|  |
| --- |
| Question |
| **Should a junctional pressure device compared with direct pressure be used for adults and children with severe of life-threatening external bleeding?** |
| **Population:** | Adults and children with severe, life-threatening external bleeding |
| **Intervention:** | Application of a junctional pressure device Junctional pressure devices: Abdominal Aortic and Junctional Tourniquet (AAJT), Combat Ready Clamp (CRoC), Junctional Emergency Treatment Tool (JETT), and SAM Junctional Tourniquet (SJT). These devices apply either direct pressure over areas that are difficult to access, such as the groin or axillae, or provide indirect pressure over an artery proximal to the bleeding in order to control the areas of bleeding (e.g. abdominal aorta to control lower extremity bleeding).  |
| **Comparison:** | Direct pressure (manual or pressure dressings) |
| **Main outcomes:** | Death owing to bleeding, cessation of bleeding (restoration of hemostasis), and time to hemostasis, death from any cause, decrease in bleeding, and adverse effects (e.g. wound infection, limb loss, re-bleeding, pain related to an intervention). Where possible, the Evidence to Decision tables also include information regarding outcomes related to provider ability to use / ease of use / feasibility / satisfaction (for method of bleeding control) and predictors of use/response (for method of bleeding control). |
| **Setting:** | All studies performed in the out-of-hospital setting (direct evidence), as well as studies providing indirect evidence about the effects of interventions collected in combat (military) settings, simulations (i.e. human volunteers, human cadaver or other models excluding animal models), and studies performed in the hospital setting, that clinical content experts judged as performed in sufficiently similar conditions to still be informative.  |
| **Perspective:** | Of the first aid provider and/or patient |
| **Background:** | Traumatic injury is a leading cause of morbidity and mortality and a major cause of death from traumatic injury is uncontrolled bleeding. Tourniquets and hemostatic dressings have the potentially to prevent morbidity and mortality from traumatic bleeding. Therefore it is easy to see that first aid care is essential to help prevent injury related morbidity and mortality, as injured persons can exsanguinate from severe injuries in only a few minutes.Current first aid recommendations for an individual with severe, life-threatening external bleeding includes applying direct pressure as standard therapy. Tourniquets and hemostatic dressings have been found to control bleeding effectively, therefore may be considered for use when standard measures are unable to control hemorrhage or in the situation where a first aid provider is unable to use standard first aid practices (for tourniquets) or for body areas where a tourniquet cannot be applied or is unable to control bleeding (for hemostatic dressings). There is no or limited data supporting the use of pressure points, elevation, or localized cold therapy.  |
| **Conflict of interests:** | None identified |

# Assessment

|  |
| --- |
| ProblemIs the problem a priority? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no○ Probably yes● Yes○ Varies○ Don't know | Traumatic injury is the leading cause of injury related morbidity and mortality throughout the world, resulting in millions of hospitalizations each year. The leading cause of preventable mortality in injured patients is uncontrolled hemorrhage [Jacobs 2014 67). Hemorrhage is cited as the primary cause of death in 35% of traumatic mortalities and often contributes to death ultimately attributed to other causes (Kauvar 2006 S3). In addition, trauma related deaths disproportionality affects those in low and middle income countries where well established pre-hospital trauma systems may not exist (World Health Organization 2018). |  |
| Desirable EffectsHow substantial are the desirable anticipated effects? |
| Judgement | Research evidence

