

CG031 Spinal Immobilisation & Primary Packaging

1. Key Recommendations for operational use

For use by: Pre-hospital care teams. **Internet:** Yes

1	Initial Approach	<ul style="list-style-type: none"> • On arrival, assess the mechanism of injury and immobilise the spine if indicated. <ul style="list-style-type: none"> - maintain a high index of suspicion in the elderly and frail. • Use Manual In-line Stabilisation (MILS) initially. • If resources do not allow MILS to be performed: <ul style="list-style-type: none"> - ask conscious patients to keep their head and neck still. - in the unconscious patient, avoid spinal motion until the spine can be protected. • Complete a <C>ABCD assessment to identify life threatening injuries requiring urgent intervention prior to full assessment of the spine: <ul style="list-style-type: none"> - refer to CG006 Major Trauma.
2	Selective Immobilisation	<ul style="list-style-type: none"> • Following assessment, make a case-by-case decision to continue spinal immobilisation. • Unconscious patients are particularly at risk of secondary injury: <ul style="list-style-type: none"> - immobilise and do not clear clinically. • Conscious patients without neck pain, clear the cervical spine if all of the following criteria are present: <ul style="list-style-type: none"> - no midline tenderness. - no focal neurological deficit. - normal alertness. - no intoxication. - no painful distracting injury (further guidance in explanatory notes). • Conscious patients with traumatic neck pain, clear the cervical spine using the Canadian C-Spine Rule if: <ul style="list-style-type: none"> - There are no high-risk factors: <ul style="list-style-type: none"> ▶ Age \geq65, Dangerous Mechanism, Paraesthesia in extremities. - There is any one of the following low risk factors: <ul style="list-style-type: none"> ▶ Simple rear-end MTC, ambulatory at any time, delayed onset neck pain, absence of midline c-spine tenderness. - The patient can actively rotate their neck 45° left and right. • Consider mechanism, pain, and neurology in assessment of the thoracic and lumbar spine. • Patients with penetrating trauma and no neurological signs do not require immobilisation.

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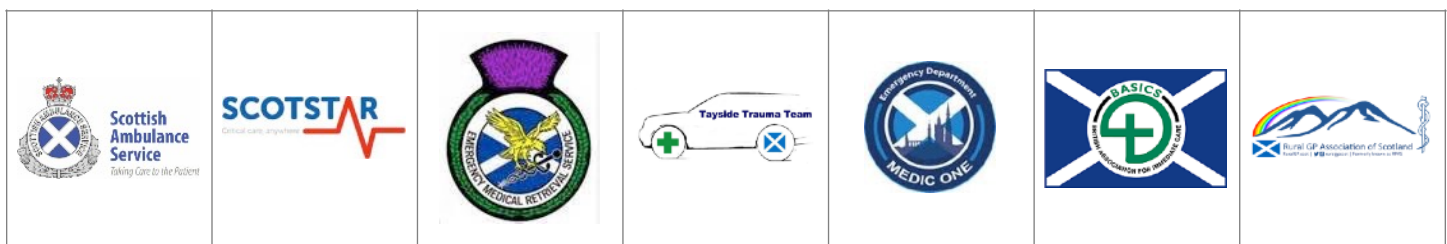
3	Extrication	<ul style="list-style-type: none"> • Consider self-extrication for patients who are trapped in vehicles if: <ul style="list-style-type: none"> - they are not overtly intoxicated or confused. - there are no major distracting injuries. - they are not physically trapped. - they do not have any abnormal neurology. • Ask patients suitable for self-extrication to extricate themselves cautiously and lie on a trolley: <ul style="list-style-type: none"> - if they experience pain or neurology during extrication they should be asked to stop and mechanical extrication considered. • Consider mechanical extrication in those not suitable or able to self-extricate: <ul style="list-style-type: none"> - determine the method, speed and technique by the likelihood of spinal injury and presence of other life-threatening injuries. - refer to SG008 Entrapment and Extrication. • The long-board can be used in extrication but do not use for transfer. • Aim to remove a patient from a hazardous environment as quickly and safely as possible: <ul style="list-style-type: none"> - do not leave patients without signs of injury in a dangerous environment for extended periods.
4	Adult Spinal Immobilisation	<ul style="list-style-type: none"> • If a fracture is suspected at any level, immobilise the entire spine in a neutral position that is comfortable for the patient. • MILS is suitable for use in all patients. • Maintain neutral spinal alignment when performing any rolls. • As a minimum, immobilise patients on either: <ul style="list-style-type: none"> - a scoop with head blocks and tape. - a vacuum mattress with head blocks and the mattress moulded around the blocks. • A cervical collar can be used in addition to the above: <ul style="list-style-type: none"> - consider the use of a cervical collar on a case-by-case basis taking into account the benefits and risks (further information given in explanatory notes). - if using a cervical collar, size and fit it correctly. • Immobilise the patient in a position of comfort: <ul style="list-style-type: none"> - patients with spinal deformities may require modification of standard immobilisation techniques. • Attempting to forcibly immobilise agitated patients may increase agitation, movement and any underlying injury: <ul style="list-style-type: none"> - use a considered approach and consider modifying standard techniques. • Take precautions for vomiting / regurgitation during transfer: <ul style="list-style-type: none"> - ensure suction is accessible and ready to use. - consider an antiemetic in conscious patients.

