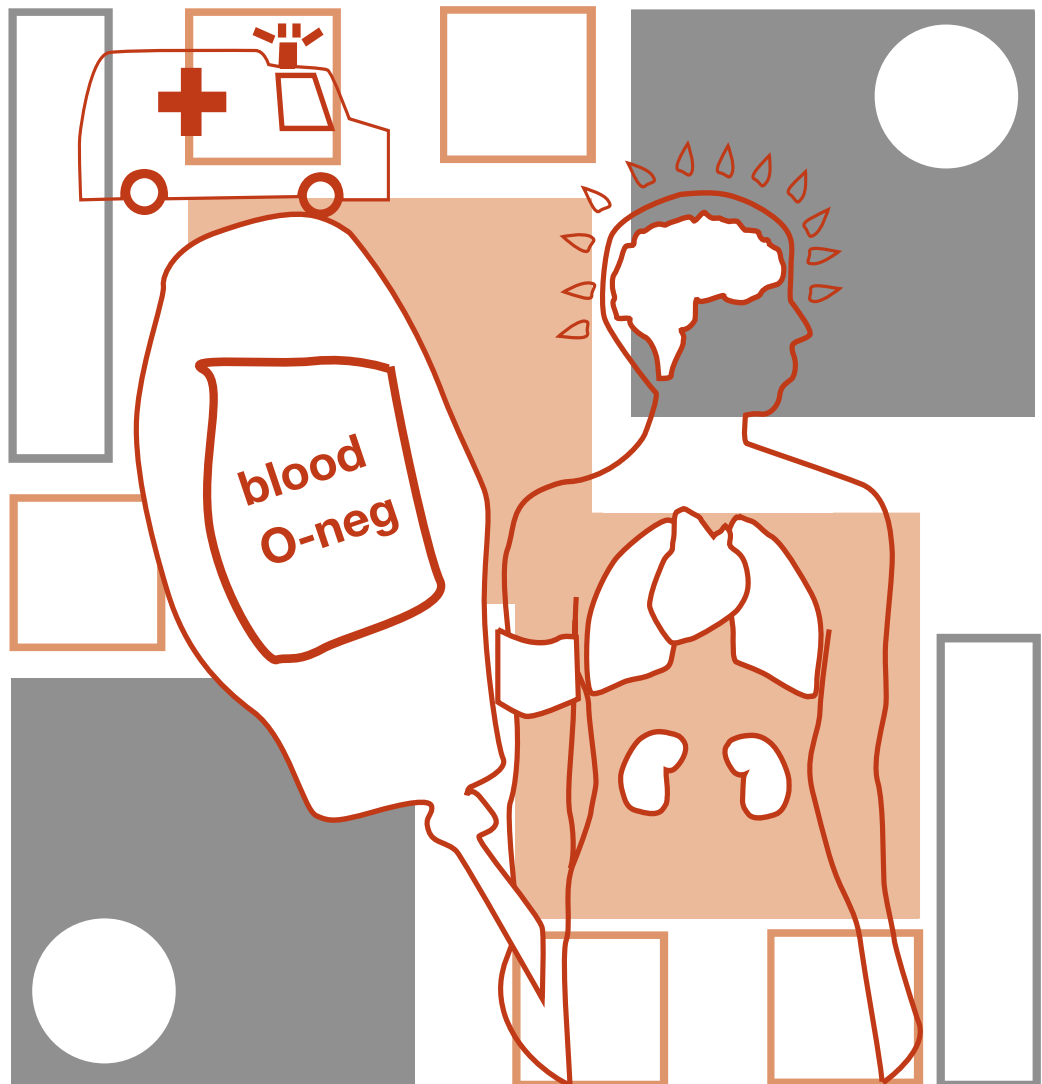


# ■ ■ Management of Hypovolaemic Shock in the Trauma Patient



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**Authors**

Ms Sharene Pascoe (RN), Rural Critical Care Clinical Nurse Consultant

Ms Joan Lynch (RN), Project Manager, Trauma Service, Liverpool Hospital

**Editorial team**

NSW ITIM Clinical Practice Guidelines Committee

Mr Glenn Sisson (RN), Trauma Clinical Education Manager, NSW ITIM

Dr Michael Parr, Intensivist, Liverpool Hospital

Assoc. Prof. Michael Sugrue, Trauma Director, Trauma Service, Liverpool Hospital

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For further copies contact:

**NSW Institute of Trauma and Injury Management**

PO Box 6314, North Ryde, NSW 2113

Ph: (02) 9887 5726

or can be downloaded from the NSW ITIM website

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January 2007



## Important notice!

'Management of Hypovolaemic Shock in the Trauma Patient' clinical practice guidelines are aimed at assisting clinicians in informed medical decision-making. They are not intended to replace decision-making. The authors appreciate the heterogeneity of the patient population and the signs and symptoms they may present with and the need to often modify management in light of a patient's co-morbidities.