| **Certainty assessment** | **Impact**  | **Certainty** | **Importance** |
| --- | --- | --- | --- |
| **№ of studies** | **Study design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** |
| Cessation of bleeding - Simulation (assessed with: Absence of distal pulse palpation or ultrasound Doppler device) |
| 12 | observational studies  | serious | not serious  | serious | not serious  | none  | Across all simulations and types of junctional tourniquets, cessation of bleeding - as measured with absence of distal pulse palpation or ultrasound Doppler device - was achieved in a median of 99% of device applications (range: 11% to 100%). Lower rate of bleeding cessation was observed with AAJT and this was attributed to the pain in healthy volunteers related to device application that prompted investigators to stop the test. Excluding AAJT, cessation of bleeding with other devices was achieved in a median of 98% of device applications (range: 75% to 100%). (Chen 2016 36, Cotte 2013 747, Gaspary 2018 1, Gates 2014 40, Lyon 2015 405,, Kragh 2013 1276, Kragh 2014 58, Kragh 2015 391, Kragh 2016 358, Meusnier 2016 41, Taylor 2013 1196, Theodoridis 2016 44) | ⨁◯◯◯VERY LOW  | CRITICAL  |
| Time to hemostasis (assessed with: Absence of distal pulse palpation or ultrasound Doppler device) |
| 7 | observational studies  | serious | not serious  | serious | not serious  | none  | Time to achieve hemostasis (measured with absence of distal pulse palpation or ultrasound Doppler device - ranged between 34 and 212 seconds in human volunteers, and between 43 and 95 seconds in mannequin models. (Chen 2016 36, Gaspary 2018 1, Kragh 2014 58, Kragh 2015 391, Kragh 2016 358, Meusnier 2016 41, Theodoridis 2016 44) | ⨁◯◯◯VERY LOW  | CRITICAL  |
|  |
|  |

 | Additional considerations |
| Undesirable EffectsHow substantial are the undesirable anticipated effects? |
| Judgement | Research evidence | Additional considerations |
| ○ Large○ Moderate● Small○ Trivial○ Varies○ Don't know |

| **Certainty assessment** | **Impact**  | **Certainty** | **Importance** |
| --- | --- | --- | --- |
| **№ of studies** | **Study design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** |
|  |
| Pain - Simulation (healthy volunteers) (assessed with: various pain scales) |
| 4 | observational studies  | serious  | serious | serious | not serious  | none  | Median pain score was 4 points (range: 1 to 8) on a 10-point verbal scale among 13 healthy individuals who received AAJT (Lyon 2015 405). Mean pain score was 30, 43, 45, and 76 points on a 100-point visual scale among 30 healthy individuals who received CRoC, SJT, JETT, and AAJT, respectively (Kragh 2015 391). Mean pain score was 1.64 and 1.76 on a 5-point verbal scale among healthy individuals receiving CRoC or SJT (Meusnier 2016 41). Kragh 2014 58 only reported that "low effectiveness of AAJT may be attributed to pain prompting investigators not to continue the test.  | ⨁◯◯◯VERY LOW  | IMPORTANT  |
| Complications/Adverse events |
| 8 | observational studies  | serious a | not serious  | serious b | not serious  | none  | All studies reported that there were no other adverse effects of the application of the devices besides pain. (Chen 2016 36, Cotte 2013 747, Lyon 2015 405, Kragh 2014 58, Kragh 2015 391, Meusnier 2016 41, Taylor 2013 1196, Theodoridis 2016 44)  | ⨁◯◯◯VERY LOW  | IMPORTANT  |

|  |
| --- |
|  |
|  |

 | Six simulation studies with healthy volunteers indicated that the use of a junctional device lead to pain. Eight simulation studies with healthy volunteers demonstrated that no adverse effects were caused, other than pain.  |
| Certainty of evidenceWhat is the overall certainty of the evidence of effects? |
| Judgement | Research evidence | Additional considerations |
| ● Very low○ Low○ Moderate○ High○ No included studies | The certainty of the evidence across all outcomes was determined to be very low. Certainty downgrades were due primarily to risk of bias and indirectness.

