



PREPARATION FOR RETRIEVAL

1. Key messages.....	1
2. Rapid Reference Guideline	2
3. Introduction.....	3
4. Retrieval coordination.....	4
5. Choice of transport vehicle	4
6. Process of transfer.....	5
7. Patient preparation	6
8. Appendix 1: AGREEII Score Sheet - Preparation for Retrieval.....	9
9. References.....	10

1. Key messages

The Victorian State Trauma System (VSTS) provides support and retrieval services for critically injured patients requiring definitive care, transfer and management. This preparation for retrieval guideline provides advice on the initial management and transfer of major trauma patients who present to Victorian health services.

This guideline is developed for all clinical staff involved in the care of trauma patients in Victoria. It is intended for use by frontline clinical staff that provides early care for major trauma patients; those working directly at the Major Trauma Service (MTS) as well as those working outside of a MTS.

These guidelines provide the user with accessible resources to effectively and confidently provide early care for critically injured patients. They provide up-to-date information for front-line healthcare clinicians. The guideline is evidence based, has followed the AGREE II methodology for guideline development and is under the auspice of the Victorian State Trauma Committee (VSTC).¹

Clinical emphasis points

- Adult Retrieval Victoria (ARV) is the single contact point for adult major trauma advice, critical care advice, critical care bed access and retrieval of critical care adult patients state-wide.
- Paediatric Infant Perinatal Emergency Retrieval (PIPER) is the point of contact for paediatric major trauma advice and retrieval of critical care paediatric patients state-wide.
- Final preparation of a patient for transfer should be made well ahead of the actual move, with conscious anticipation of clinical needs.
- The patient must be reassessed before transport begins, especially after being placed on monitoring equipment and the transport ventilator (if used).
- Checklists are a valid and effective way to ensure all key points are covered, risks anticipated and mitigated, and all clinical priorities are addressed.
- If unsure or in doubt about any aspect of preparation for retrieval, contact ARV.
- Contact retrieval services immediately if there is significant deterioration in clinical status or if the patient requires additional or unplanned interventions or treatment.

Preparation For Retrieval



RAUMA
VICTORIA

Careful Preparation for Retrieval Transport Improves Care & Reduces Risk



AIRWAY

ENSURE PATIENT AIRWAY SAFETY

- 1 Assess airway stability
- 2 ETT patent, secure and position confirmed
- 3 ETCO₂ continuous monitoring
- 4 Sedation and/ or paralysis adequate



BREATHING

ENSURE OPTIMISED OXYGENATION

- 1 Observe respiratory rate and character
- 2 SpO₂ monitored / blood gases reviewed
- 3 Administer oxygen using an appropriate delivery device
- 4 Ensure ventilation settings appropriate
- 5 Intercostal catheters patent and secure



CIRCULATION

ENSURE IV ACCESS AND MANAGEMENT

- 1 Ensure x 2 peripheral access secure and patent, injection ports accessible.
- 2 Consider intraosseous access where IV access difficult
- 3 Secure all CVC/arterial lines
- 4 ECG & NiBP/ Arterial BP appropriately monitored and managed
- 5 IDC and orogastric tube insitu - output measured
- 6 Check blood sugar
- 7 Prepare medications for transfer according to the [Monash Childrens Paediatric Emergency Medication Handbook](#) or [Adult Retrieval Victoria Infusion Guidelines](#)



DOCUMENTS & DEPARTURE

ENSURE DOCUMENTATION COMPLETE

- 1 Complete referral and transfer document
- 2 Provide copies of all patient charts & NOK details
- 3 Investigation & imaging results included
- 4 Be aware of any advanced care directives
- 5 Ensure belongings are managed and family engaged



EQUIPMENT

EQUIPMENT CHECK

- 1 Oxygen/infusions sufficient for transport
- 2 Batteries and spares sufficient
- 3 BVM and suction available and functioning

OTHER

- + Monitor temperature and prevent heat loss
- + Ensure pressure area care is attended
- + Gastric decompression if intubated
- + Empty drainage bags prior to transport
- + Administer anti-emetic and analgesia as required
- + Restrict spinal motion, manage splints & pelvic binder if indicated, consult with ARV/ PIPER if not tolerated
- + Seizure prophylaxis in Traumatic Brain Injury