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5	Paediatric Spinal Immobilisation	<ul style="list-style-type: none"> • Immobilise older children with the same techniques as described in adults. • Consider modification of adult techniques for smaller children. • Immobilisation of the conscious child can be unpleasant for both the child and carers. <ul style="list-style-type: none"> - involve carers early. - use a considered approach balancing the benefits / risks of attempted immobilisation. • Infants can be kept in car seats for transport to hospital by road.
6	Minimal Patient Handling	<ul style="list-style-type: none"> • Apply the principle of minimal patient handling when packaging the multiply injured trauma patient.
7a	Scoop Packaging	<ul style="list-style-type: none"> • For shorter transfers, consider packaging patients on a scoop stretcher: <ul style="list-style-type: none"> - package scoop to skin. - place the scoop and patient within a blizzard blanket with additional blankets / mediwrap used for insulation. • For transfers where the time on scoop will exceed 45 minutes, consider packaging in a vacuum mattress.
7b	Vacuum Mattress Packaging	<ul style="list-style-type: none"> • For longer transfers consider packaging patients in a vacuum mattress. <ul style="list-style-type: none"> - position the vacuum mattress on the floor / trolley - place a blizzard blanket then a sheet on top of it. - it is important to place the patient on a sheet to aid with transfer at the receiving unit. - use a scoop stretcher to lift the patient and place them on the vacuum mattress. - then remove the scoop. - use additional blankets / mediwrap for insulation as required. - when using the scoop to lift patients from the ground, make all efforts to minimise and remove road debris (stone, glass) from underneath the patient prior to transportation. If possible, this should be done along with the removal of clothing.

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2. Document History			
Reference Number	CG031		
Version	1		
Writing group (Lead author in bold)	Dan Graham	Consultant	EMRS West
	James Hale	Fellow	EMRS West
	Danny Kerr	Clinical Effectiveness Lead, Major Trauma.	SAS
	Mark McDonald	Paramedic	Helimed 5
	Alan Megahy	Retrieval Practitioner	EMRS West
Associate Medical Director	Andrew Inglis		
Date issued	12th August 2022		
Date for review	August 2025		
Distribution	BASICS Scotland		✓
	Medic 1		✓
	Referring centres via service websites		✓
	Rural GPs Association of Scotland		✓
	SAS	Air Ambulance	✓
		Specialist Services Desk	x
	ScotSTAR	EMRS West	✓
		EMRS North	✓
		Paediatric	x
		Neonatal	x
Tayside Trauma Team		✓	



3. Scope and purpose

- Overall Objectives:

The aim of this document is to provide guidance on the management of trauma patients with respect to spinal assessment, spinal immobilisation and packaging. The packaging described within the document relates to pre-hospital care. Whilst written specifically for trauma patients, aspects of the packaging guidance can also be applied to medical patients.

