



INTER-HOSPITAL TRANSFER GUIDELINE



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1. Key messages

Inter-hospital transfer to a major trauma service (MTS) should be initiated soon after arriving at the primary hospital in order to reduce delaying definitive care. Major trauma patients who receive definitive care in an MTS have reduced morbidity and mortality. The Victorian State Trauma System aims to ensure that as many major trauma patients as possible receive their definitive care at an MTS.

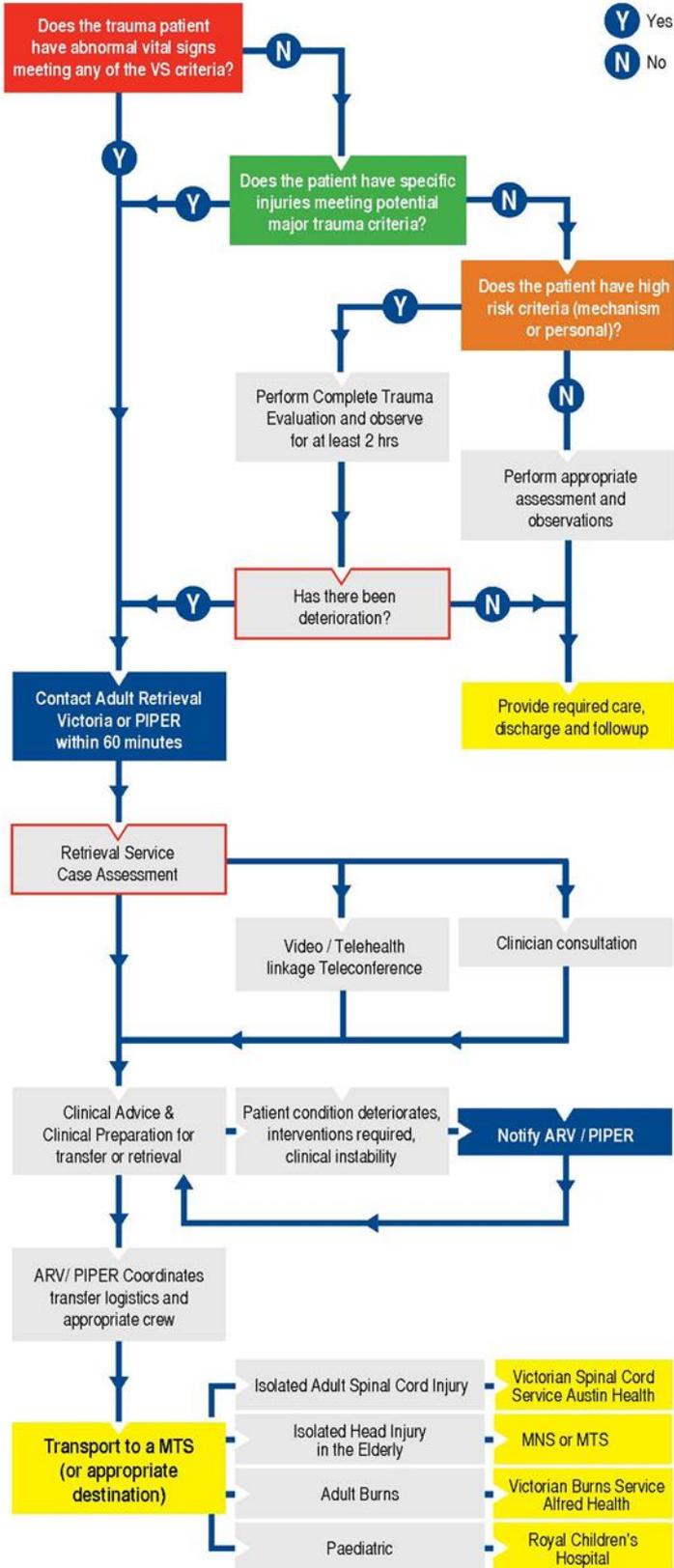
For a patient who meets the major trauma transfer criteria, Adult Retrieval Victoria (ARV) or Paediatric Infant Perinatal Emergency Retrieval (PIPER) should be contacted within 60 minutes of their arrival at hospital. Once initial notification of the trauma patient has been received, the retrieval service will make available a coordination consultant with trauma expertise for advice regarding clinical management and/or the need for transfer. A multiparty teleconference between clinicians and facilities will be arranged as required.