ALERT

It is important that you notify the ARV/PIPER Coordinator of:

- Significant deterioration in:
 - Conscious state
 - Respiratory status or oxygenation
 - Heart rate
 - Blood Pressure
- Major clinical developments such as: significantly abnormal diagnostic tests or new clinical signs.
- The need for major interventions prior to the retrieval team arriving such as: intubation or surgery



Ambulance
Victoria

1300 36 86 61

ARV
Adult Retrieval Victoria

PIPER

Paediatric Infant Perinatal Emergency Retrieval

1300 13 76 50



3. Introduction

Retrieval generally involves transferring patients with critical illness or life-threatening injury – situations where the patient requires the highest levels of clinical care and vigilance. Transfers are required when the needs of the patient exceed the resources of the hospital². Retrieved patients are often unstable, at the margin of physiological compensation, and in need of specialised investigation and intervention. They are often at that phase of an emergency presentation where diagnosis is incomplete, treatment is problem-focused and risk is high. This setting therefore requires special expertise, risk-averse processes and fail-safe systems characterised by anticipation, redundancy, rapid response and reliability. If executed poorly, the transfer of critically ill patients is potentially hazardous. It is important to focus on pretransfer stabilisation, the anticipation and management of hazards and the selection of the correct personnel and equipment³.

Coordination

Retrieval is a coordinated process that provides specialised assessment and management, prior to and during transfer of critically ill patients from situations where resources or services are inadequate to a destination where definitive care can be provided.

Movement ‘up the chain of care’

The approach aims to deliver the same or higher level of clinical care than that available at the point of referral, ensuring the patient is not exposed to any reduction in the quality of clinical care despite the inherent risks of the transport environment.

Need for retrieval systems

The need for retrieval is related to the limitations of health facilities, the geography of populations as well as the patient’s injuries⁴. Rural communities have a right to equitable and timely access to critical care medicine; however, it is recognised that there is often an urban–rural divide in regard to the accessibility of healthcare generally and to specialised critical care in particular. Key clinical ‘gap’ areas exist at both urban and rural and regional levels regarding trauma, neurosurgery, cardiac, neonatal and paediatric critical care. Advances in medicine and technology are unavoidably concentrated in major metropolitan centres, increasing the need for critical patient transport (such as coronary percutaneous procedures and interventional radiology such as angio-embolisation) to an MTS, and paediatric tertiary and quaternary care hospitals. Given that such divides exist and that critical care transfer is inevitable, retrieval medicine aims to ensure quality of care in transfer in distinction to the somewhat ad hoc approach to irregular critical care transfers that otherwise may be the case in less systemised approaches.

The retrieval of injured patients from a referring health facility has the primary objective of improving patient outcomes through the coordinated support and timely transfer of major trauma patients by highly capable transfer teams, to an appropriate trauma service.



4. Retrieval coordination

ARV is a single contact point for major trauma advice (adult), adult critical care advice, critical care bed access and retrieval of critical care adult patients state-wide.

ARV provides a centralised hub for communication and coordination for the trauma retrieval system with the dispatching of appropriately qualified personnel and a transport-appropriate platform. Ideally, interhospital transfers should be initiated with a single telephone call, followed by ready acceptance of the transfer, timely arrival of transport and an uncomplicated journey to the receiving hospital⁵.

ARV encourages early consultation and activation. Contact ARV on 1300 368 661.

Preparation for retrieval is the responsibility of both the referring health facility and retrieval specialists, facilitated by effective communication and handover procedures. This may include updating information regularly to identify changes in patient condition and requirements.

The transfer of critically ill patients is improved by the use of appropriately trained specialist retrieval teams, such as ARV and PIPER. Staff on these teams are specially trained in the process of retrieval, have access to high standards of transfer equipment and ensure that the patient is properly assessed prior to transfer^{6 7}.