|  |
| --- |
|  |
|  |

 | The certainty of the included studies is very low with no randomized controlled trials. All studies used healthy volunteers, manikins or cadaver models. |
| ValuesIs there important uncertainty about or variability in how much people value the main outcomes? |
| Judgement | Research evidence | Additional considerations |
| ○ Important uncertainty or variability○ Possibly important uncertainty or variability● Probably no important uncertainty or variability○ No important uncertainty or variability | No research evidence | Like other forms of hemostasis for control of severe, life-threatening bleeding, the outcomes of reduced mortality and control of bleeding are valued. The main goal is to have rapid, effective bleeding cessation.There is no specific research evidence regarding the value of junctional pressure devices or direct pressure specifically.  |
| Balance of effectsDoes the balance between desirable and undesirable effects favor the intervention or the comparison? |
| Judgement | Research evidence | Additional considerations |
| ○ Favors the comparison○ Probably favors the comparison○ Does not favor either the intervention or the comparison○ Probably favors the intervention○ Favors the intervention○ Varies● Don't know | Junctional tourniquets demonstrated benefit in cessation of hemorrhage; however, none of the studies had a control for comparison. Across all simulations and types of junctional tourniquets, cessation of bleeding - as measured with absence of distal pulse palpation or ultrasound Doppler device - was achieved in a median of 99% of device applications (range: 11% to 100%). Lower rate of bleeding cessation was observed with AAJT and this was attributed to the pain in healthy volunteers related to device application that prompted investigators to stop the test. Excluding AAJT, cessation of bleeding with other devices was achieved in a median of 98% of device applications (range: 75% to 100%).(Chen 2016 36, Cotte 2013 747, Gaspary 2018 1, Gates 2014 40, Lyon 2015 405,, Kragh 2013 1276, Kragh 2014 58, Kragh 2015 391, Kragh 2016 358, Meusnier 2016 41, Taylor 2013 1196, Theodoridis 2016 44)In one study (Lyon 2015 405), median pain score was 4 points (range: 1 to 8) on a 10-point verbal scale among 13 healthy individuals who received AAJT. Mean pain score was 30, 43, 45, and 76 points on a 100-point visual scale among 30 healthy individuals in a study (Kragh 2015 391) who received CRoC, SJT, JETT, and AAJT, respectively. Mean pain score was 1.64 and 1.76 on a 5-point verbal scale among healthy individuals receiving CRoC or SJT (Meusnier 2016 41). An additional study (Kragh 2014 58) only reported that "low effectiveness of AAJT may be attributed to pain prompting investigators not to continue the test.All studies reported that there were no other adverse effects of the application of the devices besides pain. | Some devices did not show enough benefit to continue the study. For the specific circumstance of an injury with life-threatening bleeding in a location that is amenable to use of a junctional tourniquet (i.e., proximal femoral artery/groin injury), the desirable effects (cessation of bleeding, hemostasis) compared with the undesirable effects (pain) probably favor use of the intervention (junctional tourniquet) compared with use of direct manual pressure or pressure dressing . |
| Resources requiredHow large are the resource requirements (costs)? |
| Judgement | Research evidence | Additional considerations |
| ○ Large costs● Moderate costs○ Negligible costs and savings○ Moderate savings○ Large savings○ Varies○ Don't know | No research evidence identified. | There would be a cost to purchase and stock devices as well as training to implement them. Training costs would include development of material, training aids, instructor training and first aid provider training. The cost of a Junctional Tourniquet online ranges from US$360 to US$461. Training in use of these devices would require in- person skills sessions, which is also labor- and time-consuming. |