Major trauma requiring an inter-hospital transfer can be recognised by: certain vital sign markers; the presence of a specific physiological or anatomical injury; deterioration associated with a high-risk mechanism of injury; or being a high-risk patient¹. There are also guidelines, which aim to guide and support early management and transfer to an MTS for specific injuries including spinal trauma, burns, traumatic brain injury, obstetric and paediatric trauma. These guidelines have been developed in collaboration with experts in each of the relevant fields, has been assessed using the AGREE methodology for guideline development and is auspiced by the Victorian State Trauma Committee.

Clinical emphasis points

- Early identification of major trauma criteria requiring inter-hospital transfer should be achieved using the defined triage guidelines.
- Early activation of the retrieval and transfer system should take place.
- All inter-hospital transfer of adult major trauma patients should be referred via ARV (1300 368661).
- All inter-hospital transfer of paediatric major trauma patients should be referred via PIPER (1300 137650).

Inter-hospital Major Trauma Transfer



Inter-hospital Vitals Signs Major Trauma Criteria

Age	Term - 3 mths	4-12 mths	1-4 yrs	5-12 yrs	12+ yrs	Adult
HR	<100 or >180	<100 or >180	<90 or >160	<80 or >140	<60 or >130	<60 or >120
RR	>60	>50	>40	>30	>30	<10 or >30
BP sys	<50	<60	<70	<80	<90	<90
SpO ₂			<90%			<90%
GCS			<15			<13

Specific injuries – Major Trauma

All penetrating injuries (except isolated / superficial limb injuries)

Blunt injuries:

- Serious injury to a single body region such that specialised care or intervention may be required, or such that life, limb or long term quality of life may be at risk
- Significant Injuries involving more than one body region

Spinal trauma

- Significant spinal fracture
- Minor spinal cord or nerve root injury
- Presence of neurological deficits
- In isolated spinal cord trauma, the patient should be transferred from a primary hospital to the Victorian Spinal Cord Service at the Austin and Repatriation Medical Centre, paediatric patients should be transferred and managed at the Royal Children's Hospital

Specific Injuries:

- Limb amputations / limb threatening injuries
- Serious crush injury
- Major compound fracture or open dislocation
- Fracture to two or more of the following: femur / tibia / humerus
- Fractured pelvis

Paediatric Trauma

- Any of the above conditions when in children will initiate transfer

Obstetric Trauma

- Evidence of foetal distress
- Foetus beyond 24 weeks gestation
- Possibility of trauma to the uterus
- All obstetric major trauma patients should be transferred to the Royal Melbourne Hospital where they will have urgent obstetric assessment

Burns:

- Burns > 20% (adult) or 10% (child)
- Suspected respiratory tract burns
- High Voltage Electrical Injury

Neuro-trauma

- Neurological deficits
- Skull fracture
- Abnormal CT scan findings

High Risk Criteria for Major Trauma

- Ejection from vehicle
- Motor / cyclist impact > 30 kph
- Fall from height > 3 m
- Struck on head by object falling > 3 m
- Explosion
- High speed MCA > 60 kph
- Pedestrian impact
- Age > 50 / Age < 16
- Pregnant
- Significant comorbidity

2. Identification of potential major trauma

Vital signs

The first step to identifying potential major trauma is to assess the patient's vital signs. In the inter-hospital setting, major trauma is recognised where an injured patient meets the following criteria^{ii iii}.

INTER-HOSPITAL VITAL SIGNS MAJOR TRAUMA						
AGE	Term – 3 Months	4-12 Months	1-4 Years	5-12 Years	12 + Years	Adult
RR	>60	>50	>40	>30	>30	<10 or >30
HR	<100 or >180	<100 or >180	<90 or >160	<80 or >140	<60 or >130	<60 or >120
BP sys	<50	<60	<70	<80	<90	<90
SpO2	<90%	<90%	<90%	<90%	<90%	<90%
GCS	<15	<15	<15	<15	<15	<13

If the trauma patient has any one of the above signs present, then potential major trauma is identified and activation of early consultation and potentially retrieval should begin.