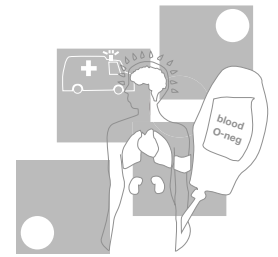
The guidelines are intended to provide a general guide to the management of specified injuries. The guidelines are not a definitive statement on the correct procedures, rather they constitute a general guide to be followed subject to the clinicians judgement in each case.

The information provided is based on the best available information at the time of writing, which is December 2003. These guidelines will therefore be updated every five years and consider new evidence as it becomes available.

### **These guidelines are intended for use in adults only.**

All guidelines regarding pre-hospital care should be read and considered in conjunction with NSW Ambulance Service protocols.





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**Algorithm 1 ::** The management of hypovolaemic shock in the trauma patient

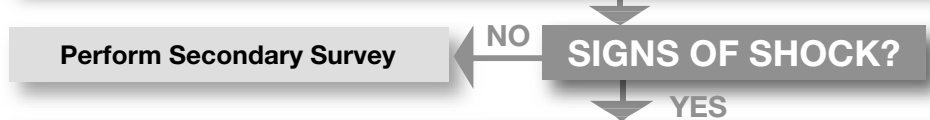
# The Management of Hypovolaemic Shock in the Trauma Patient

If definitive care is not available in your facility make early contact with retrieval services

**Primary survey**  
Includes organising the trauma team, calling the surgeon and notifying the blood bank. Also consider early call to Retrieval Services (AMRS 'formerly MRU' 1800 650 004).

Airway / C-spine	Breathing	Circulation	Disability	Exposure / Environment	Adjuncts
<ul style="list-style-type: none"> <li>Protect airway, secure if unstable.</li> <li>Airway adjunct as needed.</li> <li>Control of c-spine.</li> </ul>	<ul style="list-style-type: none"> <li>Definitive control of airway.</li> <li>Oxygen.</li> <li>Bag and mask.</li> </ul>	<ul style="list-style-type: none"> <li>Secure venous access x 2 large bore cannula.</li> <li>Bloods:                             <ul style="list-style-type: none"> <li>- x-match</li> <li>- FBC</li> <li>- EUC's</li> <li>- Creatinine</li> <li>- ABG's</li> <li>- Blood ETOH.</li> </ul> </li> <li>Control external bleeding.</li> </ul>	<ul style="list-style-type: none"> <li>Assess neurological status.</li> <li>AVPU:                             <ul style="list-style-type: none"> <li>- alert</li> <li>- responds to vocal stimuli</li> <li>- responds to painful stimuli</li> <li>- unresponsive.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Undress patient.</li> <li>Maintain temperature.</li> </ul>	<ul style="list-style-type: none"> <li>X-ray:                             <ul style="list-style-type: none"> <li>- chest</li> <li>- pelvis</li> <li>- lateral c-spine.</li> </ul> </li> </ul>

**REMEMBER** – BP and HR will not identify all trauma patients who are in shock. **ASSESS** – History and perfusion indices – ABG's, base deficit, lactate, Hb and HCT.



**Identify the source of haemorrhage**

External	Long bones	Chest	Abdomen	Retroperitoneum
<ul style="list-style-type: none"> <li>Careful visual inspection.</li> </ul>	<ul style="list-style-type: none"> <li>Careful visual inspection.</li> </ul>	<ul style="list-style-type: none"> <li>Chest x-ray.</li> </ul>	<ul style="list-style-type: none"> <li>DPA* and / or FAST**.</li> </ul>	<ul style="list-style-type: none"> <li>Pelvic x-ray.</li> </ul>

\* Diagnostic Peritoneal Aspiration (DPA). >10mls of frank blood = positive DPA.  
\*\* Focused Abdominal Sonography in Trauma (FAST). Free fluid = positive FAST.

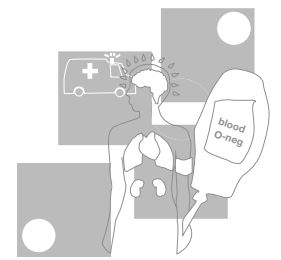
**Interventions**

External	Long bones	Chest	Abdomen	Retroperitoneum
<ul style="list-style-type: none"> <li>Apply direct pressure.</li> <li>Suture lacerations.</li> </ul>	<ul style="list-style-type: none"> <li>Splint + / - reduce #.</li> </ul>	<ul style="list-style-type: none"> <li>Chest tube.</li> </ul>	<ul style="list-style-type: none"> <li>Emergency Laparotomy.</li> </ul>	<ul style="list-style-type: none"> <li>Externally stabilise pelvis.</li> <li>Emergency angiogram.</li> </ul>

In the presence of uncontrolled haemorrhage and a delay of greater than 30 minutes to operative haemostasis, infuse small aliquots (100-200mls) of fluid to maintain systolic blood pressure between 80-90mmHg. Use caution in the elderly. Contraindicated in the unconscious patient without a palpable blood pressure. Maintain the systolic blood pressure >90mmHg for those with a traumatic brain injury.