- Statement of intent:

This guideline is not intended to be construed or to serve as a standard of care. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan.

- Feedback:

Comments on this guideline can be sent to: sas.cpg@nhs.scot

- Equality Impact Assessment:

Applied to the ScotSTAR Clinical Standards group processes.

- Guideline process endorsed by the Scottish Trauma Network Prehospital, Transfer and Retrieval group.

4. Explanatory Statements		
4.1 Initial Approach	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>On arrival, assess the mechanism of injury and immobilise the spine if indicated.</i> <ul style="list-style-type: none"> - <i>maintain a high index of suspicion in the elderly and frail.</i> <p>Spinal Cord Injury (SCI) is commonly associated with the following mechanisms:</p> <ul style="list-style-type: none"> - Road traffic collisions (especially involving motorcycles, high-speed motor vehicle collisions, roll-over accidents, ejections and pedestrians hit by vehicles). - Sports injuries (horse-riding and other high-impact sports). - Fall from height (especially with axial loading). <p>This list is not exhaustive and other mechanisms can lead to SCI. The elderly and frail are particularly at risk of SCI even from low energy mechanisms such as falls from standing.</p>	Strong	Guidelines [6,14] 2++ [8]
<ul style="list-style-type: none"> • <i>Use Manual In-line Stabilisation (MILS) initially.</i> • <i>If resources do not allow MILS to be performed:</i> <ul style="list-style-type: none"> - <i>ask conscious patients to keep their head and neck still.</i> - <i>in the unconscious patient, avoid spinal motion until the spine can be protected.</i> <p>Manual in-line stabilisation is suitable for all patients, is quick and easy to use. However, in resource limited situations, other interventions may need prioritising over MILS. Co-operative patients should be asked to refrain from movement until immobilisation can be performed. Spontaneous movement is less likely in the unconscious patients, but caution should be taken that assessment and interventions do not cause excessive motion.</p>	Strong	Guidelines [1,6,14]
<ul style="list-style-type: none"> • <i>Complete a <C>ABCD assessment to identify life threatening injuries requiring urgent intervention prior to full assessment of the spine:</i> <ul style="list-style-type: none"> - <i>refer to CG006 Major Trauma.</i> <p>Assessment and management of life-threatening pathology takes priority over full assessment of the spine.</p>	Strong	Guidelines [1,6,14]

