standing Group on Health Technology, 1994). This definition includes drugs and devices, medical and surgical procedures, plus the organisational systems in which these technologies are provided.

Development of clinical procedures and diffusion of health technologies has usually taken place in the setting of providers' clinical autonomy, with evaluation relying on professional self-regulation. As a consequence, the potential for safety, efficacy and effectiveness of many procedures has not been evaluated (Gelijns, 1990).

There has been major support at many levels of the health care system for devising and disseminating clinical practice guidelines and coordinated care pathways related to common illnesses or symptom complexes. The uptake of evidence and guidelines by providers continues to be patchy as many fear a loss of their clinical autonomy. Ongoing efforts in this area need to be supported and new initiatives devised to improve the uptake of evidence-based practice.

Consideration of the funding implications of new health technologies involves the interplay between a number of complex issues:

- Technologies are usually additive to current practices.
- Technology establishment costs may be high, but recurrent funding is usually more significant.
- IT costs of telemedicine will be high if properly implemented.
- There are potential savings from successful preventive and screening technologies.
- Private versus public involvement in research, development and implementation of new technologies.

### **Treatment Modalities**

The following service or technology developments have been identified by the Taskforce as relevant and potentially beneficial in trauma care:

- Development of the trauma team approach to trauma resuscitation.
- 'Point of care' recording of patient treatments.
- Electronic and bioengineered artificial aids.
- Lighter, more durable prostheses.

## **Diagnostics**

In trauma care, technology developments that speed diagnosis of critical injuries are likely to be of greatest importance. Examples of this might include bedside and near-patient diagnostics and continued expansion of CT, MRI, SPECT imaging.

### *Ultrasound in Trauma and Emergency Care*

Studies by European, US and Japanese facilities have demonstrated that brief, highly focused ultrasound examination can provide a valuable bedside clinical tool for rapid assessment of emergency patients and can be performed to a high standard by non-radiologists with frequent and extensive experience (Tiling, 1990).

A rational approach to imaging of emergency patients which aims to maximise efficiency of resource use and diagnostic accuracy would be to provide imaging that is timely, appropriate for the patient's clinical condition, and performed by the most highly trained staff available.

### *Transoesophageal Echocardiography*

This specialised ultrasound technique, generally performed by cardiologists, has recently been undergoing evaluation as a modality to complement and possibly replace the gold standard of aortography for diagnosis of traumatic aortic dissection (Chan, 1998). Study results have varied widely, perhaps related to the experience of operators. In the largest study to date, a prospective study from 50 US trauma centres, the technique was found to have an unacceptably high false negative rate of 20 per cent, suggesting that at this time aortography should remain the diagnostic procedure of choice (Fabian et al., 1997).

## **Information Systems**

### *Information Systems*

The maturation of clinical information systems is likely to significantly impact on trauma care, as it will in most other aspects of health care delivery. The implementation of decision support systems, clinical pathways, electronic medical records, real-time data collection and physiologic monitoring data integration are likely to be of most relevance to acute trauma care delivery.

### *Telemedicine*

While many definitions of telemedicine exist, the essence of telemedicine is the use of telecommunications technology for medical diagnosis and patient care for sites that are at a distance from the provider. The information exchanged may be a voice, an image, medical records or commands to a surgical robot. The technology encompasses everything from a standard telephone service through transmission of digitised signals in conjunction with computers, fibre optics, satellites and other sophisticated peripheral equipment and software (Currell et al., 1997; Coiera, 1995).

Telemedicine services are expanding around Australia and, through a number of State Government initiatives, have largely focused on providing communication links between tertiary level hospitals/specialists and rural locations for services including psychiatry, general practice, renal dialysis and intensive care (Yellowlees & Kennedy, 1997). A number of telemedicine pilot projects have already been undertaken in Victoria.

While there is a paucity of evidence on the efficacy of telemedicine in improving systems of trauma care, telemedicine has significant potential to impact on the delivery of trauma and emergency services by augmenting the delivery of timely, appropriate care, including appropriate patient transfer, especially for remote and rural services.



Expert advice on current and future management of trauma and emergency patients can be provided through links between tertiary level hospitals and other metropolitan or remote hospital sites for patient interview, clinical examination and transmission of data including radiology/pathology tests and ECGs. Specific teleradiology links are proving particularly useful for discussions of management of neurotrauma and orthopaedic trauma patients. Expert evaluation of patient X-rays and computed tomography images may save unnecessary patient transfer where local services are adequate. The success of teleorthopaedic links such as the Flinders Medical Centre's links to both metropolitan and remote sites has led to plans for a national orthopaedic online register for treatment of trauma patients (Yates, 1998).

As telemedicine technology improves and costs fall, it is expected that there will be increased demand for expansion of telemedicine links. Sustained support by clinicians is likely to depend on the presence of clinical leaders in telemedicine, adequate training in telemedicine interview techniques, and incentives for telemedicine use backed by funding which covers not only the technology but also staff, training, line charges and maintenance (Yellowlees & Kennedy, 1997).

The potential for widespread use of telemedicine means that further discussion and evaluation will be required on a range of issues including:

- Medico-legal issues.
- Reliability and validity of technologies.
- Effectiveness, efficiency and safety of technologies.
- Eligibility of consultations for Medicare Benefit payments.
- Patient confidentiality.
- Quality control and standards of care.
- Rights of access (Currell et al., 1997; Hailey and Jacobs, 1997).

# Funding

## Recommendations

In relation to funding, the Taskforce recommends:

**11.1** (p.94) A tiered strategy for investment prioritising the following key areas:

- System coordination mechanisms, including data collection, analysis and dissemination
- Targeted trauma education and training
- Enhanced primary transport and secondary retrieval services
- Hospital staffing levels that meet role delineation specifications.

**11.2** (p.93) Purchasing options that support the system improvement strategies recommended by the Taskforce, such as triage and transfer of major trauma patients to Major Trauma Services according to appropriate guidelines.

**11.3** (p.96) Purchasing options to be further developed with key providers and stakeholders during the implementation stage.

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## Introduction

Purchasing and payment approaches specific to major trauma cases provide not only appropriate reimbursement for services delivered but can also incorporate a range of incentives to promote appropriate triage and transfer to MTS. These incentives are justified in a trauma system predicated on the following principles:

- Optimal clinical outcomes for patients following time-critical trauma are achieved when time to definitive treatment is minimised.
- Trauma patients should be triaged to a hospital that is best able to provide definitive care.
- Trauma management is considered a specialised activity that should be undertaken in a designated trauma hospital.

Purchasing and payment approaches are a key mechanism in promoting appropriate triage and transfer to MTS. Other mechanisms include:

- Education and training of ambulance, clinical and other emergency staff responsible for the triage, treatment and referral of major trauma cases.
- Prehospital triage guidelines for ASV that will result in major trauma patients bypassing other hospitals within logistical and safety considerations.
- Interhospital transfer guidelines at hospital level to clearly identify those patients requiring referral and/or transfer to a MTS and the associated process.
- Ongoing monitoring of the effectiveness of triage and interhospital transfer guidelines as an integral part of the overall trauma monitoring system.

This section outlines the current approach to funding trauma care and provides options for future consideration in the context of anticipated system changes.

## Current Purchasing Strategies and Payment Approach

### Prehospital and Interhospital Transfer Payments

The cost of transport to the initial hospital is borne by the patient (under ambulance insurance cover or by the individual concerned) or a specified third party insurer (for example DVA, WorkCover, TAC). The destination decision, however, is made by the ambulance officer based on defined triage and transport guidelines relating to the accessibility of an appropriate service and the patient's condition, rather than on the basis of transport cost.

The issue of whether there would be additional costs incurred by either ASV or, where not covered by insurance, by individual patients arising from the application of such guidelines, needs further consideration. Although the flat fee structure for ambulance transport recently introduced by MAS would meet cost concerns in relation to non-ambulance insured cases in metropolitan Melbourne, ASV's internal administrative mechanisms should be in place to support appropriate prehospital referral and transport based on agreed guidelines.

Interhospital patient transfer costs, including escort and ambulance costs associated with transfer, are currently paid for by the hospital initiating the transfer.

On the assumption that appropriate clinical care is constant, the incentives to admit or transfer patients need to be reviewed not only in terms of likely costs of ambulance transfer, but the total payment likely to be received for the length of stay.

### **Inpatient Payments**

The payment of hospitals for treating trauma patients needs to be considered within the overall funding policy for public hospitals. Hospitals are paid on the basis of State benchmark rates for the care they provide to patients. In general, the payment structure should be as non-specific as practical giving hospitals/regions the ability to substitute different types of services where and when appropriate, consistent with their role and function.

Hospital specialisation, however, provides opportunities for better patient care, increased predictability of hospital workload and increased efficiency. The move to designate specialist trauma hospitals is consistent with the current approach in funding other specialist services such as paediatrics and intensive care. While three MTS are proposed, similar major trauma will continue to be treated at other trauma hospitals. Therefore, the definition of cases must also include the service itself.

### **Identification of Major Trauma Patients**

All of the inpatient payment and casemix funding options on the next page depend on an adequate estimate of major trauma patients. The identification of major trauma patients poses difficulties within the current system. Agreement is required among relevant authorities regarding those Australian injury and poisoning ICD codes which constitute major trauma.

The use of ICD-10 codes to identify major trauma and the suitability of AR-DRG Version 4.1, and/or the possibility of Victorian codes and DRGs, need full assessment in terms of feasibility and cost. Conversion of ICD codes to ISS should be assessed for possible system or hospital level application.

### **Resource Requirements**

Effective implementation of the VSTS will require support with an appropriate level of resources. A tiered strategy for investment would enable Government to prioritise funding for the VSTS and direct available resources at key areas where use or impact is greatest.

Although a number of system features and demands require resource support, the following are key areas for priority investment:

- System coordination mechanisms
- Targeted trauma education and training
- Enhancement of primary transport and secondary retrieval services
- Hospital staffing levels that meet the role delineation specifications.

## **Future System Funding**

### **Prehospital and Interhospital Transfer Payments—Options**

Reviewing the current payment system for interhospital transfers to the MTS with a view to moving the responsibility for such costs to the receiving MTS, would reduce any current cost incentive on non-MTS hospitals to retain major trauma patients inappropriately.

However, this would introduce a new precedent into transfer policies and may encourage inappropriate transfer to the MTS or increase the level of patient refusal at other trauma services.

### **Inpatient Payments and Casemix Funding—Options**

#### **Specified or Block Funding**

Where costs are largely fixed with respect to output, funding through block or specified grants is required. Currently, non-admitted emergency services are paid by block grants to hospitals in recognition of the relatively fixed costs associated with staffing 24-hour emergency services. These grants were established following a review of all available data by the Emergency Services Categorisation and Funding Taskforce, which comprises representatives of the Victorian Branch of ACEM, the Victorian Ambulatory Classification System Advisory Committee, hospital emergency departments (including a non-metropolitan hospital) and the Emergency Nurses Association. These grants could be adjusted to account for more highly specialised staff/services of MTS.

#### **Classification Refinement**

Some clinicians have expressed concern at the ability of AN-DRGs to capture cost differences for patients with multiple problems (as with many trauma patients). The anticipated move to AR-DRG Version 4.1 in 1999 is expected to improve the classification for trauma patients and enable improved costings for specific groups. The introduction of Version 4.1, plus the possible creation of new Victorian AN-DRGs including new same day/one day DRGs, could possibly provide the appropriate casemix funding structures. Under this system, similar cases will receive the same payment. Attention would need to be given to ensure duplicate payments are not made where existing specialised services currently receive separate grants.

#### **Below Benchmark Pricing**

Weights associated with overnight trauma patients could be set below benchmark price with additional co-payments or specified grants to the three MTS hospitals. Such a financial incentive for hospitals to transfer trauma patients is a high-risk strategy, both in terms of the overall integrity of the funding policy and, especially, in terms of patient care.

Paying hospitals at below the benchmark price represents a significant departure from the policy of 'paying a fair average price'. Currently, all inliers are paid at a rate reflecting the cost (or estimated cost) of the care typically provided. Co-payments are used to provide additional funding for patients with atypically high costs. This can be done for specific hospitals with specialised facilities (for example mechanical ventilation co-payment).

Paying less than benchmark prices for trauma at non-MTS hospitals has the potential for encouraging inappropriate care. Faced with the pressure of inadequate funding, there is a potential for trauma services to unnecessarily transfer patients with relatively minor conditions or to inappropriately transfer seriously ill patients before they are fully stabilised. This option is not recommended.

### **Modifying Weighted Inlier Equivalent Separations (WIES) Targets**

The creation of three MTS could result in a redistribution of current health care delivery and consequently requires a review of WIES targets. Transferring the WIES associated with the provision of overnight trauma care to MTS and discounting these WIES when calculating future WIES targets for other hospitals could achieve the same impact as paying below benchmark prices. Most hospitals reach their annual WIES targets. Although any trauma care provided would be fully funded, hospitals would have a significant incentive to preferentially provide other types of care because such an approach could potentially contribute to obtaining more WIES in the following years.

### **Next Step**

Purchasing policy to support the Taskforce's recommendations for system improvements, such as appropriate triage and transfer of major trauma, will be developed. This will occur at implementation planning in conjunction with stakeholders and providers.