The process of patient retrieval either by helicopter, fixed-wing aircraft or by road vehicle requires effective coordination, communication and organisation between hospital staff, ARV coordinators, the retrieval team and receiving hospital. Additionally, the patient's condition needs to be accurately assessed and treated. It needs to be stabilised as much as possible, with preparation of appropriate equipment, medication administration and invasive line management prior to the arrival of the retrieval team.

Specifically trained personnel are required for the transport of neonates, infants and young children, and are provided by Paediatric Infant Perinatal Emergency Retrieval (PIPER) teams.

5. Choice of transport vehicle

This is influenced by a range of factors and will be facilitated by ARV and Ambulance Victoria coordination staff. Factors include⁸:

- Nature of trauma.
- Possible clinical impact of the transport environment.
- Urgency of intervention.
- Location of patient.
- Distances involved.
- Number of retrieval personnel and volume of accompanying equipment.
- Road transport times and road conditions.
- Weather conditions and aviation restrictions for airborne transport.
- Aircraft landing facilities.
- Range and speed of vehicle.



6. Process of transfer

Pre-transport communication and coordination:

- Telephone or videoconference the referrer, gather a history, conduct an exam, check vital signs and initiate investigations.
- Accept the transfer. Discuss the patient with referring and receiving senior medical staff and agree that transfer is feasible and beneficial and should proceed.
- Provide stabilisation advice and institute any additional management.
- Agree on the required medical and/or nursing attendants during transport.
- Decide the appropriate mode and timing of transportation. Factors to consider include:
 - Patient condition, age and size.
 - Urgency of transfer.
 - Medical interventions anticipated.
 - Personnel and other resource availability.
 - Time of day.
 - Weather and/or traffic conditions.
 - Geographical considerations.
- Make a decision regarding the required monitoring, equipment and medication.

Ensuring patient readiness for transfer

Final preparation of the patient should be made before the actual move, with conscious anticipation of clinical needs. Patients should be appropriately resuscitated and stabilised prior to transfer in order to reduce the physiological disturbance associated with movement and reduce the risk of deterioration during the transfer⁹. Examples include giving appropriate doses of muscle relaxants or sedatives, replacing near-empty inotropic and other intravenous (IV) solutions with fresh bags, and emptying drainage bags.

The patient will need to be “packaged” prior to retrieval.

The packaging procedure aims to:

- Minimise clot disturbance and repeated blood loss by reducing patient movement, application of pelvic binder or limb splints and limiting repeated log rolls.
- Minimise spinal movements.
- Minimise cytokine release.
- Maintain normothermia.
- Prevent pressure induced skin injuries.

Vacuum mats will often be used to facilitate this.

Haemostatic packaging is based on the concept of “First clot is best” with any further bleeding depleting coagulation factors and resulting in worse patient outcomes¹⁰.

The patient must be reassessed before transport begins, especially after being placed on monitoring equipment and the 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:

- 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.
- Blood products and IV fluids are available.
- IV drips and infusion pumps are functioning properly.
- The patient is safely secured on a trolley.
- The charge status of all electrical equipment has been checked.

7. Patient preparation

Airway

Ensure patient airway safety

Assess airway stability for all patients.

Secure the endotracheal tube (ETT). Ensure the tapes are firm and intact. If there is a suspected head injury the tapes should not occlude venous drainage, preventing increases in intracranial pressure (tapes may need to be tied above the ears and secured with tape).

Record the length and diameter. Ensure a chest x-ray has been performed at the current ETT length.

Insert the orogastric tube. Ensure it is not secured to the ETT (so is independently secure) and aspirate prior to transport.

It is preferable to replace hard (extrication) cervical collars with a Philadelphia collar to minimise the risk of a pressure injury. A cervical collar must remain in situ during transfer to a MTS, regardless of spinal clearance.

Breathing

Ensure optimised oxygenation

Observe the patient's respiratory rate and its character.

Measure the oxygen saturation (SpO₂) and end-tidal carbon dioxide (ETCO₂).

Administer oxygen using the correct delivery device.

Check arterial blood gases. If a head injury is suspected, ensure the partial pressure of carbon dioxide (PaCO₂) is between 35 and 40 mmHg. This will optimise cerebral perfusion.

