2021 Evidence Update Worksheet
Appendix B4 First Aid 1

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Date Submitted: 5/13/2020; Updated 2/11/2021

PICO / Research Question: In victims of a venomous snakebite (P) does pressure immobilization (I) of an extremity, when compared to no therapy (C), improve outcome (O)?
Outcomes: Survival, intercompartmental pressure, swelling, slowing venom/tracer spread
Type (intervention, diagnosis, prognosis): intervention

Additional Evidence Reviewer(s):
Conflicts of Interest (financial/intellectual, specific to this question): None

Year of last full review: 2010 New question: 2010

Last ILCOR Consensus on Science and Treatment Recommendation:

Pressure Immobilization[FA-1001A]

Consensus on Science

One LOE 5 monkey study[239] showed that application of a pressure bandage to create ≈55 mm Hg of pressure and simultaneous immobilization of the bitten extremity with a splint are effective and safe in retarding snake venom uptake into the systemic circulation. One LOE 2 human study[240] and 1 LOE 5 animal study[241] demonstrated that lymphatic flow and "mock venom" uptake can be significantly or almost completely reduced by proper application of pressure and immobilization but that either pressure or immobilization alone was ineffective. No adverse effects were observed within certain prescribed pressure ranges (between 40 and 70 mm Hg for upper, and 55 to 70 mm Hg in lower limbs); a useful and practical field estimation for this pressure range is the application of a comfortably tight bandage that allows the insertion of a finger under it. Theoretically, if a venom produces more local tissue effects than systemic effects, damage may be increased if the venom is "trapped" in 1 place with use of pressure and immobilization. One LOE 5 animal study[242] demonstrated the effectiveness of pressure and immobilization on survival from the venom of nonneurotoxic North American snakes. Two LOE 5 studies[243,244] using volunteer first aid providers showed that retention of the ability to perform proper pressure/immobilization application is poor.

Treatment Recommendation

Properly performed pressure immobilization of extremities should be considered in first aid following snake envenomation.

Knowledge Gaps

Does first aid provider compressive wrapping of an extremity bitten by a venomous snake improve outcome? What is the best method to teach the optimal way to apply a compressive dressing? How often does this need to be refreshed for retention?

2010/2015 Search Strategy:

PubMed
(("snakes"[MeSH Terms] OR "snakes"[All Fields] OR "snake"[All Fields]) AND ("immobilisation"[All Fields] OR "immobilization"[MeSH Terms] OR "immobilization"[All Fields])) AND English[lang] – 87
(("snakes"[MeSH Terms] OR "snakes"[All Fields] OR "snake"[All Fields]) AND ("first aid"[MeSH Terms] OR ("first"[All Fields] AND "aid"[All Fields]) OR "first aid"[All Fields])) AND (("2000/01/01"[PDAT] : "2008/10/10"[PDAT]) AND English[lang]) - 51
AHA EndNote Master library
Cochrane database for systematic reviews and Central Register of Controlled Trials
Hand searches of journals, review articles, and books

2019 Search Strategy:

Search ((((("Snake Venoms/poisoning"[Mesh]) OR ("Snake Bites/mortality"[Mesh] OR "Snake Bites/therapy"[Mesh]))) AND (((((("Clinical Competence"[Mesh]) OR "First Aid"[Majr]) OR "First Aid/methods"[Majr]) OR "Emergency Treatment/methods"[Mesh]) OR "Emergency Treatment/standards"[Mesh])) AND ((((((("Bandages"[Mesh] OR "Compression Bandages"[Mesh]) OR "Constriction"[Mesh]) OR "Immobilization"[Mesh]) OR "Immobilization/methods"[Mesh]) OR "Pressure"[Mesh]) OR "Pressure"[Majr])

2020 Pubmed Search update:

Search ((((("Snake Venoms/poisoning"[Mesh]) OR ("Snake Bites/mortality"[Mesh] OR "Snake Bites/therapy"[Mesh]))) AND (((((("Clinical Competence"[Mesh]) OR "First Aid"[Majr]) OR "First Aid/methods"[Majr]) OR "Emergency Treatment/methods"[Mesh]) OR "Emergency Treatment/standards"[Mesh])) AND ((((((("Bandages"[Mesh] OR "Compression Bandages"[Mesh]) OR "Constriction"[Mesh]) OR "Immobilization"[Mesh]) OR "Immobilization/methods"[Mesh]) OR "Pressure"[Mesh]) OR "Pressure"[Majr])
Updated Pubmed search strategy:
("Snake Venoms"[Mesh] OR "Snake Bites"[Mesh] OR "Snake Venoms"[All fields] OR "Snake Bites"[All fields]) AND ("Clinical Competence"[Mesh] OR "First Aid"[Majr] OR "First Aid/methods"[Majr] OR "Emergency Treatment/methods"[Mesh] OR

"Emergency Treatment/standards"[Mesh] OR "first aid"[MeSH Terms] OR ("first"[All Fields] AND "aid"[All Fields]) OR "first aid"[All Fields]) AND ("Bandages"[Mesh] OR "Compression Bandages"[Mesh] OR ("compression"[All Fields] AND "bandages"[All Fields]) OR "compression bandages"[All Fields] OR "Constriction"[Mesh] OR "Immobilization"[Mesh] OR "Pressure"[Mesh] OR "pressure immobili*"[All fields] OR ("pressure"[All fields] AND "immobili*" [All fields]) OR "PIB"[All fields])
Results 2-11-2021: 64 total. Nil in last 12 months.