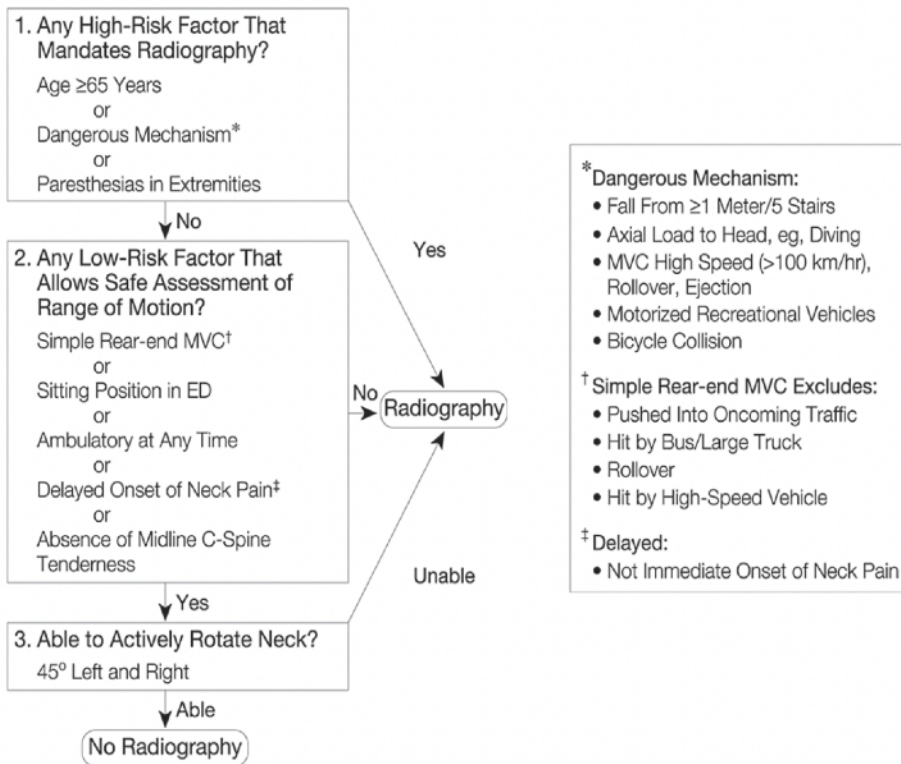
4.2 Selective Immobilisation	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>Following assessment, make a case-by-case decision to continue spinal immobilisation.</i> <p>Prolonged immobilisation carries risk and can hinder other interventions. Ongoing use should be considered taking account of the likelihood of injury, benefits and risks of immobilisation.</p>	Strong	Guidelines [1,6,14]
<ul style="list-style-type: none"> • Unconscious patients are particularly at risk of secondary injury: <ul style="list-style-type: none"> - <i>immobilise and do not clear clinically.</i> <p>No rule is able to exclude spinal injury in the unconscious patient. They are particularly at risk of secondary injury as the initial injury is more likely to be missed and they are unable to protect their own spine.</p>	Strong	Guideline [1] 2 ⁺⁺ [3,4]
<ul style="list-style-type: none"> • Conscious patients without neck pain, clear the cervical spine if all of the following criteria are present: <ul style="list-style-type: none"> - <i>no midline tenderness.</i> - <i>no focal neurological deficit.</i> - <i>normal alertness.</i> - <i>no intoxication.</i> - <i>no painful distracting injury (further guidance in explanatory notes).</i> <p>There are a number of tools available which can be used to assess the cervical spine. The Canadian C-spine Rule (CCSR) and Nexus criteria have the best level of evidence. They are both highly sensitive but not specific. Other tools, such as JRCALC, are derivatives of these tools.</p> <p>The CCSR is validated in patients with traumatic neck pain. The Nexus criteria can be applied to all trauma patients and are simpler to apply than the CCSR.</p> <p>The original Nexus criteria listed distracting injuries as: (a) a long bone fracture; (b) a visceral injury requiring surgical consultation; (c) a large laceration, degloving injury, or crush injury; (d) large burns; or (e) any other injury producing acute functional impairment (3). This list was not based on clinical evidence but the principle that strong painful stimuli can prevent pain from other areas of the body from being perceived (gate theory). More recent studies suggest that injuries above the diaphragm are more likely to mask tenderness from a cervical fracture than injuries below this level [13]. It is not possible to give a definitive list of injuries or a threshold of pain that could distract but severe pain in a region close to the cervical spine is the more likely to be distracting. Clinical judgment is required.</p>	Conditional	Guideline [1] 2 ⁺⁺ [3] 2 ⁺ [13]

- **Conscious patients with traumatic neck pain, clear the cervical spine using the Canadian C-Spine Rule if:**
 - There are no high-risk factors:
 - ▶ Age ≥ 65 , Dangerous Mechanism, Paraesthesia in extremities.
 - There is any one of the following low risk factors:
 - ▶ Simple read-end MTC, ambulatory at any time, delayed onset neck pain, absence of midline c-spine tenderness.
 - ▶ The patient can actively rotate their neck 45° left and right.

Both the CSSR and Nexus criteria can be applied to patients with traumatic neck pain.