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## 5. Appendices

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## **Appendix 1**

### **Terms of Reference— Ministerial Taskforce on Trauma and Emergency Services**

## Terms of Reference– Ministerial Taskforce on Trauma and Emergency Services

The revised terms of reference for the Ministerial Taskforce on Trauma and Emergency Services are:

1. To advise on an appropriate system structure for integrated trauma and emergency services, considering the following issues:
  - Demographic and demand trends and service and technology developments that will influence future service requirements.
  - Role delineation of trauma and emergency services, considering metropolitan and regional service requirements.
  - Optimal staffing, support services, facilities and clinical services associated with each role.
  - Optimal number and location of such facilities, giving consideration to optimal patient care, the directions and developments outlined in the Metropolitan Health Care Services Plan, changes in demand, efficient use of resources, access and responsiveness and relevant government policies.
  - Effective coordination and management of emergency patients between health care facilities.
  - Effective collaboration of services between government, private and voluntary agencies.
2. To advise on appropriate structures for ongoing monitoring of the accessibility and responsiveness of trauma and emergency services, considering the following issues:
  - Development of an effective system of quality assessment and quality assurance with ongoing reporting to the Government of the performance of trauma and emergency services.
  - Emphasis on patient outcomes including mortality, morbidity, functioning, quality of life and patient satisfaction.
  - Facilitation of best practice, quality improvement and other service improvement initiatives.
  - The Department of Human Services Information Strategy and related information projects.
3. To advise on education and training issues relating to trauma and emergency services, including prevention and public education, where relevant.
4. To advise on priorities for research and development that will enhance the delivery of trauma and emergency services in Victoria.

The Taskforce will work in consultation with the Working Party on Emergency and Trauma Services. It is chaired by Mr Robert Doyle, Parliamentary Secretary to the Minister for Health.

## **Appendix 2**

### **Terms of Reference— Working Party on Emergency and Trauma Services**

## Terms of Reference– Working Party on Emergency and Trauma Services

The terms of reference for the Working Party on Emergency and Trauma Services are to prioritise and assist in implementing health care service improvement initiatives identified by the Consultative Committee on Road Traffic Fatalities and other relevant bodies.

In undertaking this task, the Working Party will consider:

- The reports and recommendations of the Consultative Committee on Road Traffic Fatalities in Victoria and other relevant reports.
- A broad range of initiatives to include, but not be limited to, best practice guidelines, quality improvement activities, pilot studies, education and funding incentive programs.  
and
- The cost-effectiveness of proposed programs.

The Working Party will report to the Director, Acute Health, and will work closely with the Ministerial Taskforce on Trauma and Emergency Services and the Acute Health Quality Committee.

The membership, terms of reference and ongoing role of the Working Party will be reviewed in 1998 following the report of the Ministerial Taskforce on Trauma and Emergency Services.

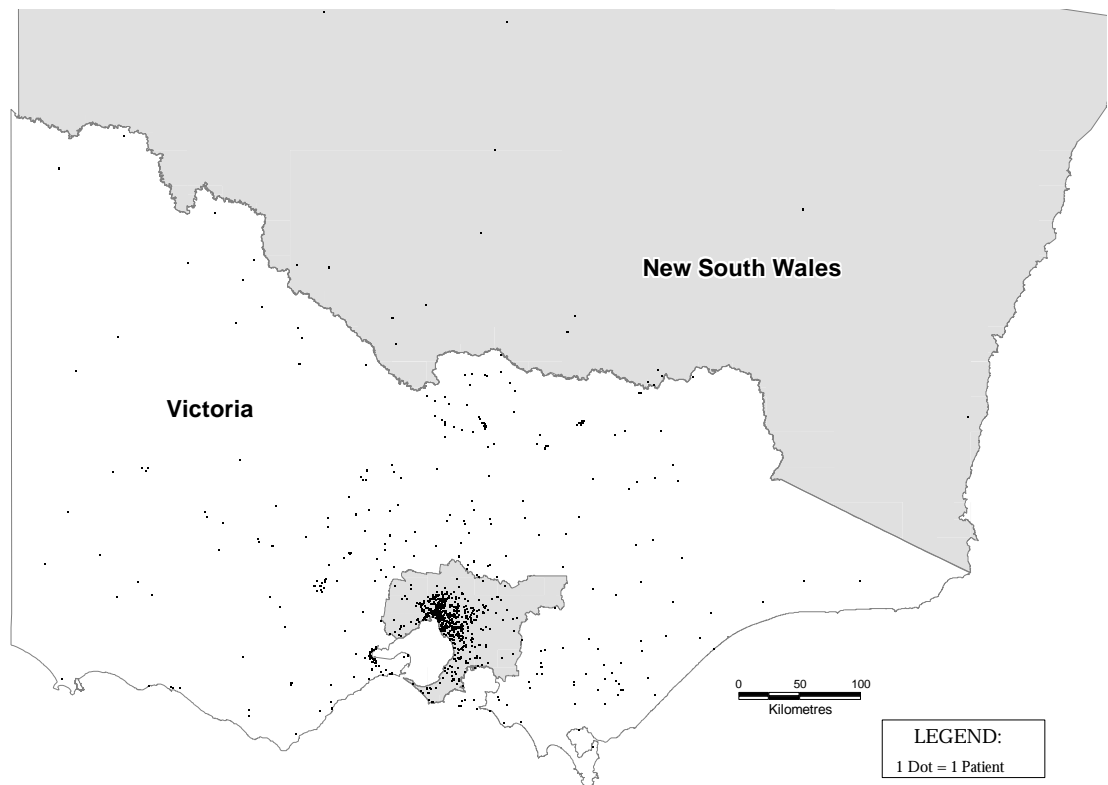
Working Party members will be invited as individuals and will not be representative of specific organisations. The Working Party is chaired by Dr Campbell Miller.

## **Appendix 3**

### **Trauma Distribution in Victoria (ISS>15)**

## Trauma Distribution in Victoria (ISS>15)

ref. Cameron P et al, Victorian Major Trauma Study II (1995)



## **Appendix 4**

### **Recommended Role Delineation Guidelines— Major Trauma Service and Metropolitan Trauma Service**

# Recommended Role Delineation Guidelines– Major Trauma Service and Metropolitan Trauma Service

Note: Development of the role delineation guidelines for trauma services in Victoria have been developed by adapting the guidelines established by the NRTAC in 1993. Modification of the guidelines is intended to provide increased definition to the type of services required. In reading these guidelines it is important to note that they are intended to describe the services required for trauma management only. Services not essential for the role of the service within the system may be required for other functions of the hospital.

Major Trauma Service	Metropolitan Trauma Service
----------------------	-----------------------------

## PREHOSPITAL TRANSPORT AND CARE

Triage protocols	Essential	Essential
Communications with hospital medical officer	Essential	Essential
Site medical team capacity: disaster	Essential	Essential
Participation in statewide retrieval service	Essential	Desirable
Prehospital notification system	Essential	Essential

## HOSPITAL ORGANISATION

Designation as Trauma Service	Essential	Essential
Director of Trauma Service	Essential	Essential
Trauma Committee	Essential	Essential
Organisational chart	Essential	Essential
Surveillance data systems	Essential	Essential
Written procedural guidelines	Essential	Essential
Written management protocols	Essential	Essential
Transfer protocols	Essential	Essential

## EMERGENCY DEPARTMENT

### i/ General

General criteria as established by ACHS	Essential	Essential
Documented policies and protocols	Essential	Essential
24-hour operation	Essential	Essential
Direct communication with amb. vehicle <sup>1</sup>	Essential	Essential
Single point for referrals	Essential	Essential
Ambulance access	Essential	Essential
Helicopter access	On-site	Where appropriate
Triage on arrival	Essential	Essential
Designated Medical Director of ED	Essential	Essential
Consultant (FACEM) 24 hours	On-site	On call < 30 min
Medical Officer(s) with EMST training	Essential	Essential
Medical Officer(s) 24 hours - Registrar	Desirable	Essential
Nursing staff with trauma training (24 hr) <sup>2</sup>	Essential	Essential

<sup>1</sup> The Taskforce and Working Party recognise that while this requirement is not currently consistently available, developments in digital communications technology over the next few years will make this more technically viable.

<sup>2</sup> The Taskforce and Working Party recognise that there is currently not a recognised standard course for nursing trauma management. The development of this in Victoria is a long term aim.



Major Trauma Service	Metropolitan Trauma Service
----------------------	-----------------------------

## ii/ Access to Surgical Specialities

General Surgery <sup>3</sup>	Registrar (4 <sup>th</sup> year or more) in-house 24-hr Consultant < 15 min desirable, < 30 min essential	Registrar in-house 24-hr. Consultant < 30 min desirable, < 60 min essential
Surgical Trauma Fellow	Desirable	-
Orthopaedic	Registrar and Consultant < 30 min	Registrar and Consultant < 30 min desirable < 60 min essential
Neurosurgery <sup>4</sup>	Registrar (4 <sup>th</sup> year or more) 24-hr and specialist neurosurgeon available within < 30 min	Specialist neurosurgeon available for phone consult 24 hours and available to attend in < 45 min
Vascular	Registrar < 30 min Consultant 30–60 min	Consultant < 30 min desirable, < 60 min essential
Cardiothoracic	Registrar 24-hr in-house Consultant < 30 min	Consultant < 30 min desirable, < 60 min essential
Paediatric Surgeon	Consultant < 30 min at Paed MTS	Consultant < 30 min desirable, < 60 min essential
Plastic	Consultative on call	Consultative on call
Ophthalmic	Consultative on call	Consultative on call
ENT	Consultative on call	Consultative on call
Faciomaxillary	Consultative on call	Consultative on call
Urology	Consultative on call	Consultative on call

## iii/ Access to Other Specialities

Anaesthesia	Registrar and Consultant in-house 24-hr <sup>5</sup>	Registrar in-house and Consultant on call < 30 min
Intensive Care	Registrar in-house and Consultant 30– 60 min	Registrar in-house and Consultant < 60 min
Internal Medicine	Consultative on call	Consultative on call
Paediatrician	Consultation with RCH	Consultation with RCH
Haematology	Consultative on call	Consultative on call
Nephrology	Consultative on call	Consultative on call
Infectious Diseases	Consultative on call	Consultative on call
Psychiatry	Consultative on call	Consultative on call
Radiology	Registrar < 30 min, Consultant on call	Registrar < 30 min desirable, < 60 min essential. Consultant on call

<sup>3</sup> The hospital must have an accredited general surgical training program.

<sup>4</sup> The hospital must have an accredited neurosurgical training program. Neurosurgical registrar: desirable in-house 24 hours, essential on call <30 min. The implementation of this requirement is subject to the availability of accredited neurosurgical training positions.

<sup>5</sup> A MTS must have the capacity to immediately access a second anaesthetist according to clinical need. The Taskforce recognises that this requirement may require review by the STC.

<b>RADIOLOGY</b>	<b>Major Trauma Service</b>	<b>Metropolitan Trauma Service</b>
Plain XR-stat 24 hours	Essential (in-house radiographer)	Essential
Angiography-within 30 min	Essential	Desirable
CT scan	Essential < 15 min <sup>6</sup>	Desirable within 15 min
CT scan within 1 hour	Not applicable	Essential
Ultrasound within 30 min <sup>7</sup>	Essential	Desirable
Ultrasound within 1 hr	Not applicable	Essential
Echocardiography	Essential < 60 min	Desirable

## **PATHOLOGY**

ABGs stat 24 hrs	Essential	Essential
Blood delivery within 1 hour	Uncrossmatched O -ve & +ve immediately available	Uncrossmatched O -ve & +ve immediately available
	Group and X-match within 30 min	Group and X-match within 1 hr
Electrolytes stat 24 hours	Essential	Essential
Coag. studies within 1 hour	Essential	Essential

## **OPERATING AND RECOVERY ROOM**

Staff immediately available 24 hours	In-house	Desirable in-house Essential on call <30 min
Emergency OR available 24 hours: within 30 minutes	One dedicated theatre with capacity to open second	Desirable
within 1 hour	Not applicable	Essential
Specialised equipment:		
Neurosurgical capability	Essential	As required
Image Intensifier	Essential	Essential
Operating microscope	Essential	As required
Portable X-Ray	Essential	Essential
Cardiopulmonary bypass	Essential	Not applicable

<sup>6</sup> A CT scanner must be available for emergency use. It is preferable for the location of the CT scanner to be within the Emergency Department. If not, it should be readily accessible from the Emergency Department. Full resuscitation equipment should be available within the CT scanning area.

<sup>7</sup> In time, ultrasonography may be performed in the Emergency Department by appropriately trained non-radiologists.

<b>QUALITY ASSURANCE, TRAINING AND RESEARCH</b>	<b>Major Trauma Service</b>	<b>Metropolitan Trauma Service</b>
General criteria as established by ACHS	Essential	Essential
QA organisational structure	Essential	Essential
Trauma outcome studies	Essential participation in statewide programs	Essential participation in statewide programs
Trauma research programs	Essential participation in statewide programs	Essential participation in statewide programs
Trauma training programs:		
- staff medical officers	Active training program	Active training program
- nurses	Active training program	Active training program
- visiting Medical Officers <sup>8</sup>	Educational programs essential	Not applicable
- allied health personnel	Active training program	Active training program
<b>COMMUNITY EDUCATION</b>	Essential participation in health promotion campaigns	Essential participation in health promotion campaigns
<b>DISASTER PLAN</b>	Essential (participation in Displan and internal disaster planning)	Essential (participation in Displan and internal disaster planning)

<sup>8</sup> Funding of training positions should be considered by the relevant funding bodies. These positions could be either a component of the hospital staffing numbers or supernumerary by arrangement.