Isolated head injury in older people

Where a person has an altered conscious state (GCS < 13) **and** is over 65 years of age **and** has sustained their injury as a result of a low fall (< 1 m) **then** the patient should be managed in or transferred to a metropolitan neurosurgical service (MNS) or MTS. If the patient is already being assessed in an MNS, then there is no requirement to transfer to an MTS. Data from the Victorian State Trauma Registry demonstrates that outcomes for this subset are comparable when care is delivered in an MNS as when provided in an MTS^{iv}.

Injuries found or suspected

The presence of any one of the following physiological or anatomical injuries constitutes major trauma for the purpose of inter-hospital transfer^v. These injuries cover threats to life, limb or eyesight.

All penetrating injuries

- Excluding isolated/superficial limb injuries

Blunt injuries

- Serious injury to a single region such that specialised care or intervention may be required, or that life, limb or long-term quality of life may be at risk

- Significant injuries involving more than one body region

Specific injuries

- Limb amputations or limb-threatening injuries
- Serious crush injury
- Major compound fracture or open dislocation
- Fracture to two or more of the following: femur/tibia/humerus
- Fractured pelvis

Specialised trauma transfer indications

There are certain indicators in the *Specialist trauma guidelines* whereby transfer to either an MTS or a specialised unit is necessary. The acute nature of these injuries often requires definitive specialist care with minimal delay.

Burns

- Burns to more than 20% of the body for an adult or 10% for a child
- Suspected respiratory tract burns
- High-voltage electrical injury

Used with permission from www.vicburns.org.au

Specialised burns units providing optimal care for severely burned patients are situated at The Alfred (adult) and the Royal Children's Hospital (paediatric). Trauma services at all levels may receive patients with major burns injuries for resuscitation and initial stabilisation. Staff should be familiar with the burns trauma transfer guidelines, which highlight the differences between patients requiring immediate transfer and those requiring non-urgent transfer. Advice and consultation can always be sought from ARV or PIPER.

Traumatic Brain Injury

- Neurological deficits
- Skull fracture
- Abnormal CT scan findings

Spinal trauma

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

In isolated spinal cord trauma, the patient should be transferred from a primary hospital (including an MTS) directly to the Victorian Spinal Cord Service at Austin Health at the earliest appropriate time, preferably in less than 12 hours. All spinal cord trauma in paediatric patients should be transferred and managed at the Royal Children's Hospital.

Paediatric trauma

- Any of the above conditions when in children will initiate transfer

All paediatric major trauma is transferred to the Royal Children's Hospital.

Obstetric trauma

- Evidence of fetal distress and fetus beyond 24 weeks' gestation
- Possibility of trauma to the uterus

All obstetric major trauma patients should be transferred to the Royal Melbourne Hospital where they will have urgent obstetric assessment.

High-risk criteria

The presence of a high-risk mechanism of injury **or** a comorbid factor places the patient **at risk** of major trauma complications. Patients in this category should have a complete trauma evaluation conducted and be observed for a period of time.

If physiologically stable patients with **only** a high-risk mechanism of injury **or** a comorbid factor are triaged as major trauma patients, this may result in unnecessary over-triage.

If deterioration in a patient's condition occurs, then ARV should be contacted to discuss the case and possible activation of retrieval services and transfer to a MTS.

High-risk criteria for major trauma involves ^{vi}:

- ejection from a vehicle
 - motorbike rider or cyclist impact > 30 km/h
 - fall from a height > 3 m
 - struck on the head by an object falling > 3 m
 - explosion
 - high-speed car accident > 60 km/h
 - pedestrian impact
- AND
- age < 10 or > 55
 - pregnancy
 - significant comorbidity

3. Deterioration

The approach to a deteriorating trauma patient should be no different from any other patient. Trauma patients, however, can be complex and deterioration of any particular vital sign may be the result of a complex interaction of a number of causes.