Database searched: Pubmed
Date Search Completed: 4/17/2020, updated 2/11/2021
Search Results 4/17/2020: (Number of articles identified / number identified as relevant): 40/14
Search Results 2/11/2021: 64 total/0 new
Inclusion/Exclusion Criteria: All publication dates; human and animal, all study types, systematic reviews; English only
Link to Article Titles and Abstracts (if available on PubMed):

Sutherland SK, Harris RD, Coulter AR, Lovering KE. First aid for cobra (Naja naja) bites. Indian J Med Res. 1982;73:266-8. https://www.ncbi.nlm.nih.gov/pubmed/7239610

Anker RL, Straffon WG, Loiselle DS, Anker KM. Snakebite. Comparison of three methods designed to delay uptake of 'mock venom Aust Fam Physician. 1983;2(5):365-8. https://www.ncbi.nlm.nih.gov/pubmed/6351824

Burgess JL, Dart RC, Egen NB, Mayersohn M. Effects of constriction bands on rattlesnake venom absorption: A pharmacokinetic study. Ann Emerg Med. 1992;21(9):1086-93.
https://www.ncbi.nlm.nih.gov/pubmed/?term=Burgess+JL%2C+Dart+RC%2C+Egen+NB%2C+Mayersohn+M

Pe T, Thwin MM, Than MM, Myint AA, Myint K, Than T. The efficacy of compression immobilization technique in retarding spread of radio-labeled russell's viper venom in rhesus monkeys and "mock venom" NaI in human vomunteers Southeast Asian J Trop Med Public Health. 1994;25(2):349-353. https://www.ncbi.nlm.nih.gov/pubmed/7855655

Currie BJ, Canale E, Isbister GK . Effectiveness of pressure-immobilization first aid for snakebite requires further study. Emerg Med Australas. 2008;20(3):267-270. https://www.ncbi.nlm.nih.gov/pubmed/18549384

Canale E, Isbister GK, Currie BL. Investigating pressure bandaging for snakebite in a simulated setting: bandage type, training and the effect of transport. Emerg Med Austral. 2009;21(3):184-90. https://www.ncbi.nlm.nih.gov/pubmed/19527277

Meggs WJ, Courtney C, O'Rourke D, Brewer KL. Pilot studies of pressure-immobilization bandages for rattlesnake envenomations Clin Toxicol. 2010;48(1):61-3
https://www.ncbi.nlm.nih.gov/pubmed/?term=Meggs+WJ%2C+Courtney+C%2C++O%27Rourke+D%2C+Brewer+KL.

Smyrnioudis ME, O'Rourke DP, Rosenbaum MD, Brewer KL, Meggs WJ. Long-term efficacy of pressure immobilization bandages in a porcine model of coral snake envenomation. Am J Emerg Med. 2014 Sep;32(9):1024-6. doi: 10.1016/j.ajem.2014.06.002. Epub 2014 Jun 12. https://www.ncbi.nlm.nih.gov/pubmed/?term=Smyrnioudis+M+E%2C+O%27Rourke+DP%2C+Rosenbaum+MD%2C

Summary of Evidence Update:

Evidence Update Process for topics not covered by ILCOR Task Forces

1. This evidence update process is only applicable to PICOs which are *not* being reviewed as ILCOR systematic and scoping reviews.

Relevant Guidelines or Systematic Reviews

Organisation (if relevant); Author; Year Published	**Guideline or systematic review**	**Topic addressed or PICO(S)T**	**Number of articles identified**	**Key findings**	**Treatment recommendations**
World Health Organization Regional Office for South-East Asia, 2016	Guideline	Pressure immobilization bandaging for snakebites in South-East Asia			Unless the possibility of an elapid bite can confidently be excluded, apply pressure-pad immobilization, or, if the necessary equipment and skills are available, pressure-bandage immobilization. The pressure-pad immobilization method is preferred and recommended as being simpler and more practicable.
American College of Medical Toxicology & American Academy of Clinical Toxicology & American Association of Poison Control Centers & European Association of	Position Statement	Pressure immobilization bandaging for North American Crotalinae bites			"Given that the primary toxic effect of envenomation is local tissue injury, mortality is not an ideal outcome measure to extrapolate to human crotaline envenomation. Available evidence fails to

Poison Control Centres & International Society of Toxinology & Asia Pacific Association of Medical Toxicology 2011					establish the efficacy of pressure immobilization in humans, but does indicate the possibility of serious adverse events arising from its use. The use of pressure immobilization for the prehospital treatment of North American Crotalinae envenomation is not recommended."
Australian Resuscitation Council, 2011	Guideline	GUIDELINE 9.4.8 ENVENOMATION - PRESSURE IMMOBILISATION TECHNIQUE			If on a limb, apply a broad pressure bandage over the bite site as soon as possible.. Elasticised bandages (10-15cm wide) are preferred over crepe bandages, if neither are available, clothing or other material should be used.5 [Class A; LOE: III-2]The bandage should be firm and tight, you should be unable to easily slide a finger between the bandage and the skin. In order to further restrict lymphatic flow and to assist in immobilisation of the limb, apply a further pressure bandage, commencing at the fingers or toes of the bitten limb and extending upward covering as much of the limb as possible.3 [Class A; LOE: III-2] The bandage should be applied over existing clothing if possible."