# Summary of guidelines

How do you know when the patient is in hypovolaemic shock?

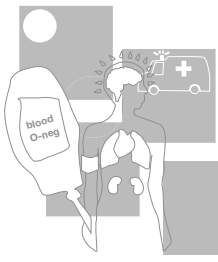
GUIDELINE	LEVEL OF EVIDENCE
<p>Blood pressure and heart rate will not identify all trauma patients who are in shock. Assessment of the trauma patient should include:</p> <ul style="list-style-type: none"> <li>⌘ arterial blood gases and assessment of base deficit</li> <li>⌘ haemoglobin</li> <li>⌘ lactate</li> <li>⌘ haematocrit.</li> </ul> <p>These tests are only of value when interpreted in a series, therefore should be repeated.</p>	<p>III-2</p>

How do you find the sources of bleeding in a hypotensive trauma patient?

GUIDELINE	LEVEL OF EVIDENCE
<p>When the haemodynamically unstable patient enters the resuscitation room, a primary survey with full exposure takes place. Carefully inspect for external bleeding sources and examine the long bones. If x-ray facilities are available, a supine chest x-ray and pelvic x-ray should be obtained within 10 minutes of arrival. The CXR will identify any large haemothorax. If the pelvic x-ray shows a pelvic fracture, the remaining two sites of significant bleeding are the abdomen and the pelvic retroperitoneum. The options for assessing the abdomen are DPA and / or FAST.</p>	<p>IV</p>

What is the best management of the bleeding patient?

GUIDELINE	LEVEL OF EVIDENCE
<ul style="list-style-type: none"> <li>⌘ Establish patent airway.</li> <li>⌘ Ensure adequate ventilation and oxygenation.</li> <li>⌘ Secure venous access – large bore cannula x 2.</li> <li>⌘ Control any external bleeding by applying direct pressure.</li> <li>⌘ Rapidly identify patients requiring operative haemostasis.</li> <li>⌘ Establish prompt contact with the major referral hospital and retrieval service.</li> </ul>	<p>III-2</p>
<p>In the presence of uncontrolled haemorrhage and a delay of greater than 30 minutes to operative haemostasis, infuse small aliquots of fluid (100-200mls) to maintain systolic blood pressure between 80-90mmHg. Use caution in the elderly. Contraindicated in unconscious patients without a palpable blood pressure and those with traumatic brain injury (see over leaf).</p>	<p>II</p>



# Summary of guidelines

What is the best management of the bleeding patient? *continued...*

GUIDELINE	LEVEL OF EVIDENCE
<p>In the presence of uncontrolled haemorrhage in the patient with a concurrent traumatic brain injury, prevention of secondary brain injury from hypotension is crucial as a systolic blood pressure &lt;90mmHg is associated with poor outcomes. Infuse small aliquots of fluid (100-200mls) to maintain systolic blood pressure above 90mmHg.</p>	I

If fluid resuscitation is indicated, what type of fluid should be given?

GUIDELINE	LEVEL OF EVIDENCE
<ul style="list-style-type: none"> <li>⚡ Early use of blood, if available, remains the optimal resuscitation fluid for the hypovolaemic patient. Use with caution due to numerous complications.</li> </ul>	Consensus
<ul style="list-style-type: none"> <li>⚡ Where blood is not available or delayed, Compound Sodium Lactate (Hartmanns) is the preferred alternative for the initial resuscitation of the hypovolaemic trauma patient. Caution should be exercised in the trauma patient with liver disease.</li> <li>⚡ 0.9% Normal Saline is also an acceptable alternative. Large volumes, however may result in metabolic acidosis.</li> </ul>	II

What are the endpoints of fluid resuscitation in the trauma patient?

GUIDELINE	LEVEL OF EVIDENCE
<p>Traditional haemodynamic parameters do not adequately quantify the degree of physiological derangement in hypovolaemic trauma patients. If point of care blood gas analysis is available base deficit and lactate levels should be used to identify the magnitude of tissue oxygen debt and the adequacy of resuscitation. These tests are only of value when interpreted in a series, therefore should be repeated.</p> <p>A persistently high or increasing base deficit indicates the presence of ongoing blood loss or inadequate volume replacement.</p>	III-2
<p>In the absence of point of care blood gas analysis capability the restoration of a normal mentation, heart rate, skin perfusion and urine output and maintaining the systolic blood pressure at 80-90 mmHg serve as the end point of resuscitation.</p>	Consensus