## **Appendix 5**

### **Recommended Role Delineation Guidelines— Regional Trauma Services, Urgent Care Services and Primary Injury Services**

# Recommended Role Delineation Guidelines– Regional Trauma Services, Urgent Care Services and General Injury Services

Note: The role delineation guidelines for trauma services in Victoria have been developed by adapting the guidelines established by the NRTAC in 1993. Modification of the guidelines is intended to provide increased definition to the type of services required. In reading these guidelines it is important to note that they are intended to describe the services required for trauma management only. Services considered not essential for the role of the service within the system may be required for other functions of the hospital.

Regional Trauma Service	Urgent Care Service	Primary Injury Service
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## PREHOSPITAL TRANSPORT AND CARE

Triage protocols	Essential	Essential	Essential
Communications with service staff	Essential	Essential	Essential
Site medical team capacity	Essential	Essential	Desirable

## HOSPITAL ORGANISATION

Designation as Trauma Service	Essential	Essential	Essential
Director of Trauma Service	Essential	Essential	Not applicable (NA)
Trauma Committee	Essential	Essential	Desirable
Organisational chart	Essential	Essential	Desirable
Surveillance data systems	Essential	Essential	Desirable
Written procedural guidelines	Essential	Essential	Essential
Written management protocols	Essential	Essential	Essential
Transfer protocols	Essential	Essential	Essential

## EMERGENCY DEPARTMENT

### i/ General

General criteria as established by ACHS	Essential	Essential	Desirable
Documented policies and protocols	Essential	Essential	Essential
24-hour operation	Essential	Essential	Desirable
Radio communication with ambulance vehicle	Essential	Essential	Essential
Single point referral for referrals	Essential	Essential	Essential
Ambulance access	Essential	Essential	Essential
Helicopter access	Essential	Essential	Essential
Triage on arrival	Essential	Essential	Essential
Designated Medical Director of ED	Essential	Essential	Desirable
Medical officer(s) with EMST training	Essential	Essential	Desirable
Medical officer (s) 24 hours	Essential	NA	NA
Medical officer(s) on call (15 minutes)	NA	Essential	Desirable
Nursing staff with trauma training <sup>9</sup>	Essential	Desirable	Desirable

<sup>9</sup> The Taskforce and Working Party recognise that there is currently not a recognised standard course for nursing trauma management. The development of this in Victoria is a long term aim.

<b>ii/ Access to Surgical Specialities</b>	<b>Regional Trauma Service</b>	<b>Urgent Care Service</b>	<b>Primary Injury Service</b>
General Surgery	Registrar and Consultant < 30 min	Telephone consultation available	Telephone consultation available
Orthopaedic	Desirable	Telephone consultation available	Telephone consultation available
Neurosurgery	Desirable	Telephone consultation available	Telephone consultation available
Vascular	Desirable	Telephone consultation available	Telephone consultation available
Plastic	Desirable	Telephone consultation available	Telephone consultation available
Cardiothoracic	Desirable	Telephone consultation available	Telephone consultation available
Ophthalmic	Desirable	Telephone consultation available	Telephone consultation available
ENT	Desirable	Telephone consultation available	Telephone consultation available
Faciomaxillary	Desirable	Telephone consultation available	Telephone consultation available
Urology	Desirable	Telephone consultation available	Telephone consultation available

### **iii/ Access to Other Specialities**

Anaesthesia	Essential	Essential <sup>10</sup>	NA
Intensive Care	Essential	NA	NA
Paediatrics	Desirable	Telephone consultation available	Telephone consultation available
Haematology	Desirable	NA	NA
Nephrology	Desirable	NA	NA
Infectious Diseases	Desirable	NA	NA
Psychiatry	Desirable	NA	NA

## **RADIOLOGY**

Plain XR- 24 hours	Essential	Desirable	NA
Angiography within 30 min	Desirable	NA	NA
CT scan within 15 minutes	Desirable	NA	NA
CT scan within 1 hour	Essential	Desirable	NA
Ultrasound within 15 min	Desirable	NA	NA
Ultrasound within 1 hr	Essential	Desirable	NA
Echocardiography within 1 hr	Desirable	NA	NA

<sup>10</sup> It is likely that anaesthetic availability at Urgent Care Services will be provided by appropriately skilled General Practitioners.

<b>PATHOLOGY</b>	<b>Regional Trauma Service</b>	<b>Urgent Care Service</b>	<b>Primary Injury Service</b>
ABGs stat 24 hrs	Essential	Desirable	NA
Blood delivery within 1 hour	Essential	Desirable	NA
Electrolytes stat 24 hours	Essential	Desirable	NA
Coag. studies within 1 hour	Essential	Desirable	NA

## **OPERATING AND RECOVERY ROOM**

General criteria as established in ACHS Accreditation Guide (13th Ed.)	Essential	Essential	Essential
Emergency OR available 24 hours:			
- within 30 minutes	Desirable	NA	NA
- within 1 hour	Essential	NA	NA
Specialised equipment:			
- Neurosurgical instrumentation	As required	NA	NA
- Image intensifier	Essential	NA	NA
- Operating microscope	As required	NA	NA
- Portable X-Ray	Essential	NA	NA
- Cardiopulmonary bypass	NA	NA	NA

## **QUALITY ASSURANCE, TRAINING AND RESEARCH <sup>11</sup>**

General criteria as established by ACHS	Essential	Essential	Essential
QA organisational structure	Essential	Essential	Essential
Trauma outcome studies	Essential	Essential	Essential
Trauma research programs	Essential	-	-
Trauma training programs:			
- staff medical officers	Essential	Essential	Essential
- nurses	Essential	Essential	Essential
- allied health personnel	Essential	Essential	Essential

<b>COMMUNITY EDUCATION <sup>11</sup></b>	Essential	Desirable	Desirable
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<b>DISASTER PLAN <sup>11</sup></b>	Essential	Essential	Essential
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<sup>11</sup> The undertaking of the higher level system activities including quality assurance, training, research and community education is to be developed, planned and undertaken on a regional level with steering of these functions by the regional CCECCS.

## **Appendix 6**

### **Hospital Designations**

**Table 6.1            Proposed Designation for Trauma Services in  
Metropolitan Melbourne**

**Table 6.2            Proposed Designation of Trauma Services  
in Rural Victoria**



## 6.1 Proposed Designation for Trauma Services in Metropolitan Melbourne

<b>Major Trauma Service</b>	<p><b>Paediatric only</b> Royal Children's Hospital</p> <p><b>Adult only</b> The Alfred Royal Melbourne Hospital</p>
<b>Metropolitan Trauma Service</b>	<p><b>Adult and Paediatric</b> Austin and Repatriation Medical Centre Box Hill Hospital Dandenong Hospital Monash Medical Centre Mornington Peninsula Hospital, Frankston The Northern Hospital</p> <p><b>Adult only</b> Maroondah Hospital St Vincent's Hospital Western Hospital</p>
<b>Primary Injury Service</b>	<p><b>Adult and Paediatric</b></p> <p><i>Public Hospitals</i> Mornington Peninsula Hospital, Rosebud Sandringham and District Memorial Hospital Sunshine Hospital The Angliss Health Services The Mercy Hospital, Werribee Williamstown Hospital</p> <p><i>Private Hospitals</i> Dandenong Valley Private Hospital Epworth Hospital John Fawkner Hospital Knox Private Hospital South Eastern Private Hospital Warburton Hospital</p>

Note:

- Hospitals are designated as Primary Injury Service because either they do not sufficiently meet the reception and resuscitative requirements of a Metropolitan Trauma Service or are within close proximity to a more appropriate trauma service.
- Some hospitals have not been designated to receive paediatric major trauma since they are within close proximity to a more appropriate trauma service.
- Private hospitals are designated within the system structure but major trauma patients are not to be conveyed to those hospitals as consistent with the Department of Human Services Circular, 4/1998, 14/4/98.

## 6.2 Proposed Designation of Trauma Services in Rural Victoria

	Barwon South West	Loddon Mallee	Gippsland	Grampians	Hume
<b>Regional Coordination of Trauma Services</b>	<ul style="list-style-type: none"> <li>Barwon South Western Consultative Committee on Emergency and Critical Care Services</li> </ul>	<ul style="list-style-type: none"> <li>Loddon Mallee Region Consultative Committee on Emergency and Critical Care Services</li> </ul>	<ul style="list-style-type: none"> <li>Gippsland Region Consultative Committee on Emergency and Critical Care Services</li> </ul>	<ul style="list-style-type: none"> <li>Grampians Region Consultative Committee on Emergency and Critical Care Services</li> </ul>	<ul style="list-style-type: none"> <li>Hume Region Consultative Committee on Emergency and Critical Care Services</li> </ul>
<b>Regional Trauma Service</b>	<ul style="list-style-type: none"> <li>Barwon Health - The Geelong Hospital campus</li> <li>Warrnambool and District Base Hospital</li> </ul>	<ul style="list-style-type: none"> <li>Bendigo Health Care Group</li> <li>Mildura Base Hospital</li> </ul>	<ul style="list-style-type: none"> <li>Latrobe Regional Hospital</li> </ul>	<ul style="list-style-type: none"> <li>Ballarat Health Services</li> <li>Wimmera Health Care Group - Wimmera Base Hospital</li> </ul>	<ul style="list-style-type: none"> <li>Goulburn Valley Health (GVBH)</li> <li>Wangaratta Base Hospital</li> <li>Albury Base Hospital</li> </ul>
<b>Urgent Care Service</b>	<ul style="list-style-type: none"> <li>Casterton Memorial Hospital</li> <li>Coleraine and District Hospital</li> <li>Colac Community Health Services - Colac campus</li> <li>Corangamite Regional Hospital Services - Camperdown campus</li> <li>Edenhope and District Hospital</li> <li>Hesse Rural Health Service - Winchelsea campus</li> <li>Lorne Community Hospital</li> <li>Port Fairy Hospital</li> <li>Portland and District Hospital</li> <li>Terang and Mortlake Health Service - Terang campus</li> <li>Timboon and District Health Care Service</li> <li>Western District Health Service - Hamilton campus</li> </ul>	<ul style="list-style-type: none"> <li>Cohuna District Hospital</li> <li>Echuca Regional Hospital</li> <li>Kerang and District Hospital</li> <li>Kyabram and District Memorial Hospital</li> <li>Kyneton and District Health Service</li> <li>Inglewood and District Health Service</li> <li>Maryborough District Health Service</li> <li>Mt Alexander Hospital</li> <li>Swan Hill District Hospital</li> <li>Wycheproof and District Health Service</li> </ul>	<ul style="list-style-type: none"> <li>Bairnsdale Regional Health Service</li> <li>Central Wellington Health Service</li> <li>Far East Gippsland Health Service (Orbost)</li> <li>Gippsland Southern Health Service (Leongatha)</li> <li>South Gippsland Hospital (Foster)</li> <li>West Gippsland Health Care Group (Warragul)</li> <li>Wonthaggi and District Hospital</li> <li>Yarram and District Health Service</li> </ul> <p><b>Private Facilities</b></p> <ul style="list-style-type: none"> <li>Warley Hospital (Cowes)</li> </ul>	<ul style="list-style-type: none"> <li>East Grampians Health Service (Ararat)</li> <li>East Wimmera Health Service (St Arnaud)</li> <li>Edenhope and District Memorial Hospital</li> <li>Hepburn Health Service (Daylesford)</li> <li>Stawell District Hospital</li> </ul> <p><b>Private Facilities</b></p> <ul style="list-style-type: none"> <li>St John of God Health Care Ballarat</li> </ul>	<ul style="list-style-type: none"> <li>Alexandra District Hospital</li> <li>Alpine Health (Bright, Mt Beauty, Myrtleford)</li> <li>Benalla and District Memorial Hospital</li> <li>Cobram District Hospital</li> <li>Kilmore and District Hospital</li> <li>Nathalia District Hospital</li> <li>Numurkah District Health Service</li> <li>Mansfield District Hospital</li> <li>Seymour District Memorial Hospital</li> <li>Upper Murray Health and Community Service</li> <li>Wodonga Regional Health Service</li> <li>Yarrawonga District Hospital</li> <li>Yea and District Memorial Hospital</li> </ul>

