Step 1: Gather the evidence

Define your search strategy.
(e.g. ((cardiopulmonary-resuscitation*:me or heart-arrest*:me) not (atrial-fibrillation:me of electrophysiology:me)) and hypothermia:ab))

MeSH Terms
Pathology
Hypotension, Orthostatic
Wounds and Injuries

Text Terms
Suspension Trauma
Orthostatic Shock
Orthostatic Intolerance
Harness
Harness Induced Pathology
Vertical
Trauma

List electronic databases searched (at least MEDLINE (http://igm.nlm.nih.gov/) Embase, Cochrane database for systematic reviews and Central Register of Controlled Trials, and hand searches of journals, review articles, and books.

This search was developed and run using the Cochrane Library 2008, Issue 2 (The Cochrane Library includes the Cochrane database for systematic reviews and the Central Register of Controlled Trials), Ovid MEDLINE(R) 1996 to 10 June 2008 and EMBASE.

• Describe search results; describe best sources for evidence.

The MeSH and text terms were combined appropriately using AND/OR operators. The search identified 4 possibly relevant studies. Review of the titles and abstract of these studies identified no relevant Cochrane systematic reviews and 2 relevant papers (Medline).

•• State major criteria you used to limit your search; state inclusion or exclusion criteria (e.g., only human studies with control group? no animal studies? N subjects > minimal number? type of methodology? peer-reviewed manuscripts only? no abstract-only studies?)

The search strategy was limited to human studies only. English language restrictions were applied.

Number of articles/sources meeting criteria for further review:

Title / Abstract review identified 2 relevant papers meeting criteria for further review

Create a citation marker for each study (use the author initials and date or Arabic numeral, e.g., “Elam 1958”). If possible, please supply file of best references; End Note 4+ preferred as reference manager, though other reference databases acceptable.

Step 2: Determine the Level of Evidence for each study.
For each article/source from step 1, assign a level of evidence—based on study design and methodology.

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Definitions (See manuscript for full details)</th>
<th>Articles found (Use citation marker: e.g. Elam 1958)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>Evidence obtained from a systematic review of all relevant randomised controlled trials</td>
<td></td>
</tr>
<tr>
<td>Level II</td>
<td>Evidence obtained from at least one properly designed randomised controlled trial</td>
<td>Turner 2008</td>
</tr>
<tr>
<td>Level III-I</td>
<td>Evidence obtained from well designed properly pseudo-randomised controlled trials (alternate</td>
<td></td>
</tr>
</tbody>
</table>
Step 2B: Critically assess each article/source in terms of research design and methods.

Was the study well executed? Suggested criteria appear in the table below. Assess design and methods and provide an overall rating. Ratings apply within each Level; a Level I study can be good or poor as a clinical trial, just as a Level II study could be good or poor. Where applicable, please append a code (A to E, as shown below) to categorize the primary endpoint of each study.

<table>
<thead>
<tr>
<th>Component of Study and Rating</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methodology</td>
<td>The methodological quality of the study is high with the likelihood of any significant bias being minimal</td>
<td>The methodological quality of the study is reasonable with the potential for significant bias being likely.</td>
<td>The methodological quality of the study is weak possessing considerable and significant biases.</td>
</tr>
<tr>
<td>Articles</td>
<td></td>
<td>Turner 2008 E</td>
<td></td>
</tr>
<tr>
<td>(use citation marker and code for outcome applicable: e.g. Elam 1998 D)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A = Return of spontaneous circulation  
B = Survival of event  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint

STEP 3. DETERMINE THE CLASS OF RECOMMENDATION. Select from these summary definitions.

<table>
<thead>
<tr>
<th>CLASS</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A Recommended</td>
<td>Class A treatment recommendations are given to those guidelines which are considered to be beneficial and should be used</td>
</tr>
<tr>
<td>Class B Acceptable</td>
<td>Class B treatment recommendations are given to those guidelines which may be beneficial and are acceptable to be used if considered appropriate in that setting</td>
</tr>
</tbody>
</table>

State a Class of Recommendation for the Guideline Proposal. State either a) the intervention, and then the conditions under which the intervention is either Class A or Class B; or b) the condition, and then whether the intervention is Class A or Class B

Guideline or intervention (Class of recommendation):
- **Class A**: Position the patient on their side, maintaining the victim’s airway
There are few papers specifically relating to the phenomenon of ‘Suspension Trauma’ within the peer reviewed literature. One significant literature review (Seddon, 2002) and several non-peer reviewed articles were located via internet searches and reference list reviews.

Turner 2008 conducted a prospective trial to assess the effect of three different harness systems on the comfort and physiological effects on 40 healthy volunteers. Whilst symptoms associated with orthostatic intolerance were identified, the paper did not discuss the acute care of patients suffering suspension trauma. Lee 2007 was a review article and concluded that whilst the theoretical possibility of suspension trauma exists, further research is warranted.

The most controversial component of patient management following suspension trauma is the immediate positioning of the patient. Whilst there is supposition based on theoretical physiological grounds that patients who have been suspended for a significant time (5 – 30+ minutes) should never be position supine, there is little consensus (or rigorous testing of the theory). Seddon 2002 recommends patients are managed by ‘proping up the upper body for 20-40 minutes’ among other management regimes.

Please submit completed document with the following attachments:
- Printed (paper) bibliography; and electronic version using a reference manager (eg. Endnote) if available. It is recommended that the bibliography be printed in annotated format. This will include the article abstract and any notes you would like to make providing specific comments on the quality, methodology and/or conclusions of the study, and/or reasons for exclusion.
- Key figures or tables from evidence-based analysis
- Full hard copies of the critical cited papers
Bibliography

Studies Identified by Search


**Review of the titles identified 2 relevant comments (letters).**


Studies and Grey Literature Identified through Google and Reference List Search

1. Reagan R, NSW Department of Primary Industries Safety Alert; Working at Heights Prevention of Falls and Fall Arrests. Report No. SA06-02, 2006 Jan


A large literature review of past publications including many of those listed here. No original contributions or clinical testing but a useful summary of everything pre-2000. A second HSE research project (JN3547) is due to be completed in 2008, which aims to
decide if the HSE should release any official guidance. Again this will have no original information or clinical trial data to report, and any guidance will be created by yet another future research project.


Extensive physiological data on compensatory processes in medically fit adults subjected to various static postures, conducted as part of research after several fatalities involving suspension. Includes proof of the knee-raising double strop procedure giving no significant symptoms for at least 50 minutes.

4. Orzech M A, Goodwin M D, Brinkley J W, Salerno M D, Seaworth J **Test program to evaluate human response to prolonged motionless suspension in three types of fall protection harnesses** (1987) Harry G Armstrong Aerospace Medical Research Laboratory, Wright Patterson Air Force Base, Ohio, USA

5 volunteers suspended in various harnesses for up to 30 minutes. 3 reported severe discomfort and one lost consciousness at ~28 minutes.


Comparative tests of several sit harness designs and one full-body harness, with 65 tests conducted. Mean suspension times tolerated were 0.5 to 17 minutes, with many symptoms reported including narrowing of pulse pressure. Study of caving sit-harnesses, showing orthostasis was almost certain in any case of prolonged suspension. Tests famously aborted after several volunteers suffered severe symptoms.


Basic guidance on the effects and proposed treatment, but critically failing to detail the risks of reflow syndrome and actions needed to prevent it.