| Certainty of evidence of required resourcesWhat is the certainty of the evidence of resource requirements (costs)? |
| Judgement | Research evidence | Additional considerations |
| ○ Very low○ Low○ Moderate○ High● No included studies | No research evidence identified. | The cost of these devices can be found online.  |
| Cost effectivenessDoes the cost-effectiveness of the intervention favor the intervention or the comparison? |
| Judgement | Research evidence | Additional considerations |
| ● Favors the comparison○ Probably favors the comparison○ Does not favor either the intervention or the comparison○ Probably favors the intervention○ Favors the intervention○ Varies○ No included studies | No research evidence identified. | When comparing junctional tourniquets to direct pressure, there would be minimal negligible cost for direct pressure. Aside from standard first aid training, additional resources would not be necessary. In specific situations, such as military/combat settings in which 1) application of manual pressure is not feasible while under fire; 2) loss of life of both injured soldier and rescuer soldier puts the rest of the unit at risk and 3) junction tourniquet cost may be less to the organization than for the general public, cost-effectiveness likely favors the intervention (use of a junctional tourniquet) compared with manual pressure. |
| EquityWhat would be the impact on health equity? |
| Judgement | Research evidence | Additional considerations |
| ○ Reduced● Probably reduced○ Probably no impact○ Probably increased○ Increased○ Varies○ Don't know | No research evidence identified. | The cost of purchasing and implementing the devices would lead to reduced health equity for lower income countries.  |
| AcceptabilityIs the intervention acceptable to key stakeholders? |
| Judgement | Research evidence | Additional considerations |
| ○ No● Probably no○ Probably yes○ Yes○ Varies○ Don't know | Chen, J., et al., *Testing of Junctional Tourniquets by Medics of the Israeli Defense Force in Control of Simulated Groin Hemorrhage.* Journal of special operations medicine: a peer reviewed journal for SOF medical professionals, 2016. **16**(1): p. 36-42.* Preference was assessed for models of junctional tourniquets used:
* The Steel-Dwass nonparametric analysis of such ranking indicated that users’ preferred junctional tourniquet models stratified into two tiers—a first tier of one pair of models and a second tier of three models. The first tier included the two most preferred models: the SJT and AAJT. The second tier included the least preferred models: AAJT, JETT and CRoC. The reason the AAJT was in both groups was that because it had so few tests, its ranked variability was too high to differentiate it from other models. The SJT-JETT and SJT-CRoC compari­sons were significantly different *(p* = .0013 and .01, re­spectively; *p > .5* for all four others). Thus, for the first method, the SJT and AAJT were most preferred.
* The second method of analyzing user preference was to assess only the highest-ranked model (most preferred) for each user instead of analyzing all rankings. Such ranking differed by model stratified into two tiers: a most preferred tier of three models (SJT, AAJT, and JETT) and a least preferred tier of three models (AAJT, JETT, and CRoC). The only pairwise comparison that was significantly different was SJT-RoC *(p* = .047; *p >* .12 for all others). Thus, for the second method, the SJT, AAJT, and JETT were most preferred.
* Medics acted in two groups of testers; the first group had nine medics and the second had five. The first five testers to preform testing in the first group were able to test all four models of junctional tourniquet. Three AAJT devices were available and all three broke im­mediately after their removal from a casualty; the same component (pressure gauge) broke in all three. The AAJT breakage made it ineffective for subsequent use. There was no breakage of any devices of the other three junctional tourniquet models.