When compared scientifically, the Canadian C-spine Rule is generally favoured, especially in the elderly where the sensitivity of the Nexus criteria is lower [2].

For Alert (Glasgow Coma Scale Score = 15)
and Stable Trauma Patients Where
Cervical Spine (C-Spine) Injury is a Concern



Conditional

Guidelines
[1,6]
2++[2,3,4]

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<ul style="list-style-type: none"> • <i>Consider mechanism, pain, and neurology in assessment of the thoracic and lumbar spine.</i> <p>There are no validated tools for assessing the thoracolumbar spine. NICE make the following recommendation based upon consensus opinion:</p> <p>Patients with one or more of the factors listed below should be immobilised:</p> <ul style="list-style-type: none"> - age > 65 and reported pain in the thoracic or lumbosacral spine. - dangerous mechanism of injury: <ul style="list-style-type: none"> - fall from a height of greater than 3 meters - axial load to the head or base of the spine - high-speed motor vehicle collision - rollover motor accident - lap belt restraint only - ejection from a motor vehicle - accident involving motorised recreational vehicles - bicycle collision - horse riding accidents - pre-existing spinal pathology, or known or at risk of osteoporosis. - suspected spinal fracture in another region of the spine - abnormal neurological symptoms (paraesthesia or weakness or numbness) - new deformity or bony midline tenderness (on palpation, on percussion) - midline or spinal pain (on coughing) - pain or abnormal neurological symptoms (on mobilisation) 	<p>Conditional</p>	<p>Guideline [6]</p>
<ul style="list-style-type: none"> • <i>Patients with penetrating trauma and no neurological signs do not require immobilisation.</i> <p>Consensus opinion is that there is no role for immobilisation in penetrating trauma without neurology as the risk of secondary injury is negligible.</p>	<p>Strong</p>	<p>Guidelines [1,7]</p>



4.3 Extrication	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>Consider self-extrication for patients who are trapped in vehicles if:</i> <ul style="list-style-type: none"> - <i>they are not overtly intoxicated or confused.</i> - <i>there are no major distracting injuries.</i> - <i>they are not physically trapped.</i> - <i>they do not have any abnormal neurology.</i> <p>The above criteria have been taken from the FPHC consensus statement. NICE also recommend excluding patients with spinal pain or high-risk factors (as defined in the Canadian C-spine Rule).</p>	Conditional	Guidelines [1,6,14]
<ul style="list-style-type: none"> • <i>Ask patients suitable for self-extrication to extricate themselves cautiously and lie on a trolley:</i> <ul style="list-style-type: none"> - <i>if they experience pain or neurology during extrication they should be asked to stop and mechanical extrication considered.</i> <p>The optimal method for self-extrication is not known. Possible options include using a cervical collar and/or giving specific instructions to the patient on how to extricate. Recent research [10] suggests cervical collars may reduce movement during self-extrication but the movement created in the process of fitting the collar has not been studied. A single method will not fit all situations and adaptation will be required in many circumstances.</p>	Conditional	Guidelines [1,6,14] 2- [9,10,11]
<ul style="list-style-type: none"> • <i>Consider mechanical extrication in those not suitable or able to self-extricate:</i> <ul style="list-style-type: none"> - <i>determine the method, speed and technique by the likelihood of spinal injury and presence of other life-threatening injuries.</i> - Refer to SG008 Entrapment and Extrication. 	Conditional	Guidelines [1,6,14]
<ul style="list-style-type: none"> • <i>The long-board can be used in extrication but do not use for transfer.</i> <p>Prolonged immobilisation on a long board is uncomfortable and associated with pressure sores and is therefore only recommended for extrication.</p>	Strong	Guidelines [1,5,6]
<ul style="list-style-type: none"> • Aim to remove a patient from a hazardous environment as quickly and safely as possible: <ul style="list-style-type: none"> - do not leave patients without signs of injury in a dangerous environment for extended periods. 	GPP	


