**WORKSHEET for Evidence-Based Review of Science for First Aid**

**Worksheet author(s)**
Leon Chameides

**Date Submitted for review:**

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**Clinical question.**
In a bleeding victim do direct pressure, indirect pressure (pressure points), or elevation of the bleeding part help control bleeding as compared to doing nothing?

**Is this question addressing an intervention/therapy, prognosis or diagnosis?** Intervention/therapy

**State if this is a proposed new topic or revision of existing worksheet:** Revision of existing worksheet

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**Conflict of interest specific to this question**
Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet? No conflict of interest

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**Search strategy (including electronic databases searched).**

**Embase:** – Bleeding or hemorrhage AND emergency treatment

**Medline:** – MESH search: Hemorrhage AND Emergency treatment (in Pub med that includes First aid, bleeding, etc); Hemostatic techniques (technics) AND emergency care; Hemostatic techniques (technics) AND emergency treatment

Wounds and injuries AND Emergency treatment AND hemostatic techniques (technics)

**Cochrane Library** (Cochrane Central Register of Controlled Trials, Cochrane Database of Systemic Reviews, Cochrane DSR, ACP Journal Club, and DARE, All EBM Reviews): - Hemmorhage expl (in Ovid includes all subheadings

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**State inclusion and exclusion criteria**
Last 5 years. No other exclusions

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**Number of articles/sources meeting criteria for further review:**

- **Embase – 0/52**
- **Medline - 24/769**
- **Cochrane Library -2/2014**
- **AHA Library - 0**

Articles from 2005 worksheet: 7

After reviewing all the articles, 13 articles (7 from 2005 and 6 since) were deemed relevant to the question at hand for review: LOE1 = 2; LOE 2 = 4; LOE 3 = 0; LOE 4 – 3; LOE 5 = 4.
Summary of evidence

Evidence Supporting Clinical Question

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<th>Level of Evidence</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
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<td>Naimer 2004;974A</td>
<td>Pillgram-Larsen 1992;2188A</td>
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Outcomes – Please define outcomes for this question, place them after letters below and use letters to identify studies which evaluate this outcome

A = Achieving hemostasis
B = 
C = 
D = 
E = Italic

Italics = Animal studies
### Evidence Neutral to Clinical question

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Swan 2009;66

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Outcomes (same as above) – Please define outcomes for this question, place them after letters below and use letters to identify studies which evaluate this outcome

A = C = E =
B = D = *Italics = Animal studies*

### Evidence Opposing Clinical Question

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Outcomes (same as above) – Please define outcomes for this question, place them after letters below and use letters to identify studies which evaluate this outcome

A = C = E =
B = D = *Italics = Animal studies*
Despite the fact that hemorrhage control is one of the most important actions that a First Aid worker can perform, there are no studies to prove the best method of achieving it in civilian situations. The best method has to be extrapolated from studies performed to evaluate hemostasis after cardiac catheterization, in battle situations, and indirectly from animal studies, none of which are quite comparable.

Achieving hemostasis with manual pressure after femoral artery puncture has become the “gold standard” when studying the effects of various hemostatic agents and mechanical devices to provide pressure (Koreny 2004;350; Lehmann 1999;1118; Simon 1998;308; Walker 2001;366; Yadav 2003;1463; Mlekusch 2006;23;). Three studies have shown that intra-abdominal bleeding can be stopped in experimental animals by isufflation of air into the abdominal cavity (Sava 2003;590 Jaskille 2005;1305; Velmahos 2007;285). Hemostasis is presumably achieved by pressure. Manual compression cannot be sustained under certain conditions such as in battle, in remote areas where transport times are long, or in certain parts of the body. Two retrospective studies (Naimer 2000;816; Pillgram-Larsen 1992;2188;) and one case report (Naimer 2004;586) show that hemostasis can be achieved by direct pressure created by an elastic adhesive elastic bandage applied over gauze pads. One study (Naimer 2004 974) in volunteers that compared pressures achieved over an area compressed manually, with an adhesive elastic bandage, and with a field bandage showed that the highest pressure but most discomfort was with manual compression, adequate pressures and less discomfort was achieved with the adhesive elastic bandage, and the commonly used field bandage failed to achieve adequate pressures for hemostasis. From these studies it appears that an elastic adhesive bandage applied over gauze pads is best for maintaining hands free hemostasis.