Gaspary, M.J., et al., *Comparison of Three Junctional Tourniquets Using a Randomized Trial Design.* Prehosp Emerg Care, 2018: p. 1-8.* Pre-testing, when participants were asked whether they would use a junctional tourniquet if available, 26% answered “reluctantly,” 54% “willingly,” and 20% “eagerly.” Post-testing, response proportions were essentially identical (27% answered “reluctantly,” 55% “willingly,” and 18% “eagerly”). When participants were asked at post-testing to rate the devices overall for usability, 16% rated them “outstanding,” 84% rated them as “just ok,” and 0% rated them as “worse than nothing.”
* Pre-testing confidence was similar for the CRoC (M = 2.1, SD = 1.2, 95% CI = 1.8–2.5), JETT (M = 2.1, SD = 1.1, 95% CI = 1.8–2.5), and SJT (M = 2.2, SD = 1.2, 95% CI = 1.9–2.6), p = 0.44. Confidence significantly increased for all 3 devices from pre- to post-test (each p = 0.001). Confidence in the SJT was significantly higher (M = 4.1, SD = 1.0, 95% CI = 3.8–4.4) than the JETT (M = 3.4, SD = 1.2, 95% CI = 3.1–3.8; p = 0.01) or the CRoC (M = 3.2, SD = 1.0, 95% CI = 2.9–3.5; p = 0.0001) at post-test.
* Pre-testing, when participants were asked whether they would use a junctional tourniquet if available, 26% answered “reluctantly,” 54% “willingly,” and 20% “eagerly.” Post-testing, response proportions were essentially identical (27% answered “reluctantly,” 55% “willingly,” and 18% “eagerly”). When participants were asked at post-testing to rate the devices overall for usability, 16% rated them “outstanding,” 84% rated them as “just ok,” and 0% rated them as “worse than nothing.”
* Pre-testing confidence was similar for the CRoC (M = 2.1, SD = 1.2, 95% CI = 1.8–2.5), JETT (M = 2.1, SD = 1.1, 95% CI = 1.8–2.5), and SJT (M = 2.2, SD = 1.2, 95% CI = 1.9–2.6), p = 0.44. Confidence significantly increased for all 3 devices from pre- to post-test (each p = 0.001). Confidence in the SJT was significantly higher (M = 4.1, SD = 1.0, 95% CI = 3.8–4.4) than the JETT (M = 3.4, SD = 1.2, 95% CI = 3.1–3.8; p = 0.01) or the CRoC (M = 3.2, SD = 1.0, 95% CI = 2.9–3.5; p = 0.0001) at post-test.
* Post-testing, participants rated the SJT significantly higher than the CRoC or JETT in ease of use, perceived stability, and perceived reliable construction.
* When asked “which junctional tourniquet do you trust the most?” significantly more (56%) chose the SJT than the JETT (25%; p = 0.05) or the CRoC (19%; p = 0.01). The SJT was the preferred junctional tourniquet for 72% of participants, which was significantly higher than the JETT (18%) or the CRoC (10%) (each p = 0.001).