Secure an intercostal catheter (ICC) if present. Ensure the dressing is dry and intact and drainage system is functioning and not clamped/kinked.

Ventilation considerations:



- If a head injury is suspected and the patient is receiving positive pressure ventilation, maintain PEEP levels below 10 cm of water to minimise the impact of increased intrathoracic pressures on intracranial pressure.
- If there are known or suspected chest injuries ensure the tidal volume is 4–6 mL/kg to prevent an acute lung injury.
- Avoid high peak inspiratory pressures.
- If a flail segment is involved, consider early ventilation and utilise PEEP levels higher than usual.

Circulation and C-spine

Ensure IV access and management

Insert a minimum of two large-bore peripheral IV lines.

Secure all lines, ensuring the injection ports are accessible.

Attach a rapid infuser pump line and fluid for transfer.

Record all IV fluids. Ensure accurate documentation of all blood products administered.

Monitor vital signs for evidence of developing haemorrhagic shock.

Utilise serial blood gases to monitor Hb and lactate and consider serial coagulation screens to identify coagulopathy and guide blood product administration.

Transduce/monitor all arterial and central venous lines. Ensure lines are anchored appropriately and transducers are aligned with the phlebostatic axis.

Documentation

Ensure complete patient documentation

Provide copies of all medical and nursing clinical notes and charts.

Include all investigation results – pathology and ECG. Check the coagulation status and platelet count for all trauma patients.

Provide digital copies of all imaging – films, scans, MRI.

Advise of any ‘limitations of treatment’ orders.

Include the contact details of next of kin.

Include contact numbers for staff at the referral centre

Ensure patient belonging/valuables are documented and included with the transfer.

Alert

It is important that you notify the ARV coordinator of significant deterioration in:

- Conscious state.
- Blood pressure.
- Heart rate.
- Respiratory status.
- Oxygenation.
- Major clinical developments such as significantly abnormal diagnostic tests or new clinical signs.



- The need for major interventions prior to the retrieval team arriving ¹¹ (for example, intubation and surgery).

Other

Maintain body temperature

Hypothermia contributes to poor outcomes for trauma patients. Warm the patient to achieve normothermia and package to prevent heat loss.

Insert an in-dwelling catheter

Be mindful of potential bladder injuries – maintain a strict fluid balance chart.

Empty drainage bags prior to transport

Ensure clear documentation of fluid loss.

Administer antiemetic

Maintain spinal precautions if indicated

In a major head injury, ensure the bed is tilted to 20–30 degrees to reduce intracranial pressure.

Stabilise or splint fractures

Pelvic injuries should be stabilised with a pelvic binder or bed sheet. If an unstable pelvic fracture is suspected, treat it with strict spinal precautions and do not log roll; use a Jordan frame or spinal board for transfers.

If limb immobilisation devices are applied, ensure there are no areas of potential pressure injury.

Check lab results and modify treatment if needed

Check all limbs for potential compartment syndrome

Maintain neurovascular observations, elevate the affected limb and consider fasciotomy if circulation is compromised.

Ensure all open wounds are cleaned and covered

Be mindful that trauma patients are highly susceptible to infection and severe sepsis.

Impaled objects should not be removed but stabilised for transport to ensure no further movement or manipulation of the object is likely during transit.

Ensure adequate analgesia is in progress prior to transport

Notify the patient's family or next of kin of the trauma transfer and ensure all patient property is identified and secured¹².