	Barwon South West	Loddon Mallee	Gippsland	Grampians	Hume
Primary Injury Service	<ul style="list-style-type: none"> <li>• Colac Community Health Services - Birregurra campus</li> <li>• Corangamite Regional Hospital Services - Lismore campus</li> <li>• Hesse Rural Health Service - Rokewood and Beeac campus'</li> <li>• Heywood and District Memorial Hospital</li> <li>• Otway Health and Community Service (Apollo Bay)</li> <li>• Terang and Mortlake Health Service - Mortlake campus</li> <li>• Western District Health Service -Penshurst campus</li> </ul> <p><b>Private Facilities</b></p> <ul style="list-style-type: none"> <li>• Balmoral Bush Nursing Centre</li> <li>• Cobden and District Health Service</li> <li>• Dartmoor and District Bush Nursing Centre</li> <li>• Merino Health Services</li> </ul>	<ul style="list-style-type: none"> <li>• Boort District Hospital</li> <li>• Maldon and District Health and Community Care</li> <li>• Mallee Track Health and Community Service</li> <li>• Manangatang and District Health Service</li> <li>• McIvor Health and Community Service</li> <li>• Robinvale District Hospital and Health Service</li> <li>• Rochester and Elmore District Hospital</li> <li>• Sea Lake and District Health Service</li> </ul> <p><b>Private Facilities</b></p> <ul style="list-style-type: none"> <li>• Birchip Bush Nursing Hospital</li> <li>• Charlton Bush Nursing Hospital</li> <li>• Dingee Bush Nursing Centre</li> <li>• Lockington and District Bush Nursing Centre</li> <li>• Pyramid Hill Bush Nursing Hospital</li> <li>• Sea Lake and District Health Service</li> <li>• Woomelang &amp; District Bush Nursing Centre</li> </ul>	<ul style="list-style-type: none"> <li>• Maffra District Hospital</li> <li>• Omeo District Hospital</li> </ul> <p><b>Private Facilities</b></p> <ul style="list-style-type: none"> <li>• Buchan Bush Nursing Centre</li> <li>• Cann Valley Bush Nursing Centre</li> <li>• Dargo Bush Nursing Centre</li> <li>• Gelantipy &amp; District Bush Nursing Centre</li> <li>• Heyfield Hospital</li> <li>• Mallacoota District Health and Support Service</li> <li>• Mt Baw Baw Medical Centre<sup>12</sup></li> <li>• Mirboo North and District Bush Nursing</li> <li>• Neerim District Soldiers Memorial Hospital</li> <li>• Swift's Creek Bush Nursing Centre</li> </ul>	<ul style="list-style-type: none"> <li>• Beaufort and Skipton Health Service</li> <li>• Djerriwarrh Health Service (Bacchus Marsh)</li> <li>• East Wimmera Health Service (Donald)</li> <li>• Hepburn Health Service (Creswick)</li> <li>• Rural Northwest Health (Warracknabeal)</li> <li>• Wimmera Health Care Group (Dimboola)</li> </ul> <p><b>Private Facilities</b></p> <ul style="list-style-type: none"> <li>• Ballan and District Soldiers' Memorial Bush Nursing Hospital</li> <li>• Beulah Pioneers' Bush Nursing Hospital</li> <li>• Elmhurst Bush Nursing Centre</li> <li>• Harrow Bush Nursing Centre</li> <li>• Hopetoun Bush Nursing Hospital</li> <li>• Lake Bolac Bush Nursing Centre</li> </ul>	<ul style="list-style-type: none"> <li>• Tallangatta Hospital</li> <li>• The Beechworth Hospital</li> </ul> <p><b>Private facilities</b></p> <ul style="list-style-type: none"> <li>• Chiltern and District Bush Nursing Hospital</li> <li>• Euroa Hospital</li> <li>• Falls Creek Medical Centre<sup>12</sup></li> <li>• Mt Buller Medical Centre<sup>12</sup></li> <li>• Mt Hotham Medical Centre<sup>12</sup></li> <li>• Ngambie Bush Nursing Hospital</li> <li>• Violet Town Bush Nursing Centre</li> <li>• Walwa Bush Nursing Hospital</li> <li>• Yackandandah Bush Nursing Hospital</li> </ul>

Note: Hospitals were designated as a Primary Injury Service because either they do not sufficiently meet the reception and resuscitative requirements of an Urgent Care Service or are geographically close to a higher designated service.

Private facilities have been included in this listing to provide comprehensiveness and in recognition of their role in local injury management for public patients. There is a variation between the Primary Injury Services in the level of provision of health care services.

<sup>12</sup> Seasonal service only - approximately 18 weeks.

## **Appendix 7**

### **Triage Guidelines**

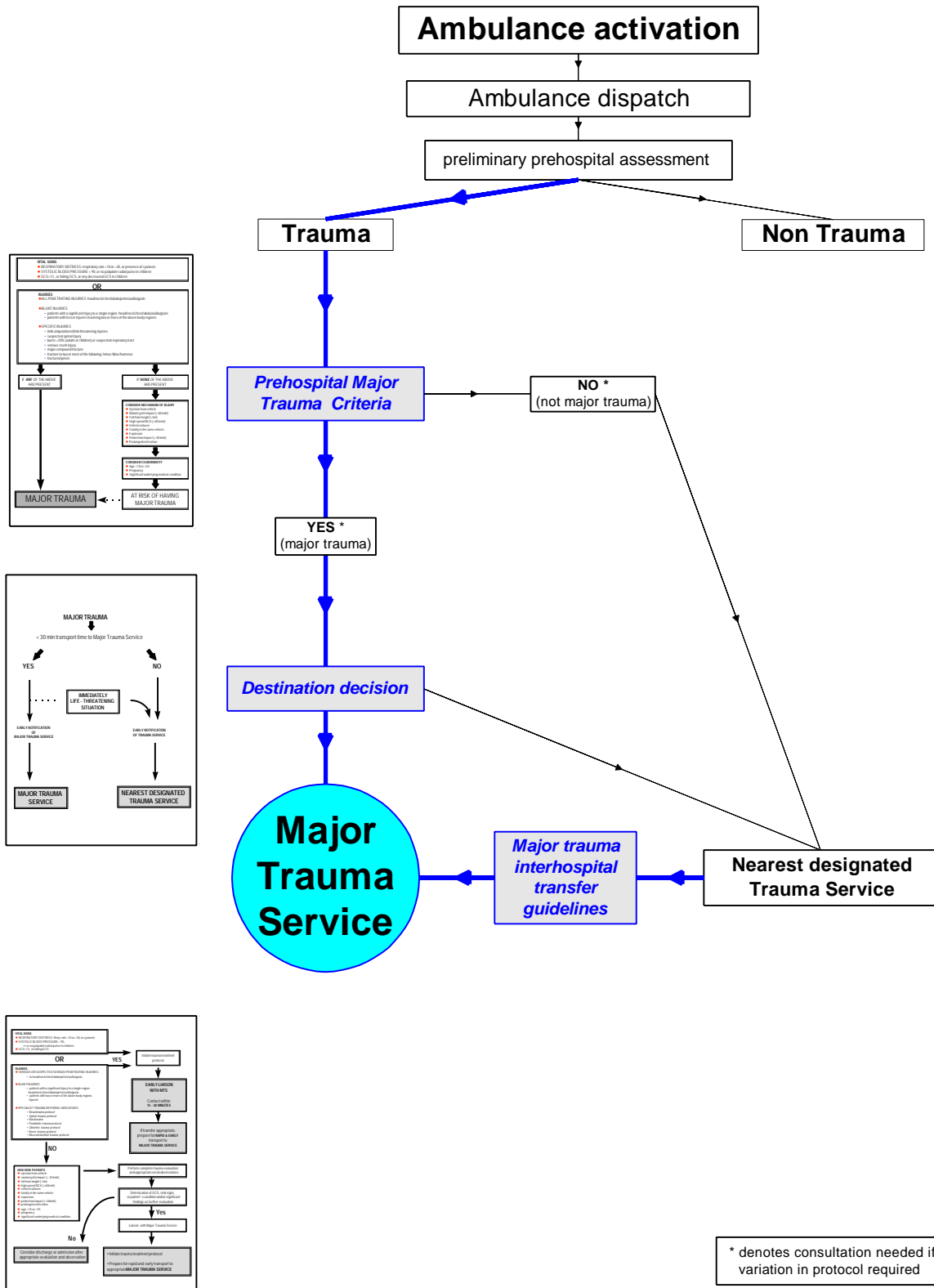
#### **7.1 Setting for Triage Guidelines in the Trauma System**

#### **7.2 Prehospital Major Trauma Criteria**

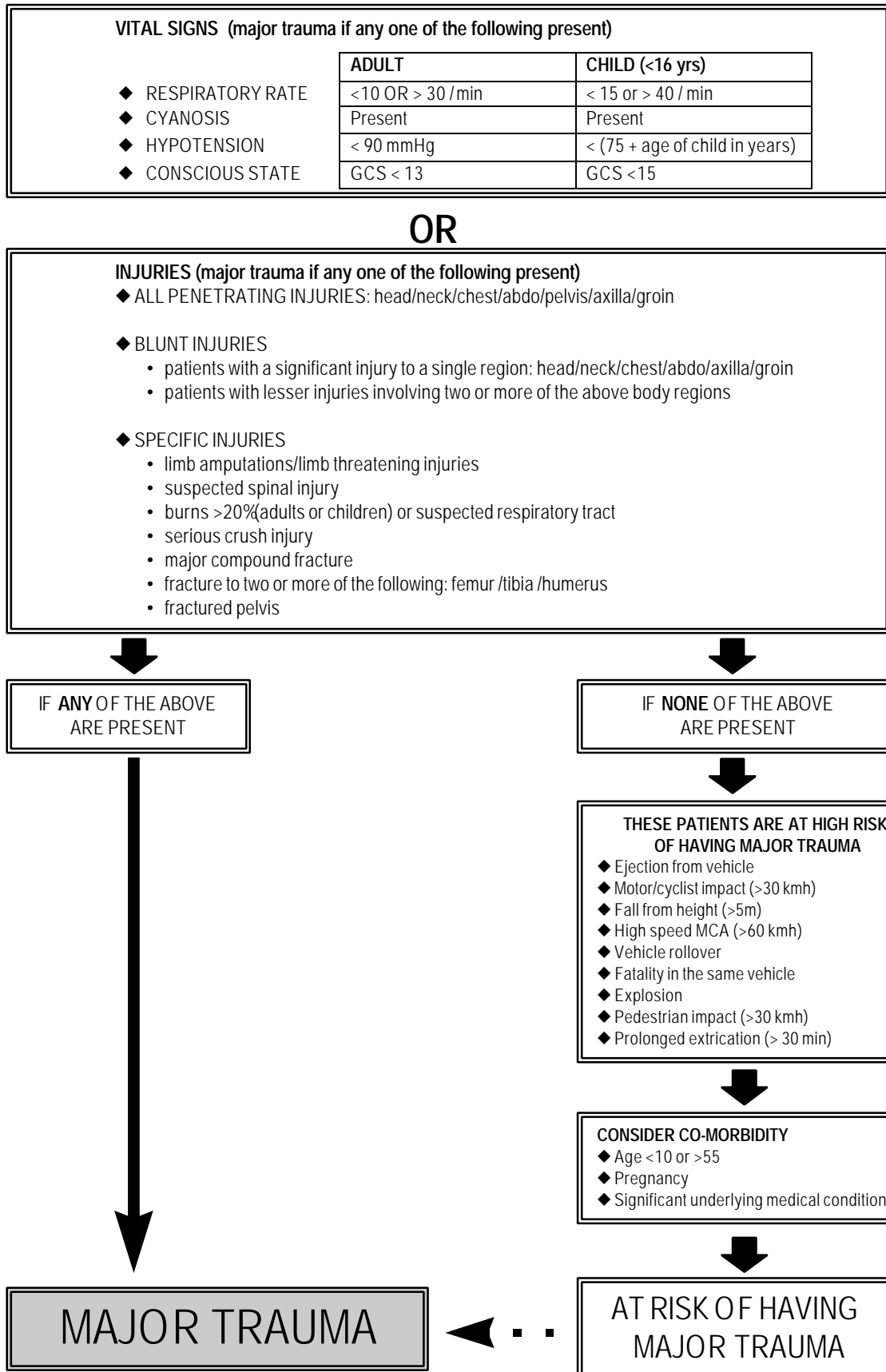
#### **7.3 Destination Decision**

#### **7.4 Major Trauma Interhospital Transfer Guidelines**

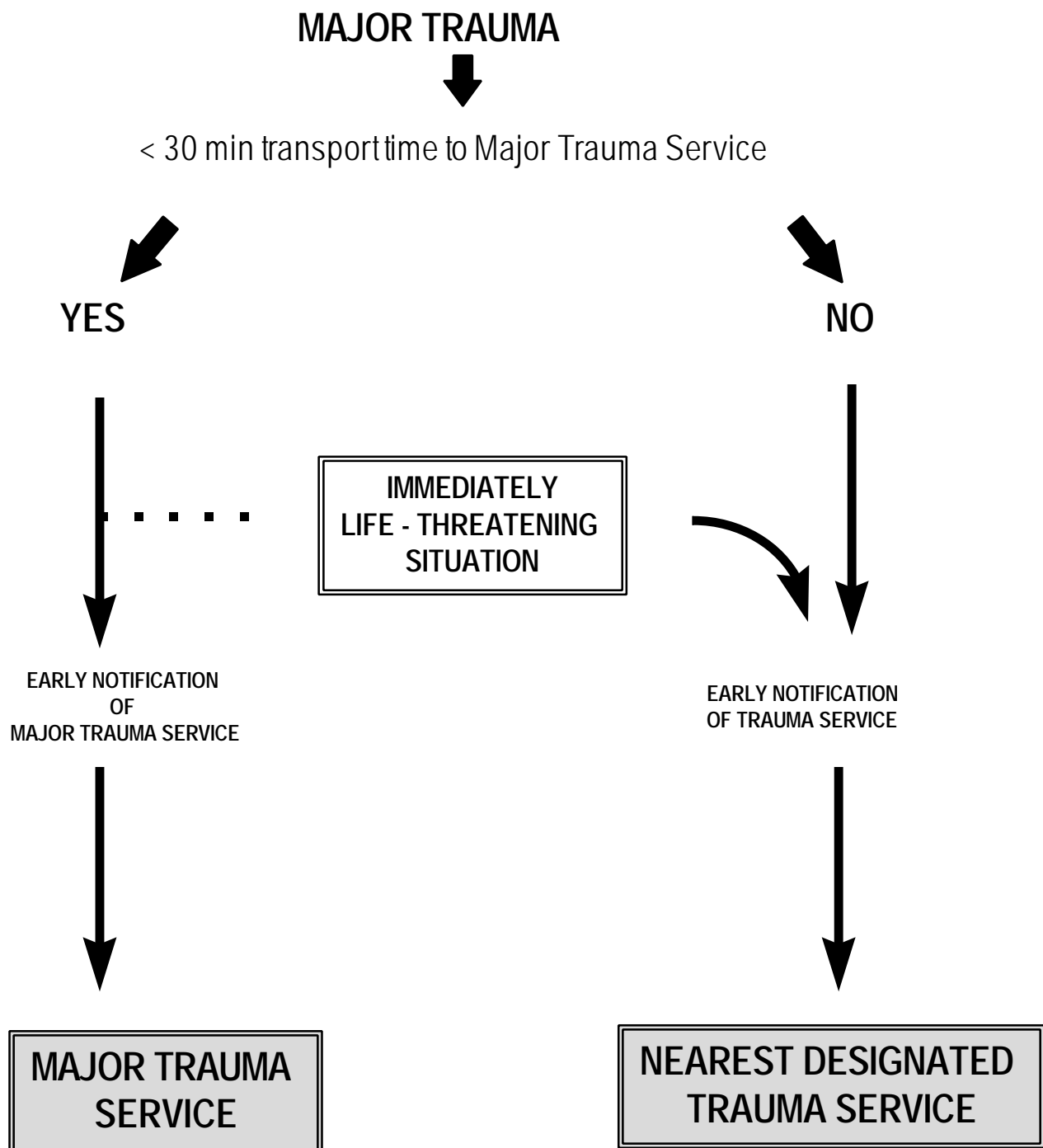
## 7.1 Setting for Triage Guidelines in the Trauma System