4.4 Adult Spinal Immobilisation	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> <i>If a fracture is suspected at any level, immobilise the entire spine in a neutral position that is comfortable for the patient.</i> <p>Around 10-15% of patients with a confirmed cervical fracture also have thoracolumbar fractures.</p>	Strong	Guidelines [1,6]
<ul style="list-style-type: none"> <i>MILS is suitable for use in all patients.</i> 	Strong	Guidelines [1,6,14]
<ul style="list-style-type: none"> <i>Maintain neutral spinal alignment when performing any rolls.</i> <p>If personnel allow, use a log-roll style technique with one person supporting the head and neck and three people supporting the body. A best effort approach will be required where personnel are limited.</p>	Conditional	Guidelines [1,6]
<ul style="list-style-type: none"> <i>As a minimum, immobilise patients on either:</i> <ul style="list-style-type: none"> <i>a scoop with head blocks and tape.</i> <i>a vacuum mattress with head blocks and the mattress moulded around the blocks.</i> <p>The orthopaedic scoop stretcher and vacuum mattress can both be used to achieve spinal immobilisation in most patients. Blocks and tape are also easy to apply to most patients without complications. Padding may be required under the head to remain neutral alignment.</p>	Strong	Guidelines [1,6]
<ul style="list-style-type: none"> <i>A cervical collar can be used in addition to the above:</i> <ul style="list-style-type: none"> <i>consider the use of a cervical collar on a case-by-case basis taking into account the benefits and risks (further information given in explanatory notes).</i> <i>if a cervical collar is used, size and fit it correctly.</i> <p>Triple immobilisation with a collar, blocks and tape has been advocated for many years in trauma guidelines. Recently, the requirement for collars has been questioned along with recognition of a number of associated complications. If a collar is used it is important that it is correctly sized and fitted to minimise the risk of negative sequelae. The patient should be reassessed following application of the collar.</p> <p>Possible negative sequelae of cervical collars include:</p> <ul style="list-style-type: none"> - Difficulty in correctly sizing and fitting collars in some patients leading to increased movement. - Increased difficulty of airway management. - Increased intra-cranial pressure. - Increased aspiration risk. - Increased patient discomfort and distress. 	Conditional	Guidelines [1,6] 4 [12]

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<ul style="list-style-type: none"> • <i>Immobilise the patient in a position of comfort:</i> <ul style="list-style-type: none"> - <i>patients with spinal deformities may require modification of standard immobilisation techniques.</i> <p>Significant adaptation may be required for patients with deformity of the spine, they should be immobilised in a position they find comfortable and not forced into a 'traditionally' neutral position.</p>	Strong	Guidelines [6,14]
<ul style="list-style-type: none"> • <i>Attempts to forcibly immobilise agitated patients may increase agitation, movement and any underlying injury:</i> <ul style="list-style-type: none"> - <i>use a considered approach and consider modifying standard techniques.</i> <p>Attempts to apply full immobilisation to a non-compliant agitated patients may increase the risk of injury if an unstable fracture is present. A measured approach should be taken with MILS or a hand-off approach considered.</p>	Strong	Guidelines [6,14]
<ul style="list-style-type: none"> • <i>Take precautions for vomiting / regurgitation during transfer:</i> <ul style="list-style-type: none"> - <i>ensure suction is accessible and ready to use.</i> - <i>consider an antiemetic in conscious patients.</i> <p>Vomiting / regurgitation with aspiration is one of the most common adverse events associated with spinal immobilisation. It is important to prepare for this and have a plan and equipment to hand. This is especially relevant during transfers in aircraft.</p>	Conditional	Guideline [14]