A structured approach helps ensure important signs are not missed and early deterioration is recognised. It helps determine priorities as well as minimising the effects of distraction and prevents important issues from being overlooked.

Managing a trauma patient requires careful observation in the period from arrival at a non-MTS, through to emergent retrieval, with a focus on two key outcomes of traumatic injury:

- *Primary injury*: outcomes of the initial mechanical forces that occur from the traumatic event
- *Secondary injury*: not mechanically caused outcomes of traumatic injuries and may be superimposed on the primary injuries already identified^{vii}

Effectively managing a deteriorating trauma patient may require simultaneous resuscitation and assessment. Any deterioration of a trauma patient indicates the need to revisit primary and secondary assessment to guide further intervention.

4. Contact Retrieval Service

ARV (adult patient) or PIPER (child < 16 years of age) is the first point of call for:

- notification of the arrival of a patient who meets the major trauma inter-hospital transfer criteria
- activation of a request for retrieval
- clinical advice.

MTS hospitals that are contacted directly by a referring hospital will refer cases to ARV or PIPER to coordinate clinical advice and transfer.

ARV and PIPER coordinators can facilitate a three-way conversation between the referral health service, the accepting trauma facility and a retrieval consultant to discuss the best, timely management of the patient.

The decision of when to transfer an unstable patient should ideally be made by the transferring and receiving clinicians in collaboration with the retrieval service^{viii}.

It is important to emphasise the necessity for consultation in order to clarify the need for transfer for patients who meet the major trauma transfer criteria. This may also allow for alternate management pathways in the following circumstances:

- The patient's injuries are assessed as not severe enough to warrant transfer.
- The referring hospital has the capacity to provide appropriate definitive treatment.
- The MTS is in agreement not to transfer in a particular case.
- Transfer from a peripheral hospital to a regional trauma service is appropriate for the needs of the patient.

Telemedicine

If telemedicine facilities exist they have a significant benefit in managing trauma, enabling prompt diagnosis and interventions in patients referred from metropolitan and rural facilities^{ix}. Using this system with the retrieval service can assist by augmenting the delivery of timely, appropriate care, including appropriate patient transfer.

Pre-transport communication and coordination

The following should occur before a patient is transported:

- a telephone or videoconference referral, gathering of history, examination, vital signs and initial investigations
- discussion between referring and receiving senior medical staff, and agreement that transfer is feasible, beneficial and should proceed
- stabilisation advice and institution of any additional management by the referrer
- agreement regarding the required medical and/or nursing attendants during transport
- a decision as to the appropriate mode and timing of transportation that considers

- the patient's condition, age and size
- the urgency of transfer
- medical interventions anticipated
- personnel and other resource availability
- the time of day
- the weather and/or traffic conditions
- geographical considerations
- a decision regarding the required monitoring, equipment and medication.

5. Retrieval and transfer

Inter-hospital retrieval and transfer of major trauma patients is a crucial phase in patient care. The process of retrieving injured patients from a referring health facility has the primary objective of improving their outcomes through coordinated support and timely transfer to an appropriate trauma service by highly capable transfer teams. It is important to note that an exhaustive clinical workup and interventions is not always necessary or appropriate prior to transfer. Stabilisation and ensuring life-threatening problems are addressed, as well as taking measures to prevent deterioration en route, are essential aspects of early care.

Once retrieval staff arrive on scene, be prepared to give a thorough handover. Retrieval staff will assess the patient prior to transfer and may make changes to their care in order to ensure the patient is safe during transfer.

Ensuring patient readiness for transfer

Final preparation of the patient should be made before the actual move, with conscious anticipation of their clinical needs. The patient must be reassessed before transport begins, especially after being placed on monitoring equipment and a transport ventilator (if used). Transport preparations must not overshadow or neglect the patient's fundamental care. An example of a *brief check on the patient* is listed below.

- The airway is secured and patent.
- Ventilation is adequate; respiratory variables are appropriate.
- All equipment alarms are switched on.
- The patient is haemodynamically stable.
- Vital signs are displayed on transport monitors and are clearly visible to transport staff.
- PEEP/CPAP (if set) and FiO₂ levels are correct.
- All drains (urinary, wound or underwater seal) are functioning and secured.
- The underwater seal drain is not clamped.
- Venous access is adequate and patent.
- Intravenous drips and infusion pumps are functioning properly.
- All electrical equipment is plugged in and charged.
- The patient is safely secured on a trolley.