## 7.2 Prehospital Major Trauma Criteria

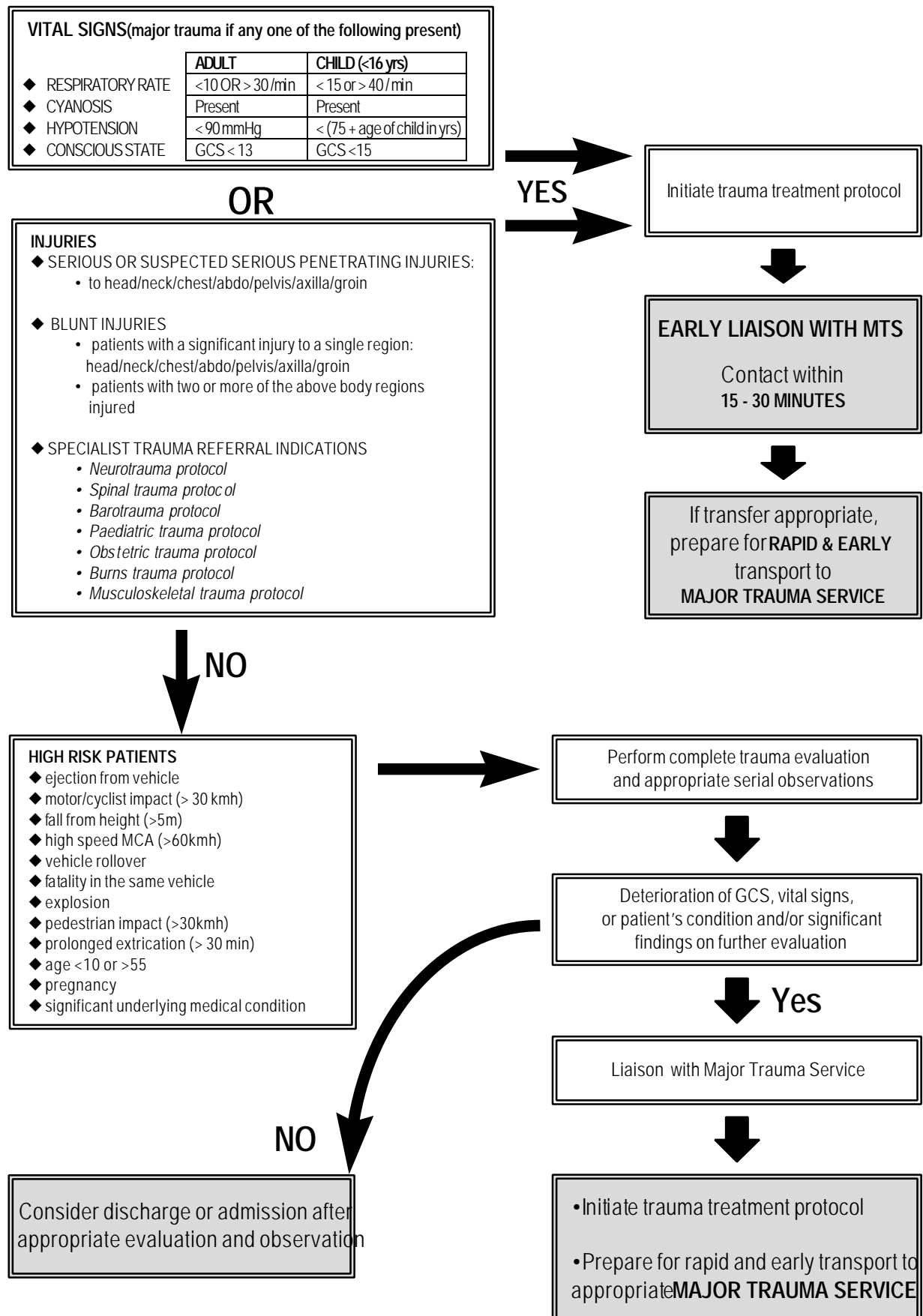


### 7.3 Destination Decision



Note: In this guideline the transport time and destination are most applicable to metropolitan Melbourne. Although these principles of triage apply to other areas, transport times and the nomenclature will require modification for use outside metropolitan Melbourne.

## 7.4 Major Trauma Interhospital Transfer Guidelines





## **Appendix 8**

### **Specialist Trauma Transfer Guidelines**

**8.1 Neurotrauma**

**8.2 Spinal Trauma**

**8.3 Barotrauma**

**8.4 Paediatric Trauma**

**8.5 Obstetric Trauma**

**8.6 Burns**

**8.7 Musculoskeletal Trauma**

## 8.1 Neurotrauma

### Indications for Neurosurgical Consultation and/or Transfer to Major Trauma Service

#### 1. Neurological Deficits

- Deterioration of neurological status, for example worsening in conscious state (2 points on GCS), fits, increasing headache, new CNS signs.
- Confusion or other neurological disturbance (GCS <13), >2 hours, no fracture.
- Persistence of headache, vomiting 2 hours post admission.
- GCS<9 after resuscitation.

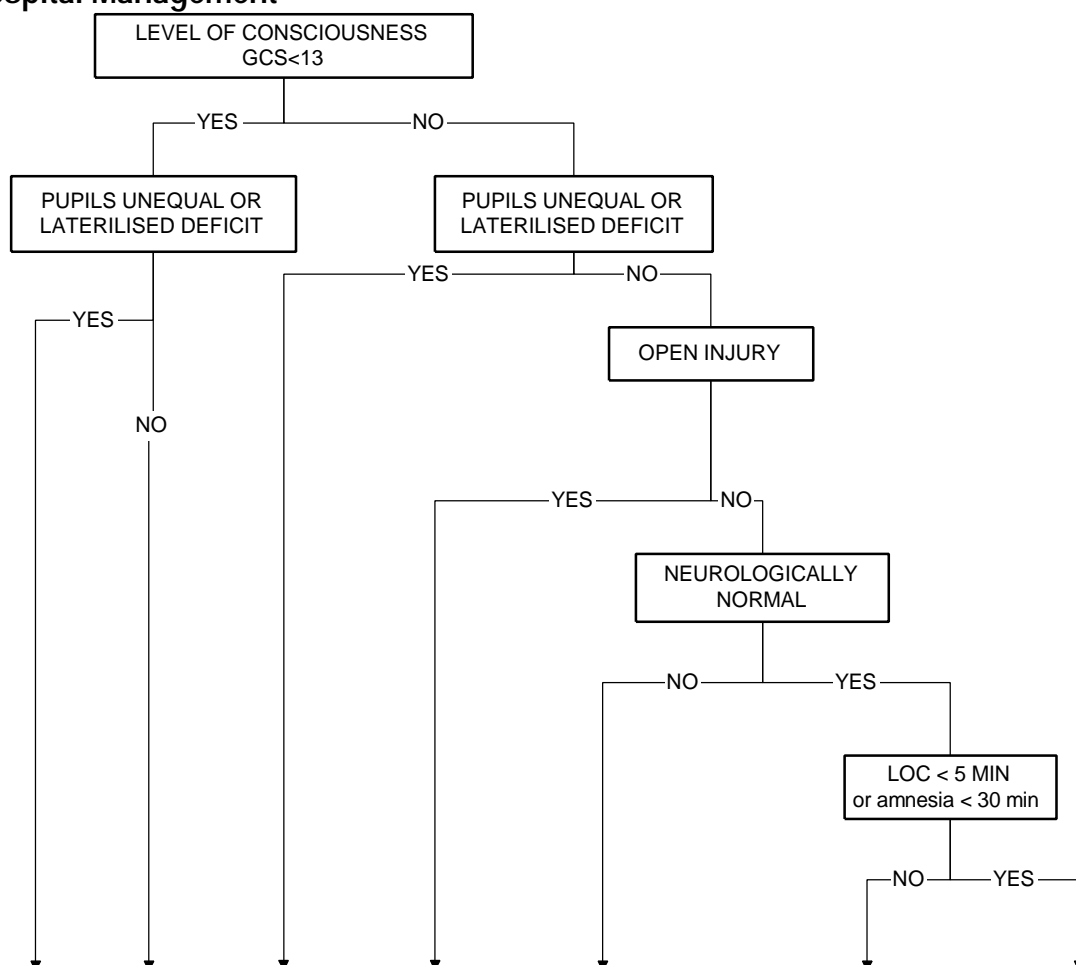
#### 2. Skull Fracture

- Skull fracture, with confusion, decreased level of consciousness, seizure, focal neurological signs, and any other neurological signs or symptoms.
- Compound skull fracture or penetrating injury— known or suspected.
- Depressed skull fracture.
- Suspected base of skull fracture, for example blood and/or clear fluid from nose/ear, periorbital haematoma, mastoid bruising.

#### 3. Abnormal CT Scan Findings

- Intracranial haematoma
- Cerebral swelling
- Aerocele
- Midline shift

## Primary Hospital Management



Provisional Diagnosis	Large mass	Diffuse axonal injury	Possible mass	Vault # Basilar # Penetrating injury	Contusion Small mass Post - concussion	Concussion Fracture	Minor injury
Treatment	Admit Intubate Ventilate (PaCO <sub>2</sub> : 30- 35mmHg Mannitol Urgent CT	Admit Intubate Ventilate Urgent CT ICU Observe ICP	Admit Urgent CT ICU Observe	Admit Urgent CT Observe	Admit Urgent CT Observe	Admit Elective CT Observe	Observe for 4-6 hrs Discharge with instructions
Nsurg. consult	Immediate	Immediate	Urgent	Urgent	Urgent	Selective	Selective

GCS = Glasgow Coma Score  
ICU = intensive care with neurosurgical unit at a  
Major Trauma Service

LOC = loss of consciousness  
# = fracture

ICP = intracranial pressure monitor  
CT = head computerised tomography scan

### Comment

- The risk of intracranial haemorrhage is increased in the presence of a skull fracture and in a patient over 50 years of age. The need for transfer/retrieval will follow consultation.
- Adequate airway, breathing and circulatory control precede all the above interventions.

## Paediatric Neurotrauma

The patterns of head injury and the principles of management of head injuries in children are similar to those of adults, however, the following important differences should be noted.

(Read in conjunction with Neurotrauma Protocol.)

### Assessment

- Fluctuation in neurological responses is more marked in children. Isolated observations may be misleading.
- The state of the fontanelle is a useful indicator of raised intracranial pressure.

### Acute Brain Swelling

- Blunt trauma may be followed, within a short period from injury, by *acute brain swelling*. This may follow a relatively minor head injury and may be marked by rapid and profound decline in the conscious state.
- The small child's brain is more likely than an adult's to swell after blunt trauma, therefore, overtransfusion must be avoided.

### Seizures

- Post-traumatic epileptic fit is not uncommon, even in minor head injury, but the following decline in conscious state may mask onset of intracranial haemorrhage. CT scan should be undertaken.
- In general, if the child makes a full and rapid recovery following a fit, there is no indication to place that child on anticonvulsants.

### Localised Brain Injury

- Puncture wounds over a child's head frequently indicate direct injury to the underlying brain. Entry wounds should be inspected for signs of fracture, discharge of CSF or cerebral tissue. If there is any doubt, CT scan should be undertaken.
- Depressed fractures, simple or compound, are more common and may be associated with local damage to the underlying brain. Lack of history of loss of consciousness does not exclude the presence of severe focal injury.
- Elasticity of a small child's skull may result in no fracture but local injury to brain or meninges, resulting in an extradural haematoma.
- Significant blood loss impairing circulating blood volume may result from a bleeding scalp wound, scalp or intracranial haematoma. If planning any surgery, immediate steps must be taken to obtain blood for transfusion as intraoperative hypotension may occur.

(Adapted from *The Management of Acute Neurotrauma in Rural and Remote Locations*, Neurosurgical Society of Australasia, RACS, 1995.)

## 8.2 Spinal Trauma

### Indications for Transfer of Spinal Trauma

- Significant spinal fracture
- Minor spinal cord or nerve root damage
- Presence of neurological deficits

### Overriding Principles of Spinal Trauma Management:

- All patients with evidence of, or potential for, spinal injury should be admitted to hospital.