4.5 Paediatric Spinal Immobilisation	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • Immobilise older children with the same techniques as described in adults. • Consider modification of adult techniques for smaller children. <p>There is very little specific evidence relating to the assessment and immobilisation of children with potential spinal cord injuries. In larger children, the same techniques and equipment can be employed as for adults. In smaller children, paediatric specific equipment may be available but modification to adults techniques may be required such as using blanket rolls instead of blocks.</p>	Conditional	Guidelines [6,14]
<ul style="list-style-type: none"> • Immobilisation of the conscious child can be unpleasant for both the child and carers. <ul style="list-style-type: none"> - involve carers early. - use a considered approach balancing the benefits / risks of attempted immobilisation. <p>Immobilisation of children can cause significant anxiety and agitation and carer can help significantly with managing these issues. In some children a considered approach will be required when attempted immobilisation is causing significant distress.</p>	Strong	Guidelines [6,14]
<ul style="list-style-type: none"> • Infants can be kept in car seats for transport to hospital by road. <p>Infant car seats are specifically designed for transferring infants safely with high safety standards. Consider their use if it will not adversely affect other aspects of patient care.</p>	Conditional	Guidelines [6,14]
<h3>4.6 Minimal Patient Handling</h3>		
<ul style="list-style-type: none"> • Apply the principle of minimal patient handling when packaging the multiply injured trauma patient. <p>The aim of minimal patient handling is to promote haemostasis from non-compressible haemorrhage, such as pelvic haemorrhage, by reducing movement.</p> <p>The key principles are:</p> <ul style="list-style-type: none"> - attempt to reduce the total number of movements the patient undergoes: "The Single Movement Principle". Eg, a pelvic binder and scoop could be inserted at the same time. - when rolling the patient use the minimum angle necessary. - avoid rolling for routine examination of the back in blunt trauma patients. 	Strong	Guideline [5]

4.7a Scoop Packaging	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> For shorter transfers, consider packaging patients on a scoop stretcher: <ul style="list-style-type: none"> package scoop to skin. place the scoop and patient within a blizzard blanket with additional blankets / mediwrap used for insulation. <p>The scoop stretcher is a familiar piece of equipment to most pre-hospital practitioners. A key advantage is that it can be inserted with minimal patient rolling. Immobilise the patient scoop to skin in order to minimise movement on arrival in hospital and reduce the risk of pressure areas due to clothing. This usually requires the clothes to be removed prior to inserting the scoop. Use measures to prevent hypothermia, especially once the patient's clothes are removed.</p> <div style="display: flex; justify-content: space-around;">   </div>	<p>Conditional</p>	<p>Guideline [5]</p>
<ul style="list-style-type: none"> For transfers where the time on scoop will exceed 45 minutes, consider packaging in a vacuum mattress. <p>Whilst no robust evidence exists for the safe amount of time a patient can be safely immobilised on a scoop stretcher, consensus opinion suggests a vacuum mattress be considered when total scoop time will exceed 45 minutes. On-scene, transit and hospital time should all be taken into account.</p>	<p>Conditional</p>	<p>Guideline [5]</p>

4.7b Vacuum Mattress Packaging	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>For longer transfers consider packaging patients in a vacuum mattress.</i> <ul style="list-style-type: none"> - <i>position the vacuum mattress on the floor / trolley.</i> - <i>place a blizzard blanket then a sheet on top of it.</i> - <i>it is important to place the patient on a sheet to aid with transfer at the receiving unit.</i> - <i>use a scoop stretcher to lift the patient and place them on the vacuum mattress.</i> - <i>then remove the scoop.</i> - <i>use additional blankets / mediwrap for insulation as required.</i> <p>Vacuum mattresses carry the lowest risk of pressure injuries compared to other methods of immobilisation and are advised for longer transfers. It is important to insert a sheet between the vacuum mattress and patient - this makes it easier to move the patient with a pat slide or by inserting a scoop on arrival in ED.</p> <div data-bbox="121 827 1036 1150" data-label="Image">  </div>	<p>Conditional</p>	<p>Guideline [5]</p>
<ul style="list-style-type: none"> - when using the scoop to lift patients from the ground, make all efforts to minimise and remove road debris (stone, glass) from underneath the patient prior to transportation. If possible, this should be done along with the removal of clothing. 	<p>GPP</p>	

5. References

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