Kragh J.F. Jr., et al. *Performance of Junctional Tourniquets in Normal Human Volunteers*. Prehosp Emerg Care, 2015. 19(3): p. 391-398.* Subjects ranked (subjective performance) the CRoC first ahead of the other devices (p ≤ 0.03), and the AAJT was ranked last by 9 of 10 subjects compared with all other models (p ≤ 0.0002). Rankings of the SJT and the JETT did not differ (p = 0.9887). The CRoC indicated some variability in preference, while the AAJT had little variability.
* The two users ranked the CRoC and SJT equally best; each user picked one as best and the other as second best so these two models tied overall at 7 points. Both users ranked the AAJT as worst, but both users had also been subjects so the experience as user and subject may not have been wholly separable during ranking.

Meusnier, J.-G., et al., *Evaluation of Two Junctional Tourniquets Used on the Battlefield: Combat Ready Clamp versus SAM Junctional Tourniquet.* Journal of special operations medicine: a peer reviewed journal for SOF medical professionals, 2016. **16**(3): p. 41-46.* From the users point of view, the SJT seemed significantly more stable (*p* = .001) and faster to apply (*p* = .0002). Clinically, the SJT seemed to be easier to use than the CRoC, but the difference was not statistically significant (*p* = .13). The effort required to use the junctional tourniquet did not seem to differ between the two models (*p* = .66).
 | Due to the cost of devices (including training/implementation) as well as the limited data on effectiveness when compared to direct pressure may lead to a lower likelihood of acceptability. The intervention may be more acceptable to stakeholders with specific requirements (e.g., military) for hands-free control of bleeding.These changes to more widely accepted use are recent and work will be needed to overcome the historical bias associated with the use of tourniquets.Acceptability may vary by region. |
| FeasibilityIs the intervention feasible to implement? |
| Judgement | Research evidence | Additional considerations |
| ○ No○ Probably no○ Probably yes○ Yes● Varies○ Don't know | Gaspary, M.J., et al., *Comparison of Three Junctional Tourniquets Using a Randomized Trial Design.* Prehosp Emerg Care, 2018: p. 1-8.* Pre-testing, when participants were asked whether they would use a junctional tourniquet if available, 26% answered “reluctantly,” 54% “willingly,” and 20% “eagerly.” Post-testing, response proportions were essentially identical (27% answered “reluctantly,” 55% “willingly,” and 18% “eagerly”). When participants were asked at post-testing to rate the devices overall for usability, 16% rated them “outstanding,” 84% rated them as “just ok,” and 0% rated them as “worse than nothing.”
* Pre-testing confidence was similar for the CRoC (M = 2.1, SD = 1.2, 95% CI = 1.8–2.5), JETT (M = 2.1, SD = 1.1, 95% CI = 1.8–2.5), and SJT (M = 2.2, SD = 1.2, 95% CI = 1.9–2.6), p = 0.44. Confidence significantly increased for all 3 devices from pre- to post-test (each p = 0.001). Confidence in the SJT was significantly higher (M = 4.1, SD = 1.0, 95% CI = 3.8–4.4) than the JETT (M = 3.4, SD = 1.2, 95% CI = 3.1–3.8; p = 0.01) or the CRoC (M = 3.2, SD = 1.0, 95% CI = 2.9–3.5; p = 0.0001) at post-test.
* Pre-testing, when participants were asked whether they would use a junctional tourniquet if available, 26% answered “reluctantly,” 54% “willingly,” and 20% “eagerly.” Post-testing, response proportions were essentially identical (27% answered “reluctantly,” 55% “willingly,” and 18% “eagerly”). When participants were asked at post-testing to rate the devices overall for usability, 16% rated them “outstanding,” 84% rated them as “just ok,” and 0% rated them as “worse than nothing.”
* Pre-testing confidence was similar for the CRoC (M = 2.1, SD = 1.2, 95% CI = 1.8–2.5), JETT (M = 2.1, SD = 1.1, 95% CI = 1.8–2.5), and SJT (M = 2.2, SD = 1.2, 95% CI = 1.9–2.6), p = 0.44. Confidence significantly increased for all 3 devices from pre- to post-test (each p = 0.001). Confidence in the SJT was significantly higher (M = 4.1, SD = 1.0, 95% CI = 3.8–4.4) than the JETT (M = 3.4, SD = 1.2, 95% CI = 3.1–3.8; p = 0.01) or the CRoC (M = 3.2, SD = 1.0, 95% CI = 2.9–3.5; p = 0.0001) at post-test.
* Post-testing, participants rated the SJT significantly higher than the CRoC or JETT in ease of use, perceived stability, and perceived reliable construction.
* When asked “which junctional tourniquet do you trust the most?” significantly more (56%) chose the SJT than the JETT (25%; p = 0.05) or the CRoC (19%; p = 0.01). The SJT was the preferred junctional tourniquet for 72% of participants, which was significantly higher than the JETT (18%) or the CRoC (10%) (each p = 0.001).

Kragh J.F. Jr., et al. *Performance of Junctional Tourniquets in Normal Human Volunteers*. Prehosp Emerg Care, 2015. 19(3): p. 391-398.* Subjects ranked (subjective performance) the CRoC first ahead of the other devices (p ≤ 0.03), and the AAJT was ranked last by 9 of 10 subjects compared with all other models (p ≤ 0.0002). Rankings of the SJT and the JETT did not differ (p = 0.9887). The CRoC indicated some variability in preference, while the AAJT had little variability.
* The two users ranked the CRoC and SJT equally best; each user picked one as best and the other as second best so these two models tied overall at 7 points. Both users ranked the AAJT as worst, but both users had also been subjects so the experience as user and subject may not have been wholly separable during ranking.