#### *In the prehospital setting:*

- All major trauma (including isolated spinal trauma) should be triaged to the MTS, within the defined safety and logistic constraints (Appendix 7.3).

#### *In the context of interhospital transfer:*

- Major trauma (as defined in Appendix 7.4) including a spinal cord injury should be transferred from the first assessing Emergency Department to the MTS. In the presence of spinal cord deficit, subsequent transfer to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre will occur at the earliest appropriate time, that is once the patient is medically stable.
- Isolated spinal cord trauma, with a spinal cord deficit, should be transferred to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre at the earliest appropriate time, generally in less than 12 hours.
- Spinal cord trauma with other injuries that do not meet the criteria which define Major Trauma (Appendix 7.4), should be transferred to the Victorian Spinal Cord Service at Austin and Repatriation Medical Centre at the earliest appropriate time, generally in less than 12 hours.
- Surgical stabilisation of the spine, in the presence of spinal cord deficit, may occur at either the MTS or the Austin and Repatriation Medical Centre. This decision will always be made following consultation between the MTS and Victorian Spinal Cord Service.

### Prehospital Management

- Always consider spinal injury, especially injury to the cervical or thoracolumbar junction, in the unconscious patient.
- Rapid clinical assessment:
  - Respiratory pattern— diaphragmatic breathing.
  - Voluntary movement and sensation in limbs.
  - Blood pressure.
- Extrication from vehicle:
  - Maintain spinal alignment, especially avoid flexion and rotation.
  - Avoid movements which increase pain.
  - If cervical injury suspected, apply cervical collar or substitute, for example, a rolled up

jacket (apply in all major trauma cases till radiologically cleared).

- Transport to designated trauma service:
  - If conscious, place in supine position. If respiratory distress is aggravated, place in the head-up position (unless hypotensive).
  - If unconscious, clear and control airway.
    - Where GCS < 9, the patient should be intubated.
    - If unconscious and intubation not possible, place in lateral position with neck support.
  - Protect airway from obstruction and/or inhalation.
  - Administer supplemental oxygen.
  - Immobilise patient with a spinal board and semi-rigid collar.
  - Arrange appropriate lifting device (Kendrick Extrication Device, Russell Extrication Device or similar) to aid immobilisation during vehicle extrication and transport.

## Primary Hospital Management

- Emergency resuscitation: airway, breathing, circulation.
- Always consider spinal injury on:
  - I. History (mechanism of injury).
  - II. Clinical examination:
    - \* Vital signs— especially bradycardia and hypotension.
    - \* Respiratory pattern— diaphragmatic in high cord injury.
    - \* Neurological examination for example:
      - Motor response in limbs (usually flaccid paralysis).
      - Sensory level to pain, joint position, touch— check perineal sensation and anal tone.
      - Altered sweat level/pattern.
      - Plantar response.
      - Priapism.
      - Elevated shoulders in cervical injury.
      - Anal tone— flaccid in cauda equina lesion, reduced in cord lesion.
      - Urinary retention.
- Suspect other injuries:
  - Head injury— beware of deterioration in GCS indicating concurrent head injury.
  - Haemopneumothorax or ruptured aorta with thoracic spinal injury.
  - Ruptured abdominal viscus with thoracolumbar injury— particularly beware of retroperitoneal injury (esp. duodenal) with lap type seatbelts.
  - Symptoms and signs of such injuries may be masked in a patient with a complete spinal cord lesion.
- Early notification of Major Trauma Service or the Victorian Spinal Cord Service at A&RMC<sup>13</sup> regarding transfer and/or management advice (see A29).
- Management of acute spinal injury:

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<sup>13</sup> Ring Austin and Repatriation Medical Centre on 03 9496 5000 and page Spinal Consultant or Registrar through switch (24 hours)

- If cord injury is suspected, advice should be sought from a Major Trauma Service or the Victorian Spinal Cord Service.
- All hypotension is hypovolaemia until proven otherwise. Hypotension may be normal in a high cord injury, however surgical shock may be present from other injuries such as a splenic tear or ruptured aorta.
- A high spinal cord injury above T6 is likely to be hypotensive (approx. 90mmHg). This is initially related to vasodilation with relative hypovolaemia and requires some blood volume expansion. There may be blood loss from other injuries, which needs replacement on its merits. Volume replacement must be undertaken in a controlled manner and is best accomplished using central venous pressure monitoring. In high spinal cord injury, a degree of hypotension is acceptable provided it is stable and urine output is satisfactory.
- Insert large bore nasogastric tube.
- Insert urinary catheter and monitor urinary output.
- Arterial blood gases are essential. Avoid hypoxia, monitor vital capacity and beware respiratory failure from sputum retention or fatigue.
- Careful lift or logroll every 2 hours to avoid trophic skin ulcers.
- Maintain normothermia: warm intravenous fluids.
- Discuss indication for steroids with Major Trauma Service or the Victorian Spinal Cord Service.

#### Information Sources

- *The Management of Acute Neurotrauma in Rural and Remote Locations*, The Neurosurgical Society of Australasia, RACS, 1995.
- Austin & Repatriation Medical Centre, Victorian Spinal Cord Service

## 8.3 Barotrauma

### Primary Hospital Management

#### Assessment

- Full neurological assessment including detailed assessment for sensory and motor deficits.
- If symptoms have arisen following underwater diving or work in a compressed air environment, ascertain details of pressure exposure, for example: depth of dive, gas mix breathed, time at pressure, number of pressurisations and decompression profile.
- CXR— screen for pneumothorax.
- FBE— may helpful to assess for haemoconcentration in acute cases.

#### Management

- Oxygen— aim for inspired concentration of 100 per cent using:
  - occlusive mask or
  - CPAP or SCUBA mouthpiece or
  - ETT supplied by non-rebreathing bag with reservoir and high flow or demand valve or anaesthetic machine at high flow.
- Fluid load— IV normal saline or Hartman's solution.
- Position patient supine. **Never** sit acute patient upright as cerebral embolism can result.
- Urinary catheter if indicated.
- Ongoing monitoring, especially for silent neurological progression.

#### Indications for Transfer to Hyperbaric Service

- Consultation should occur with the Hyperbaric Service in all cases.
- All decompression related cases require hyperbaric treatment even if symptoms resolve on normobaric oxygen, **except** those cases involving lethargy only or transient, migratory musculoskeletal symptoms only without signs and without major inert gas load.
- Hyperbaric oxygen treatment is also recommended in iatrogenic or traumatic gas embolism cases.



## Time-Critical Cases

- Any arterial gas embolism case (even if spontaneous improvement has occurred— relapse is common).
- Significant reduction in conscious state.
- Vestibular decompression illness.
- Neurological disease with areas of complete loss of sensation, any motor deficit or bladder or bowel dysfunction.
- Respiratory decompression illness ('Chokes').
- Patients with progressive disease or a high potential as a result of high inert gas load (deep, long and/or multiple dives).

## Transport

- Transport arrangements should be initiated immediately for urgent cases.
- Other cases can be arranged following consultation.
- Altitude exposure must be avoided. Transport at less than 300m effective altitude is required and preferably at 150m maximum. This does not preclude air transport which can usually be achieved by low level helicopter flight, pressurised fixed wing retrieval aircraft or low level over water flight, depending upon flying conditions and geography.

## Referral Process

Mon–Sat: 0800–1700

Phone: 03 9276 2269

Hyperbaric Service, The Alfred Hospital

Head, Hyperbaric Service, Dr Ian Millar

After hours: 03 9276 2000

Page Hyperbaric Registrar on call, The Alfred (03) 9276 2000

## 8.4 Paediatric Trauma

### Primary Hospital Management

#### Prior to Reception

- Ensure adequately trained personnel with experience in paediatric resuscitation are present in the reception area.
- Ensure the necessary resuscitation equipment is available and easily accessible in a range of sizes.
- If possible, estimate the child's weight using the formula  $(\text{Age} + 4) \times 2$  and calculate:
  - The amount of fluid bolus at 20ml/kg
  - The endotracheal tube size  $(\text{Age} / 4) + 4$ .
- Make early contact with the Paediatric Major Trauma Service (tel: 03 9345 5211) for advice or dispatch of a retrieval team.

#### Airway and the Cervical Spine

- Assess the child's airway while protecting the cervical spine.
- Optimise the position of the upper airway, checking the cervical collar size and position carefully.
- If the airway is inadequate, apply a jaw thrust manoeuvre, clear any obstruction under direct vision and consider intubation.

#### Breathing

- Apply oxygen 10 litres/min by facemask.
- Assess the child's breathing by looking at:
  - The work of breathing (recession, respiratory rate, accessory muscle use)
  - Effectiveness of breathing (oxygen saturation, chest expansion, breath sounds)
  - Effects of inadequate respiration (heart rate, mental state).
- If breathing is inadequate, exclude a tension pneumothorax, use positive pressure ventilation with bag/valve/mask and consider intubation.
- Insert a large orogastric tube to treat and prevent gastric dilatation.

#### Circulation

- Assess the child's circulatory state by looking at:
  - Pulse rate, skin colour, capillary refill time, blood pressure.
- Effects of an inadequate circulation (respiratory rate, mental state).

- Establish intravenous access with two cannulae that are as large as practicable, ideally one situated in each cubital fossa.
- If an IV cannula is unable to be sited rapidly, consider the use of an intraosseous needle inserted into a non-traumatised leg.
- Give a fluid bolus of 20 mls/kg of normal saline.
- Tamponade any continuing external haemorrhage.
- If the circulation continues to be unstable, repeat the fluid bolus using normal saline or a colloid solution. If a third bolus is necessary, consider using whole blood and arranging immediate surgical intervention.

### Mental State

- Assess mental state by determining the child's best response to pain and examining the pupillary reflexes.
- The response to pain is determined by squeezing one ear lobe hard and observing the best response to that stimulus (for example, flexion of one arm and extension of legs is recorded as flexion to pain).
- Note whether the child:
  - is alert
  - localises to pain
  - flexes to pain
  - extends limbs to pain
  - has no response to pain.

### Monitor

- Response to pain, pupillary light response, respiratory rate, heart rate, non-invasive blood pressure, oxygen saturation.

Age	Normal Heart Rate (Beats per minute)	Normal Resp. Rate (Breaths per minute)	Normal Systolic Blood Pressure (mmHg)
<1 year	110–160	30–40	70–90
2–5 years	95–140	25–30	80–100
5–12 years	80–120	20–25	90–110
>12 years	60–100	15–20	100–120

### Temperature

- Frequent rectal temperature monitoring.
- Limit exposure during assessment and resuscitation.
- All fluids and gases administered to the patient should be warmed.

### Indications for Transfer to Paediatric Major Trauma Service

- Intubated or likely to need intubation.
- Head injury and does not localise to pain.
- Focal neurological signs.
- Multitrauma.
- Spinal trauma.

**Possible Need for Transfer– Consult Paediatric Major Trauma Service**

- Isolated fractures of femur, pelvis, facial bones.
- Possible need for abdominal, chest, plastic or neurosurgery.

**Note:**

Non-operative, 'observational' care is safe only in an environment that provides both close clinical observation by a surgeon experienced in the management of paediatric trauma and immediately available operative care.

## 8.5 Obstetric Trauma

### Prehospital Management

- Supplemental oxygen.
- IV access and fluids.
- No woman in the third trimester of pregnancy should be nursed supine. Supine position creates aorto-caval obstruction and hypotension, particularly in the shocked patient.

Aorto-caval compression also renders supine CPR ineffective.

Nurse patient with a 15 degree left tilt (on a spinal board if necessary) with the uterus manually displaced to the left side.

- The pregnant patient with minor injury should also be carefully observed, since even minor injuries may be associated with complications such as foeto-maternal haemorrhage.

### Primary Hospital Management

#### Assessment

- Hypervolaemia of pregnancy means that the patient may lose up to 30–35 per cent of circulating blood volume before becoming hypotensive/showing other signs of shock. The foetus may be compromised even when the mother appears stable.
- Is the foetus viable? Foetus is not viable pre-22 weeks (probably 24 weeks). If the foetus is beyond 24 weeks gestation, obstetric backup at a Major Trauma Service is mandatory. If the foetus is preterm, this will necessitate specialist neonatal facilities if delivered.
- Is there evidence of foetal distress?
- Is there possibility of trauma to the uterus? Assess for uterine contractions, vaginal bleeding or amniotic fluid in the vagina.
- All injured pregnant women should have an obstetric assessment because abruption of the placenta and foetal distress or death may occur with seemingly minor blunt trauma. An obstetrician should be involved as early as possible in determining appropriate obstetric care in conjunction with the trauma team.

#### Stabilisation

Assessment and resuscitation of the mother must take priority and, ultimately, the welfare of the foetus is optimised by optimal care of the mother.

- Maintain position on left side.
- Early IV access in case of placental hypoperfusion. Prompt fluid replacement— if group O required before a full cross-match is complete, it must be rhesus negative.

- Avoid vasopressors to restore maternal blood pressure.
- Early nasogastric tube decompression and urinary catheter are required.

### Investigations

- Standard cervical spine, chest and pelvic radiography is mandatory, notwithstanding the presence of the foetus. Lead shield the pelvis/abdo if not needed in film.
- Ultrasound if blunt trauma of the uterus is suspected.
- Diagnostic peritoneal lavage is a safe procedure in the pregnant patient and should not be withheld, providing the indications are clear. After the first trimester, a supraumbilical method is employed.