Acknowledgements:

Citation List

Citations from 2005 Worksheet


Comments: Animal study with blunt trauma to liver and measurement of blood loss with and without abdominal insufflation (similar to Sava paper). With insufflation causing direct pressure there was significantly less blood loss.

Quality: Good LOE: 5 (Animal study)


*LOE: I (depends on how question is worded. If in the end it is worded for First Aid practitioners, it is LOE 5*

Quality of Evidence: Good;

Comments on Study: This is a metaanalysis and as such is good and a high level of evidence but does not deal directly with the question of bleeding control by lay rescuers in first aid conditions. Nevertheless, it does show that manual pressure is effective and has fewer side effects than other methods studied.

**Level of Evidence:** LOE: 1 (Randomized controlled). If wording of question changes to be for First Aid, then LOE 5.

**Quality of Evidence:** Fair

**Comments on Study:** This is an important study because it is randomized and prospective but not double blind. It shows that manual pressure is effective and safe in stopping arterial bleeding from a catheterization site and is superior to mechanical means. It does not deal with bleeding control by trained lay rescuers under first aid conditions.


**Comment:** Consecutive, randomized patients with arterial puncture site treated with manual pressure (gold standard) and a sealing device. Manual pressure was better.

**Quality; Good** LOE: 2 (Randomized controls) or LOE 5 if question reworded to include only First Aid workers


**Level of Evidence:** 4 (retrospective case series) or LOE 5 if question is reworded for First Aid workers

**Quality of Evidence:** Fair

**Comments on Study:** This is a very important study although it is retrospective. It was performed under battlefield conditions by highly trained rescuers working in an organized evacuation setting. Bleeding was controlled by direct pressure applied by an elastic bandage. The results may not be directly translatable to a trained rescuer in a civilian first aid situation.


**Comments:** This is a single case report of massive bleeding from a gunshot to the face. Bleeding was stopped with direct pressure using an elastic adhesive dressing

**Quality: Poor** LOE: 4 (or LOE 5 if question reworded to include only First Aid workers)


**Comments:** Study of pressure generated by manual and non manual methods of applying direct pressure in a human model shows that manual pressure can generate the most pressure but is also the most painful. Field dressing, tied with a string was found to generate inadequate pressures. The most comfortable and also applying adequate pressure is the ELAD (Elastic or Ace adhesive bandage). Most difficult are proximal areas including the thigh, shoulder, and neck where manual pressure produces the best pressures. Good discussion of tourniquets. This is not a measure of pressure achieved in an actual situation.

**Quality: Fair** LOE: 5 (simulation)

Level of Evidence: 4 (retrospective case series).

Quality of Evidence: Poor.

Comments on Study: This is an important observational study that shows that direct pressure applied with an elastic bandage was superior to a tourniquet and that victims with the former lost less blood than the latter.


Level of Evidence: 5 (animal study)

Quality of Evidence: Good.

Comments on Study: This study does show that pressure applied in the form of intra-abdominal insufflation with CO2 did control bleeding through a created venous hole. Not directly applicable to first aid but does show that pressure works.


Level of Evidence –2. LOE 5 if question changes to include only First Aid

Quality of Evidence: Fair (prospective and controlled but not double blind).

Comments on Study: This is another study on manual pressure versus mechanical pressure in controlling bleeding after cardiac catheterization. It shows the manual method to be effective, safe, and superior. It does not deal with bleeding control by a lay rescuer under first aid conditions.


Comments: Animal study in swine but with splenic injury again shows a significant decrease in blood loss

Quality: Good LOE: 5 (Animal study)


Level of Evidence: LOE 2 (random allocation) or LOE 5 if question is reworded to include only First Aid workers.

Quality of Evidence: Fair (prospective and controlled but not double blind).

Comments on Study: A study comparing a specific mechanical method with manual pressure for bleeding control after cardiac catheterization. The manual method was more effective and safer than the mechanical method.

Comments: Randomized multicenter (240 QuickSeal and 158 manual pressure) study to compare QuickSeal with manual compression after catheterization. Manual pressure was the gold standard and achieved hemostasis in all patients.

Quality: Good  LOE: 2(randomized controls) or LOE 5 if question reworded to include only First Aid workers