Meusnier, J.-G., et al., *Evaluation of Two Junctional Tourniquets Used on the Battlefield: Combat Ready Clamp versus SAM Junctional Tourniquet.* Journal of special operations medicine: a peer reviewed journal for SOF medical professionals, 2016. **16**(3): p. 41-46.* From the users point of view, the SJT seemed significantly more stable (*p* = .001) and faster to apply (*p* = .0002). Clinically, the SJT seemed to be easier to use than the CRoC, but the difference was not statistically significant (*p* = .13). The effort required to use the junctional tourniquet did not seem to differ between the two models (*p* = .66).
 | There is nothing to suggest that the use of junctional tourniquets could not be implemented. Further information is required on if first aid providers can appropriately determine in which situations a junctional tourniquet would be appropriate. Junctional tourniquets are in use in the military. There is nothing to suggest that the use of junctional tourniquets could not be implemented in the civilian sector. Further information is required to determine if first aid providers can appropriately decide which situations a junctional tourniquet would be appropriate, and if this skill is more appropriate for higher level of care providers.Feasibility may however vary by region. |

# Summary of judgements

|  | **Judgement** |
| --- | --- |
| **Problem** | No | Probably no | Probably yes | **Yes** |  | Varies | Don't know |
| **Desirable Effects** | Trivial | **Small** | Moderate | Large |  | Varies | Don't know |
| **Undesirable Effects** | Large | Moderate | **Small** | Trivial |  | Varies | Don't know |
| **Certainty of evidence** | **Very low** | Low | Moderate | High |  |  | No included studies |
| **Values** | Important uncertainty or variability | Possibly important uncertainty or variability | **Probably no important uncertainty or variability** | No important uncertainty or variability |  |  |  |
| **Balance of effects** | Favors the comparison | Probably favors the comparison | Does not favor either the intervention or the comparison | Probably favors the intervention | Favors the intervention | Varies | **Don't know** |
| **Resources required** | Large costs | **Moderate costs** | Negligible costs and savings | Moderate savings | Large savings | Varies | Don't know |
| **Certainty of evidence of required resources** | Very low | Low | Moderate | High |  |  | **No included studies** |
| **Cost effectiveness** | **Favors the comparison** | Probably favors the comparison | Does not favor either the intervention or the comparison | Probably favors the intervention | Favors the intervention | Varies | No included studies |
| **Equity** | Reduced | **Probably reduced** | Probably no impact | Probably increased | Increased | Varies | Don't know |
| **Acceptability** | No | **Probably no** | Probably yes | Yes |  | Varies | Don't know |
| **Feasibility** | No | Probably no | Probably yes | Yes |  | **Varies** | Don't know |

# Type of recommendation: No recommendation MADE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Strong recommendation against the intervention | Conditional recommendation against the intervention | Conditional recommendation for either the intervention or the comparison | Conditional recommendation for the intervention | Strong recommendation for the intervention |
| ○  | ○ | ○  | ○  | ○  |

# Conclusions

|  |
| --- |
| Recommendation |
| Due to the lack of comparative evidence, we are unable to recommend for or against the use a junctional tourniquet by first aid providers in comparison with direct manual pressure alone for severe, life-threatening external bleeding. |
|  |

|  |
| --- |
| Justification |
| * In considering the evidence the Task Force recognizes that data regarding the use of junctional tourniquets by first aid providers comes primarily from simulation studies. While these studies generally show favorable results, the Task Force has significant concerns about the ability of first aid providers to use junctional tourniquets in a real pre-hospital setting.
* The Task Force recognizes that benefits of junctional tourniquets may justify their use in specific populations (e.g. military organizations) that require hands-free control of life-threatening bleeding from wounds in locations not amenable to alternative methods for the control of bleeding.
 |

|  |
| --- |
| Subgroup considerations |
| N/A |

|  |
| --- |
| Implementation considerations |
| N/A |

|  |
| --- |
| Monitoring and evaluation |
| N/A |

|  |
| --- |
| Research priorities |
| Studies comparing the effectiveness of various types of junctional devices in the first aid setting and if the devices can be used appropriately by first aid providers. It is also important to determine if first aid providers are able to recognize wounds that would be amenable to junctional pressure devices. |

**References**

Chen J, Benov A, Nadler R, et al. Testing of Junctional Tourniquets by Medics of the Israeli Defense Force in Control of Simulated Groin Hemorrhage. J Spec Oper Med. 2016 Spring;16(1):36-42.