### Foetal Management

- Optimal care of the foetus is achieved through optimal care of the mother.
- If the foetus is alive and mature enough to survive delivery, it should be monitored continuously.
- Cardiotocographic monitoring initiated early gives adequate warning of a deterioration in foetal condition.

### Indications for Transfer to Major Trauma Service (with Obstetric backup)

- Evidence of foetal distress.
- Foetus beyond 24 weeks gestation.
- Possibility of trauma to the uterus.
- All pregnant, injured women should have urgent obstetric assessment.

## 8.6 Burns

### Indications for Transfer to Burns Service

- Full thickness burns greater than 5 per cent of the body surface area in any age group.
- Partial thickness burns involving more than 20 per cent of the total body surface in adults.
- Partial thickness burns involving more than 10 per cent of the total body surface area in ages under 10 and over 50 years.
- Inhalation injury indicated by:
  - facial burns
  - singeing of the eyebrows, eyelashes and nasal hair
  - carbon deposits and acute inflammatory changes in the oropharynx
  - history of impaired mentation and/or confinement in a burning environment
  - history of explosion.
- Partial thickness and full thickness burns involving face, eyes, ears, hands, feet, genitalia, perineum or skin over major joints.
- Electrical burns including lightning injury.
- Significant chemical burns.
- Lesser burns in patients with significant pre-existing disease that could complicate management\*.
- Burn injury with special social requirements including suspected child abuse.

### Primary Hospital Management

#### Assessment

- History.
- Body surface area— 'Rule of Nines'— each anatomical body region represents 9 per cent of the total body surface area.
- Depth of burn— superficial, partial thickness, deep partial thickness, full thickness.

#### Airway Management

- Signs of impending airway obstruction may not be immediately obvious.
- Assume carbon monoxide (CO) poisoning in patients sustaining burns in enclosed areas. Such patients should initially receive high flow oxygen via a non-rebreathing bag.

- If there is any doubt about damage to the respiratory tract, it is important that the patient be intubated early as the evolution of pharyngeal and laryngeal oedema in the ensuing 3–4 hours may make intubation impossible, and emergency cricothyroidotomy or tracheostomy may become necessary in difficult circumstances.

### Stop the Burning Process

- All burning clothing should be removed, taking special care in removal of chemically affected clothing. Dry chemicals should be rinsed off the body with copious amounts of water.

### Intravenous Lines

- Any patient with burns over 20 per cent of the body surface area needs immediate intravenous fluids via a large calibre line (16g). Upper extremities, even if burned, are preferable. Presence of overlying burnt skin should not deter placement of a catheter in an accessible vein, including central veins.
- Circulating blood volume should be assessed according to hourly urine output *via IDC*.
  - Children: 30kg or less, 0.7–1.0 ml of urine/kg body weight/hour
  - Adults: 30–50 ml/hour.
- Infusion of balanced salt solution at 2–4ml solution/kg body weight/per cent body surface burn in the first 24 hours from time of injury.

Proportions: one half of the estimated fluid provided over the first 8 hours post burn, and the remaining half over the next 16 hours.

(This resuscitation is only an estimate and should be adjusted according to haemodynamic and urinary responses.)

### Circumferential Extremity Burns– Maintenance of Peripheral Circulation

- Remove all jewellery.
- Assess status of distal circulation: cyanosis, neurological signs, absence of Doppler pulse.
- Relieve embarrassment of distal circulation in a circumferentially burned limb by escharotomy. Incision must be entire length of the eschar in medial or lateral line of the limb. Escharotomy of fingers is rarely indicated and should be done only in consultation with an appropriate specialist.

### Other

- Insert a nasogastric tube if >20 per cent burns.
- Wound care– gently cover with clean linen, do not break blisters, do not apply cold water to a patient with extensive burns.
- Avoid hypothermia.



## 8.7 Musculoskeletal Trauma Protocol

### Indications for transfer

#### Clinical Indications for Transfer of Musculoskeletal Injuries to a Major Trauma Service

- Limb threatening injuries.
- Suspected spinal injuries (see spinal trauma protocols, app. 8.2).
- Serious crush injuries.
- Open fracture of pelvis.
- Severe closed pelvic ring and/or acetabular injury.

#### Patient Management Indications for Transfer to a Major Trauma Service

- Inability to manage open fractures with definitive surgery within 6 hours
- Inability to manage all long bone fractures within 24 hours

If there is an indication to transfer a patient for any of the above indications or for management of other injuries then:

- Notify the MTS within 15-30 min of patient arrival and
- Arrange transfer to the MTS within 60 min of arrival.

Any intention to undertake orthopaedic procedures should be discussed with the MTS orthopaedic service.

### Musculoskeletal trauma management guidelines

#### Closed Limb Fractures

- Assess and record neurovascular status.
- Straighten / align the limb.
- Apply a splint in anatomical position.
- Continue to regularly monitor neurovascular status.
- If neurovascular compromise evident arrange orthopaedic consultation immediately.

#### Open Limb Fractures

- As per closed limb fractures above.
- Administer IV antibiotics (generally Keflin and Gentamycin). Be aware of any allergies.
- Perform simple emergency room toilet by removing any easily identified foreign objects/contamination.
- Apply Betadine soaked gauze dressing and bandage - leave intact.
- Immediate orthopaedic consultation.

Note: If definitive management occurs more than 6 hours after injury the likelihood of chronic infection is significantly increased, therefore IMMEDIATE transfer to a destination where early definitive management can be undertaken, is imperative.

It is NOT APPROPRIATE to treat other “simple”, closed injuries locally prior to transfer for management of the complex and open injuries. The reverse must occur - immediate transfer for management of the open injuries and delayed management of closed injuries.

### Joint Dislocation

- Joint dislocation may be associated with a fracture or may be mistaken for a juxta articular fracture - always obtain an x-ray before management.
- Neurovascular structures are at risk. Always assess and record findings.
- Reduce dislocated joints if possible and splint in stable position.
- Monitor neurovascular status after reduction.
- An open dislocation requires the same antiseptic precautions as an open fracture.
- Arrange immediate orthopaedic consultation.

### Pelvic Injuries

- Life threatening injuries (due to blood loss) may exist in the pelvic area with minimal external evidence.
- Always assess the pelvis clinically and radiologically in any patient with major trauma.
- Vigorous resuscitation, immediate and ongoing, may be required including multiple IV lines and uncrossmatched blood on occasions.
- A urinary catheter should be inserted (if urethral injury does not preclude this).
- Any significant injury should be transferred to a MTS within 30 minutes of diagnosis, subject to constraints of other injuries.

## **Appendix 9**

### **Current Medical Retrieval Activity in Victoria**

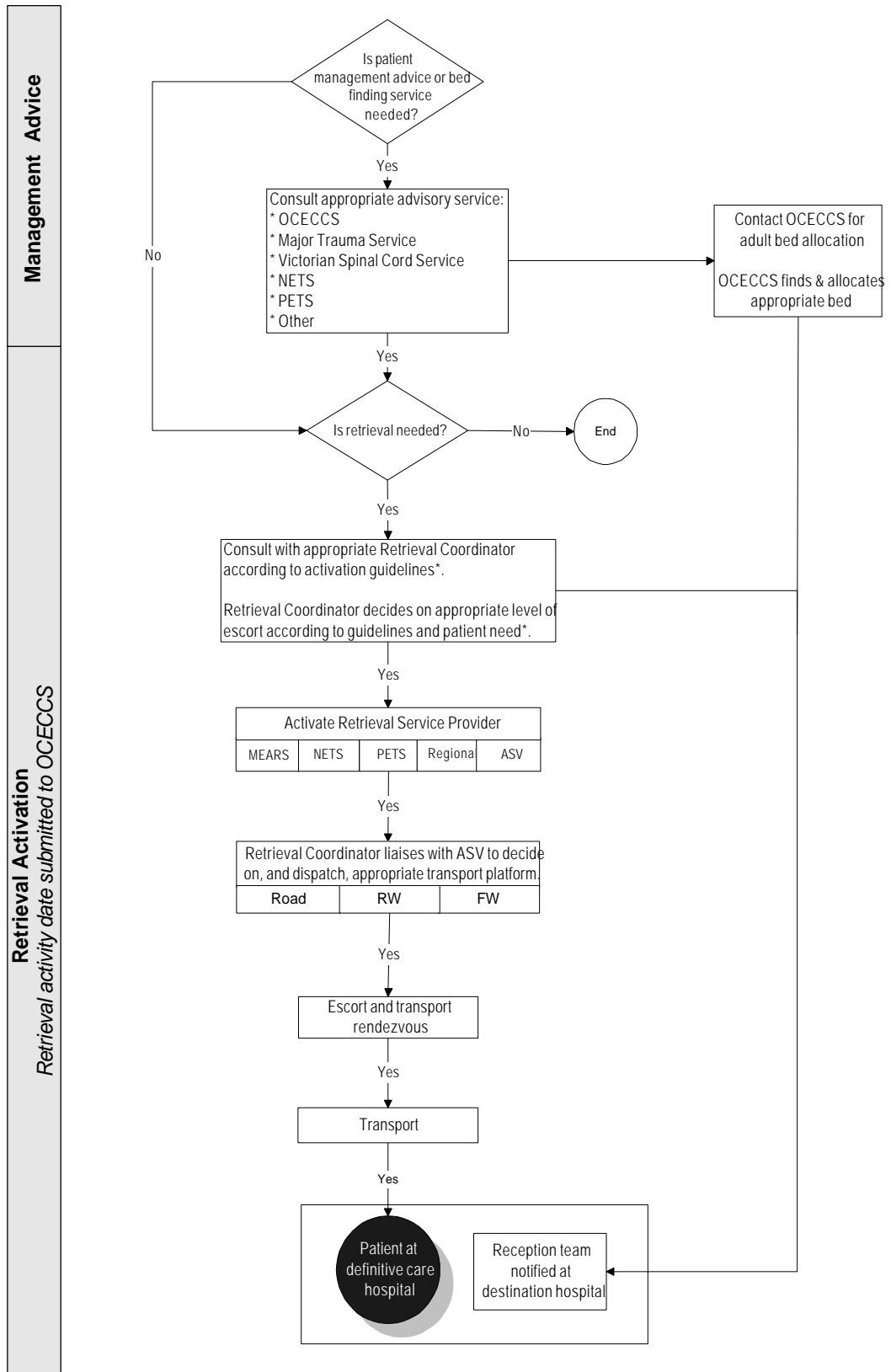
## Current Medical Retrieval Activity in Victoria

Service	No. Trauma Retrievals	Total No. Retrievals	Timeframe
Neonatal Emergency Transport Service (NETS)	0	709 (rural 31%)	Jan 1997–Dec 1997
Paediatric Emergency Transport Service (PETS)	40	170 (rural 33%)	Jan 1997–Dec 1997
Medical Emergency Adult Retrieval Service (MEARS)	30	150 (rural 80%)	annual
Geelong Retrieval Service	22	46	Sept 1996–Aug 1997
Bendigo Retrieval Service	3	71	Jan 1996–Dec 1996
Ballarat Retrieval Service	6	71	Jan 1997–Dec 1997
Albury Wodonga Retrieval Service*	1	11	Jan 1997–Dec 1997
Ambulance Service Victoria (Air Ambulance)	162	532	Jan 1996–Dec 1996
<b>Average Annual Caseload</b>	<b>264</b>	<b>1,760</b>	

\* This only includes retrievals of Victorian patients. The service undertook a total of 28 retrievals for the year.

## **Appendix 10**

### **Retrieval Activation Sequence**



\* Specific retrieval guidelines are subject to development by the regional CCECCS and the MECCC

## **Appendix 11**

### **Trauma Team Composition**

## Trauma Team Composition

The Taskforce has endorsed that the following principles apply to trauma team composition and operation:

- Optimal available expertise should be utilised to fill each role within the team.
- Team members should be sourced from throughout the hospital to ensure the most skilled clinicians available participate in trauma reception and resuscitation, for example from ED, ICU, anaesthetics.
- Specific composition of the team will vary according to local staffing levels.
- Rural and regional ambulance and MICA paramedics are important team members and should be appropriately qualified to meet such role expectations.
- Trauma team members must be available for response within five minutes of a trauma team call
- Trauma team members should be present to receive the patient. The presence of a surgeon on patient arrival complements the function of the trauma team and is essential shortly thereafter (see Appendices 4 and 5)
- Timely team assembly is contingent on early notification by prehospital providers and early subsequent trauma team activation.