Notify the patient's family or next of kin of their transfer and ensure all the patient's property is secured.

ARV or PIPER will provide updates to the receiving trauma services en route to ensure staff are fully aware of the patient's condition and are ready to intervene when necessary on arrival to the MTS.

Trauma Victoria

The Victorian State Trauma System (VSTS) facilitates the management and treatment of major trauma patients in Victoria. The VSTS aims to reduce preventable death and permanent disability and improve patient outcomes by matching the needs of injured patients to an appropriate level of treatment in a safe and timely manner.

The system works to have the right patient delivered to the right hospital in the shortest time.

One of the best ways to facilitate this is to provide an education resource to all clinicians. Trauma Victoria is a statewide education initiative directed towards clinical staff (doctors, nurses, allied health, paramedics) who provide early patient care for major trauma outside of a MTS.

Guidelines are in place to support awareness of **key aspects of the trauma system** and early trauma care and include **specialist trauma transfer** guidelines.

A web-based learning management system provides modules to support each of the principle guideline areas. Skills tutorials on key trauma procedural interventions will also be accessible.

Moderated remote tutorials will be offered in the future. Clinicians will join a multisite, multiparty videoconferenced meeting room for tutorials and discussions on relevant trauma subjects. It will allow local practitioners to tap into specialised clinical knowledge and to develop their learning to the fullest extent.

Regional simulation and team training will also be supported via a remote expert facilitator and will involve regional and subregional simulation trainers. It will build capacity among simulation trainers to enhance local trauma team training programs.

Facilitated visits will also be arranged whereby medical, nursing and allied health staff may be placed for brief rotations with a MTS in order to increase their experience and familiarity in major trauma management. The aim is also to promote the development of clinical relationships between organisations.



Created by Adult Retrieval Victoria on behalf of the Victorian State Trauma System.

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AGREE II score sheet – Inter-hospital transfer guideline

Domain	Item	AGREE II Rating						
		1 Strongly Disagree				7 Strongly Agree		
		1	2	3	4	5	6	7
Scope and purpose	The overall objective(s) of the guideline is (are) specifically described.						X	
	The health question(s) covered by the guideline is (are) specifically described.						X	
	The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.							X
Stakeholder involvement	The guideline development group includes individuals from all the relevant professional groups.						X	
	The views and preferences of the target population (patients, public, etc.) have been sought.						X	
	The target users of the guideline are clearly defined.							X
Rigor of development	Systematic methods were used to search for evidence.						X	
	The criteria for selecting the evidence are clearly described.					X		
	The strengths and limitations of the body of evidence are clearly described.						X	
	The methods for formulating the recommendations are clearly described.						X	
	The health benefits, side effects and risks have been considered in formulating the recommendations.						X	
	There is an explicit link between the recommendations and the supporting evidence.						X	
	The guideline has been externally reviewed by experts prior to its publication.						X	
	A procedure for updating the guideline is provided.							X



Domain	Item	AGREE II Rating							
		1 Strongly Disagree				7 Strongly Agree			
		1	2	3	4	5	6	7	
Clarity of presentation	The recommendations are specific and unambiguous.								X
	The different options for management of the condition or health issue are clearly presented.						X		
	Key recommendations are easily identifiable.								X
Applicability	The guideline describes facilitators and barriers to its application.								X
	The guideline provides advice and/or tools on how the recommendations can be put into practice.								X
	The potential resource implications of applying the recommendations have been considered.								X
	The guideline presents monitoring and/ or auditing criteria.								X
Editorial independence	The views of the funding body have not influenced the content of the guideline.								X
	Competing interests of guideline development group members have been recorded and addressed.								X
Overall Guideline Assessment	Rate the overall quality of this guideline. 1- Lowest possible quality 7- Highest possible quality							X	
Overall Guideline Assessment	I would recommend this guideline for use.	Yes		Yes, with modifications			No		
		X							

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