Cotte J, Cungi PJ, Montcriol A. Experimental evaluation of the Combat Ready Clamp. J Trauma Acute Care Surg. 2013 Oct;75(4):747-8. doi: 10.1097/TA.0b013e31829cbf48.

Gaspary MJ, Zarow GJ, Barry MJ, Walchak AC, Conley SP, Roszko PJD. Comparison of Three Junctional Tourniquets Using a Randomized Trial Design. Prehosp Emerg Care. 2018 Aug 17:1-8. doi: 10.1080/10903127.2018.1484968.

Gates KS, Baer L, Holcomb JB. Prehospital emergency care: evaluation of the junctional emergency tourniquet tool with a perfused cadaver model. J Spec Oper Med. 2014 Spring;14(1):40-4.

Kragh JF Jr, Aden JK 3rd, Lambert CD, Moore VK 3rd, Dubick MA. Assessment of User, Glove, and Device Effects on Performance of Tourniquet Use in Simulated First Aid. J Spec Oper Med. Winter 2017;17(4):29-36.

Kragh JF Jr, Mann-Salinas EA, Kotwal RS, et al. Laboratory assessment of out-of-hospital interventions to control junctional bleeding from the groin in a manikin model. Am J Emerg Med. 2013 Aug;31(8):1276-8. doi: 10.1016/j.ajem.2013.03.021. Epub 2013 Jul 1.

Kragh JF Jr, Parsons DL, Kotwal RS, et al. Testing of junctional tourniquets by military medics to control simulated groin hemorrhage. J Spec Oper Med. 2014 Fall;14(3):58-63.

Kragh JF, Kotwal RS, Cap AP, et al. Performance of Junctional Tourniquets in Normal Human Volunteers. Prehosp Emerg Care. 2015 Jul-Sep;19(3):391-8. doi: 10.3109/10903127.2014.980478. Epub 2014 Dec 12.

Kragh JF, Lunati MP, Kharod CU, et al. Assessment of Groin Application of Junctional Tourniquets in a Manikin Model. Prehosp Disaster Med. 2016 Aug;31(4):358-63. doi: 10.1017/S1049023X16000443. Epub 2016 May 27.

Lyon M, Johnson D, Gordon R. Use of a Novel Abdominal Aortic and Junctional Tourniquet to Reduce or Eliminate Flow in the Brachial and Popliteal Arteries in Human Subjects. Prehosp Emerg Care. 2015 Jul-Sep;19(3):405-8. doi: 10.3109/10903127.2014.980479. Epub 2014 Dec 12.

Meusnier JG, Dewar C, Mavrovi E, Caremil F, Wey PF, Martinez JY. Evaluation of Two Junctional Tourniquets Used on the Battlefield: Combat Ready Clamp® versus SAM® Junctional Tourniquet. J Spec Oper Med. 2016 fall;16(3):41-46.

Taylor DM, Coleman M, Parker PJ. The evaluation of an abdominal aortic tourniquet for the control of pelvic and lower limb hemorrhage. Mil Med. 2013 Nov;178(11):1196-201. doi: 10.7205/MILMED-D-13-00223.

Theodoridis CA, Kafka KE, Perez AM, et al. Evaluation and Testing of Junctional Tourniquets by Special Operation Forces Personnel: A Comparison of the Combat Ready Clamp and the Junctional Emergency Treatment Tool. J Spec Oper Med. 2016 Spring;16(1):44-50.

**Other References (not listed in above table)**

Jacobs L and Burns KJ. *The Hartford Consensus to improve survivability in mass casualty events: Process to policy.* Am J Disaster Med. 2014;**9**(1):67-71.

Kauvar DS, Lefering R, and Wade CE. *Impact of hemorrhage on trauma outcome: an overview of epidemiology, clinical presentations, and therapeutic considerations.* J Trauma. 2006;**60**(6 Suppl):S3-11.

World Health Organization. *Injuries*. [cited 2018 21-JUN-2018]; Available from: <http://www.who.int/topics/injuries/en/>.