Role	Core Competencies/Skills
Team Leader	<p><b>Competencies:</b> Competent and experienced in assessment and management of the trauma patient according to EMST principles.</p> <p><b>Skills:</b></p> <ul style="list-style-type: none"> <li>• Assesses priorities and makes team aware of these.</li> <li>• Prioritises treatment and investigation procedures.</li> <li>• Directs the performance of a range of invasive procedures, including: <ul style="list-style-type: none"> <li>– endotracheal intubation and mechanical ventilation</li> <li>– prescribe and administer anaesthesia and analgesia</li> <li>– intercostal catheter insertion</li> <li>– intravenous cannulation and fluid resuscitation</li> <li>– arterial blood gas sampling</li> <li>– diagnostic peritoneal lavage.</li> </ul> </li> <li>• Makes appropriate referrals early in the treatment of the patient.</li> <li>• Arranges for the transfer of patient to a place of definitive care.</li> </ul>
<u>Procedures</u>	<p><u><b>Competencies:</b></u> <u>Competent and experienced in the invasive procedures to be performed.</u></p> <p><u><b>Skills:</b></u></p> <ul style="list-style-type: none"> <li>• <u>Performs a range of invasive procedures, not limited to:</u> <ul style="list-style-type: none"> <li>– <u>intercostal catheter insertion</u></li> <li>– <u>intravenous cannulation and fluid resuscitation</u></li> <li>– <u>arterial blood gas sampling</u></li> <li>– <u>diagnostic peritoneal lavage</u></li> <li>– <u>urinary catheterisation</u></li> <li>– <u>external cardiac massage.</u></li> </ul> </li> <li>• <u>Attaches monitoring equipment (ECG, NIBP, SaO<sub>2</sub>).</u></li> <li>• <u>Performs 12 lead ECG.</u></li> <li>• <u>Performs procedures as directed by the team leader.</u></li> </ul>



<u>Airway</u>	<u>Competencies:</u> <u>Competent and experienced in airway management.</u> <u>Skills:</u> <ul style="list-style-type: none"> <li>• <u>Performs endotracheal intubation and mechanical ventilation.</u></li> <li>• <u>Administers anaesthesia and analgesia as necessary.</u></li> <li>• <u>Manages C-spine.</u></li> </ul>
Scribe	<u>Skills:</u> <ul style="list-style-type: none"> <li>• Records and documents vital signs at frequent intervals.</li> <li>• Documents the time of performance of procedures.</li> <li>• Documents the time of administration of drugs.</li> <li>• In conjunction with the team leader, controls the access of personnel to resuscitation bay.</li> </ul>

## **Appendix 12**

### **Role Description— Director of Trauma Services**

## Role Description– Director of Trauma Services

The Director of Trauma Services is responsible for

- Managing and organising the multidisciplinary trauma staff (including the trauma team) and establishing clear lines of responsibility for patient and staff management, with:
  - standardised criteria for activation before, or at the time of, the arrival of a patient with potentially serious or complex injuries.
  - adequate reception and facilities.
  - an effective communication system within the hospital for immediate activation of the trauma team.
  - guidelines to ensure a planned, coordinated and timely response for patient management.
  - early consultation with specialists, where indicated.
- Developing and overseeing implementation of protocols and procedures in line with Department of Human Services guidelines with a single point contact to facilitate communication within the trauma system.
- Leading a multidisciplinary, representative hospital committee:
  - to review the activities and performance of the trauma service including case review through regular trauma meetings and feedback to staff.
  - accountable to hospital management.
- Ensuring appropriate numbers of adequately trained staff and maintenance of skills:
  - overseeing orientation, training and supervision of junior staff; continuing education of all staff involved with trauma; ensuring re-certification of EMST qualifications according to RACS guidelines, and re-certification requirements of medical and non-medical staff.
  - ensuring that formal education programs relating to trauma care are provided to those involved in the care of trauma patients.
  - ensuring that medical specialty trainees are closely supervised by senior staff of the specialty and instructed in trauma management.
- Ensuring the collection of trauma registry data and the development and implementation of other quality improvement initiatives including internal case review and forwarding such data for STC review:
  - designating a staff member with authority, responsibility and accountability for conduct of quality activities.
- Ensuring that counselling services are provided for hospital staff involved in the delivery of services to trauma patients.
- Arranging for the trauma service to contribute to the planning of public education campaigns to make the general public aware of first aid and the principles of basic life support.
- Ensuring the trauma service plays an active role in an organised approach from injury scene to definitive care.
- Participating in the review of the hospital disaster plan annually.

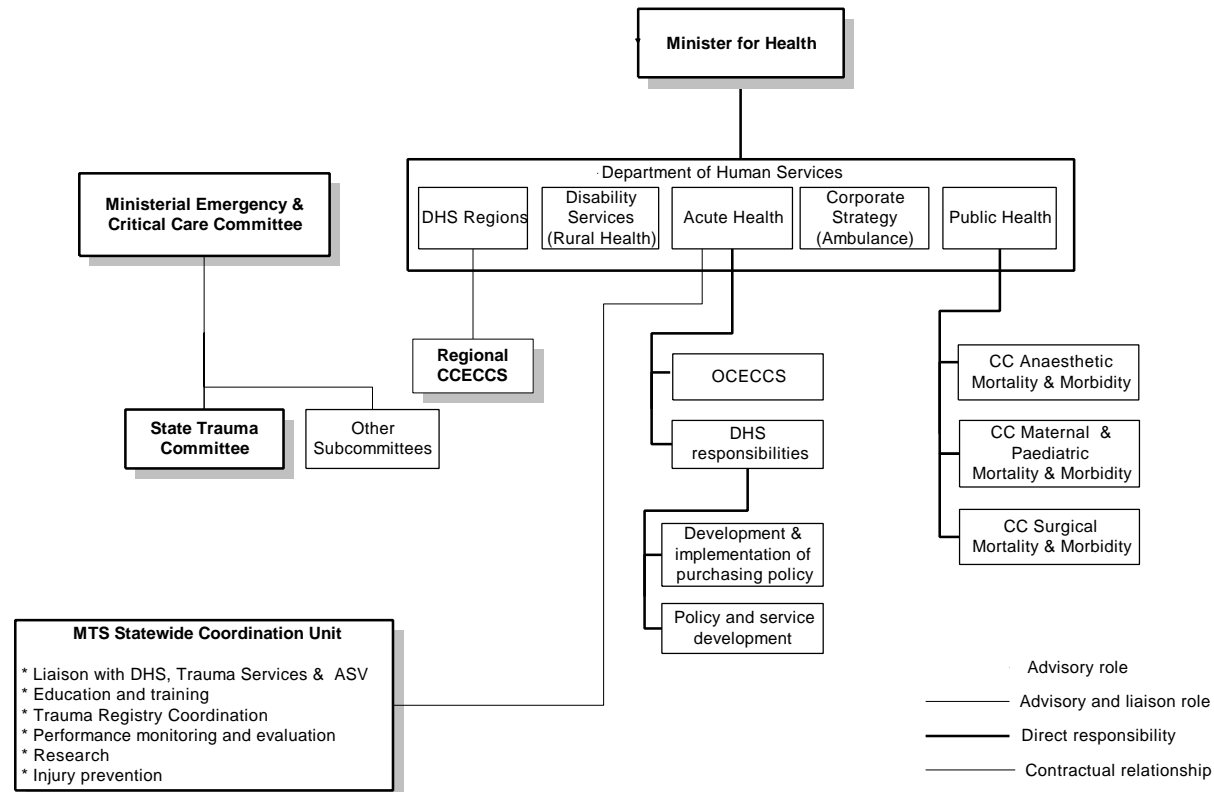
- Ensuring the trauma plan is integrated with the area/region disaster plan.

NB. It is expected that a Director of Trauma Services at a MTS will fully meet this role. At other levels of the trauma system, the degree that this role is fulfilled will be appropriate to trauma caseload. It is anticipated that this role will be filled by more than one person.

## **Appendix 13**

### **Recommended Organisational Framework for Trauma Services in Victoria**

# Recommended Organisational Framework for Emergency and Critical Care Services in Victoria– Trauma services



## **Appendix 14**

### **Recommended Roles and Responsibilities— Ministerial Emergency and Critical Care Committee**

## Recommended Roles and Responsibilities – Ministerial Emergency and Critical Care Committee

It should be noted that the terms of reference will be further developed and finalised by the Department of Human Services and the Minister for Health. This will take into account the recommendations of roles provided by the Ministerial Taskforce on Trauma and Emergency Services.

Suggested roles for the Ministerial Emergency and Critical Care Committee are:

- To provide advice to the Minister for Health and the Department of Human Services through the Acute Health Division.
- To provide advice on the coordination and monitoring of statewide emergency medical services.
- To advise on the ongoing development and distribution of emergency medical services in Victoria.
- To advise on the impact of recommendations of specialist sub-committees on the overall emergency medical system.
- To review the ongoing performance of medical retrieval services in Victoria.
- To assist and advise on matters referred to it by the Department of Human Services.
- To liaise with the regional CCECCS.
- To review the appropriateness of the terms of reference and membership on an ongoing basis.

### Membership

- Network and regional emergency service providers' representatives.
- Representatives from regional CCECCS.
- Ambulance Service Victoria representatives.
- Relevant clinical and allied health professions' representative.
- Consumer representation.
- Department of Human Services representative from Acute Health (as lead Division) and other divisions (as necessary).
- Private sector service providers' nominee.
- Office of the Coordinator, Emergency and Critical Care Services.
- Relevant Royal Colleges and professional organisations' nominee.
- Victorian Healthcare Association.
- Nominee from universities with interest in emergency medical care.
- Ex officio: Department of Human Services Acute Health representative  
Committee Secretariat

### Suggested Frequency of Meetings

- Quarterly.



## **Appendix 15**

### **Recommended Terms of Reference— State Trauma Committee**

## Recommended Terms of Reference– State Trauma Committee

The State Trauma Committee (STC) is to:

- Advise the Minister and the Department of Human Services, through the Ministerial Emergency and Critical Care Committee, on policy development, purchasing and funding issues in relation to trauma services.
- Take a lead role in conducting system-wide monitoring of trauma services, including:
  - evaluating core components of the trauma system
  - providing performance feedback to trauma care providers
  - disseminating information to trauma care providers
  - promoting system enhancement among key stakeholders.
- Liaise with Department of Human Services Acute Health Division and other purchasers of trauma care regarding purchasing strategies, monitoring, and coordination of trauma care.
- Provide advice on best practice in trauma care in relation to:
  - performance indicators
  - clinical protocols
  - educational needs
  - injury prevention initiatives.
- Liaise with Department of Human Services' committees and other committees, as appropriate, through the exchange of information under an agenda item on each committee.

### Membership

- Network and regional trauma service provider representatives.
- Representatives of the Major Trauma Services.
- Ambulance Service Victoria representatives.
- Purchasers of trauma services.
- Relevant clinical and allied health professions' representative.
- Consumer representation.
- Department of Human Services representative from Acute Health (as lead Division).
- Private sector service providers' nominee.
- Representation from CCRTF.
- Relevant Royal Colleges and professional organisations' nominee.
- Nominee from universities with a research or teaching interest in trauma care.
- Ex officio: Department of Human Services Acute Health representative  
Committee Secretariat

### Suggested Frequency of Meetings

- Bimonthly.

## **Appendix 16**

### **Recommended Roles and Responsibilities— MTS Statewide Coordination Unit**

## Recommended Roles and Responsibilities– MTS Statewide Coordination Unit

The MTS Statewide Coordination Unit (MSCU) will be established as a conjoint function between the Major Trauma Services. The MSCU will have a small management executive drawn from the MTS and Department of Human Services. The MSCU will provide representation to the STC.

The MSCU will be physically located at a MTS and will report under a service agreement to the Department of Human Services and on a day-to-day basis to the MTS management executive. The details of this will be worked out during the implementation stage by the MTS and the Department of Human Services.

The MSCU will be responsible for:

- Liaising with the Department of Human Services and other trauma care providers.
- Implementing statewide educational and training programs to enhance trauma management.
- Collecting and collating trauma system performance data from Victoria trauma care providers, including the ongoing development of a trauma registry in collaboration with the Department of Human Services.
- Providing advice, information and data to inform decision making by the STC.
- Implementing clinical indicators for monitoring trauma care.
- Coordinating and participating in the statewide system, enhancing functions of the Major Trauma Services and the STC, such as quality improvement activities, research and education.
- Participating with the system-wide activities of the STC (quality improvement activities).
- Developing a role for the participation in injury prevention activities.

## **Appendix 17**

### **Sample Terms of Reference— Regional Consultative Committee on Emergency and Critical Care Services**

## Sample Terms of Reference– Regional Consultative Committee on Emergency and Critical Care Services

Regional Consultative Committees on Emergency and Critical Care Services have been established in all rural regions. The terms of reference of these committees were adapted from the terms of reference of the Consultative Council on Emergency and Critical Care Services.

### Terms of Reference

To provide advice to the Regional Director, Department of Human Services, on issues relating to the provision, distribution and standard of emergency and critical care services within the region.

The committees should consider regional issues relating to the reception, treatment and continuity of care of patients requiring time-critical trauma, emergency medical and critical care services.

1. Emergency and critical care services:
  - a) To promote the coordination of services
  - b) To provide information, advice and recommendations concerning:
    - i) the development of plans, policies and standards for emergency and critical care services,
    - ii) effective management of patients throughout the services, and
    - iii) rationalisation, distribution and development of services to reflect current health needs and distribution of the population.
2. Services for the transport, reception and treatment of critically ill and injured patients:
  - a) To promote the development of and monitor relevant policies and procedures for patient management, and
  - b) To enable providers of emergency and critical care services to contribute to policy formulation.
3. To monitor the provision of emergency and critical care services within the region and, where applicable, identify areas of concern, notify these to the Department and advise on appropriate steps to resolve them.
4. To monitor the provision of education and training in critical care and emergency management to medical, nursing, ambulance, paramedical and emergency services staff throughout the region, and to disseminate information regarding standards, policies, procedures and protocols to relevant hospitals, organisations and individuals, as appropriate.
5. To ensure coordination of planning for emergency and critical care services with other local planning arrangements for health care services.
6. To advise the Regional Director on matters referred to the committee.
7. To meet at least four times a year.
8. To review the appropriateness of these terms of reference at least every two years.
9. To review the membership at least every two years or as the need arises.
10. To establish working groups on specific matters as necessary and to co-opt people with specific interest to assist the committee to achieve the terms of reference.