8. Appendix 1: AGREE II Score Sheet - Preparation for Retrieval

AGREE II Score Sheet: Preparation for retrieval guideline

Domain	Item	AGREE II Rating						
		1 <i>Strongly Disagree</i>	2	3	4	5	6	7 <i>Strongly Agree</i>
Scope and purpose	1. The overall objective(s) of the guideline is (are) specifically described.							X
	2. The health question(s) covered by the guideline is (are) specifically described.							X
	3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.							X
Stakeholder involvement	4. The guideline development group includes individuals from all the relevant professional groups.						X	
	5. The views and preferences of the target population (patients, public, etc.) have been sought.							X
Rigor of development	6. The target users of the guideline are clearly defined.							X
	7. Systematic methods were used to search for evidence.					X		
	8. The criteria for selecting the evidence are clearly described.						X	
	9. The strengths and limitations of the body of evidence are clearly described.						X	
	10. The methods for formulating the recommendations are clearly described.						X	
	11. The health benefits, side effects and risks have been considered in formulating the recommendations.						X	
	12. There is an explicit link between the recommendations and the supporting evidence.							X
Clarity of presentation	13. The guideline has been externally reviewed by experts prior to its publication.							X
	14. A procedure for updating the guideline is provided.							X
	15. The recommendations are specific and unambiguous.						X	
	16. The different options for management of the condition or health issue are clearly presented.							X
	17. Key recommendations are easily identifiable.							X



Domain	Item	AGREE II Rating						
		1	2	3	4	5	6	7
		Strongly Disagree						Strongly Agree
Applicability	18. The guideline describes facilitators and barriers to its application.							X
	19. The guideline provides advice and/or tools on how the recommendations can be put into practice.							X
	20. The potential resource implications of applying the recommendations have been considered.							X
	21. The guideline presents monitoring and/ or auditing criteria.							X
	22. The views of the funding body have not influenced the content of the guideline.							X
Editorial independence	23. Competing interests of guideline development group members have been recorded and addressed.							X
	1. Rate the overall quality of this guideline.	1 Lowest possible quality	2	3	4	5	6	7 Highest possible quality
Overall Guideline Assessment	2. I would recommend this guideline for use.	Yes	Yes, with modifications				No	
		X						

9. References



¹ Brouwers M, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, Fervers B, Graham ID, Grimshaw J, Hanna S, Littlejohns P, Makarski J, Zitzelsberger L for the AGREE Next Steps Consortium. AGREE II: Advancing guideline development, reporting and evaluation in healthcare. *Can Med Assoc J*. 2010. Available online July 5, 2010. doi:10.1503/cmaj.090449

² Wong K, Levy RD, Interhospital transfers of patients with surgical emergencies: areas for improvement. *Australian journal of rural health*. 2005 Oct; 13 (5):290-4.

³ Ahmed I, Majeed A. Risk management during interhospital transfer of critically ill patients: making the journey safe. *Emergency Medical Journal*. 2008; 25; 502-505.

⁴ American College of Surgeons. *Advanced Trauma Life Support*. 9th edition. 2012. American College of Surgeons Committee on Trauma.

⁵ Craig SS. Challenges in arranging inter-hospital transfer from a small regional hospital: an observational study. *Emergency Medicine Australasia*. 2005; 17 (2): 124-31.

⁶ Bellingan G, Oliver T, Batson S, Webb A. Comparison of a specialist retrieval team with current United Kingdom practice for the transport of critically ill patients. *Intensive Care Medicine*. 2000; 26(6): 740-4

⁷ Flabouris A, Runciman WB, Levings B. Incidents during out of hospital patient transportation. *Anaesthesia and Intensive Care*. 2006; 34(2): 228-236.

⁸ Royal Australasian College of Surgeons. *Australian and New Zealand Minimum Standards for the Transport of the Critically Ill*. 2012 May. p74.

⁹ The Intensive Care Society. *Guidelines for the transport of the critically ill adult* (3rd edition 2011). [Accessed 2014 May 21] Available from: <http://www.ics.ac.uk/EasysiteWeb/getresource.axd?AssetID=482&type...>

¹⁰ London Air Ambulance. (2010, May). *Pre Hospital Care Standard Operating Procedure Packaging guideline*. Retrieved from UK HEMS - Clinical excellence in Helicopter Medicine: <http://www.ukhems.co.uk/Packaging.pdf>

¹¹ Royal Flying Doctor Service of Australia; Western Operations. *Transporting your patient. Guidelines for organizing and preparing patients for transfer by air*. Version 1.7. 2009. [Accessed 2014 July 09.] Available from: http://www.flyingdoctor.org.au/ignitionsuite/uploads/docs/Transporting_Your_Patient_Final%20Rangs%20Bmarks.pdf

¹² Adult Retrieval Victoria. *Medical Reference Manual*. January 2013.