Avau B, Borra V, Vandekerckhove P, De Buck E. The Treatment of Snake Bites in a First Aid Setting: A Systematic Review. PLoS Negl Trop Dis. 2016 Oct 17;10(10):e0005079. doi: 10.1371/journal.pntd.0005079. eCollection 2016 Oct.	Systematic Review	In people with snakebites (P), is a certain first aid intervention (I), compared to another first aid intervention or no intervention (C), effective and feasible for laypeople as a first aid treatment to increase survival, tissue healing, functionalrecovery, pain, complications, time to resumption of usual activity, restoration to the pre-exposure condition, time to resolution of the symptoms or other health outcome measures (including adverse effects)(O)?	14	The effectiveness of this technique has only been demonstrated in animal models, with evidence from human studies being limited to case reports. Three of the studies on pressure immobilization efficacy meeting the selection criteria of this systematic review, favor a modified version of this technique, involving a localized cloth or rubber pad, firmly pressed on the site of the bite wound, with or without splinting, instead of a crepe or elastic bandage compressing the whole limb. One study suggests that keeping a person still delays the spread of the venom. However, the feasibility of correctly applying pressure immobilization using an elastic bandage is questionable, especially regarding the tension generated. Intense training is warranted, but even then, retention is low. Studies on the feasibility of applying a firmly strapped cloth or rubber pad are unavailable.	"The technique has a theoretical basis for limiting the spread of neurotoxic venoms, such as those produced by elapids, but less for necrotic venoms, such as those produced by vipers. However, no controlled studies have been performed in real-life snakebite patients yet, leaving this controversy unresolved."

RCT:

Study Acronym; Author; Year Published	**Aim of Study; Study Type; Study Size (N)**	**Patient Population**	**Study Intervention (# patients) / Study Comparator (# patients)**	**Endpoint Results (Absolute Event Rates, P value; OR or RR; & 95% CI)**	**Relevant 2° Endpoint (if any); Study Limitations; Adverse Events**
Anker RL, Straffon WG, Loiselle DS, Anker KM. Snakebite. Comparison of three methods designed to delay uptake of 'mock venom Aust Fam Physician. 1983;2(5):365-8.	A controlled trial investigating the use of three different first aid techniques on the uptake **of mock venom** in human subjects Tested 3 methods of pressure immobilization bandaging (PIB) (PIB, air splint, local pad w radioactive mock venom. RCT	**Inclusion Criteria:** Twelve adult subjects injected with radioactive (^{125}I) insulin in a manner similar to the 1982 Anker study. It is unclear if the researchers randomized the subjects or if it was blinded (although due to the nature of the study this is unlikely). Radioactive insulin was administered "immediately beneath the skin," 10 cm distal to the	Patients were either treated with PIB (i) (n=3), a full length lower extremity pneumatic splint (n=3), a pressure immobilization pad (n=3) or control receiving no first aid (c) (n=3). For the PIB method (i), an elastic roller bandage was applied at the site of the injection and wrapped proximally. Similar to the prior study, it appears that a pediatric sphygmomanometer was placed between the dressing and bandage and the bandage was applied to this region until 55 mmHg pressure	**1° endpoint:** Percent of maximum radioactivity in blood by 60 min for control, pneumatic splint, PIB and pressure pad were [median(IQR)] 37% (28), 34% (4), 41% (9),and 4.5% (6.5), respectively. Mean difference between PIB and control was -5.6% (95% CI -32.6 – 21.4). The percent of maximum radioactivity in the blood at release of treatment was: median(IQR)pneumatic splint 67% (5), PIB 61% (26), pressure pad 11% (14). Pressure pad was superior but low quality evidence limits conclusions	**Study Limitations:** This study provided very low quality evidence and was downgraded for bias, inconsistency, indirectness and imprecision. The authors concluded that pressure pad is superior to either pneumatic splint or PIB for delaying uptake of mock venom.

		head of the fibula on the lateral aspect of the leg.	registered on the attached mercury manometer. A padded straight wooden splint was applied to the medial side of the lower limb. In three subjects a lower-limb pneumatic splint made of rubberized cloth was inflated and pressure maintained at 50, 55 and 60 mmHg for each subject, respectively. In three subjects a 8 cm x 8 cm x 3 cm firm cloth pad was placed over the injection site and was held in place by two broad bandage firmly bound around the leg.		
Smyrnioudis ME, O'Rourke DP, Rosenbaum MD, Brewer KL, Meggs WJ. Long-term efficacy of pressure	Pig model of coral snake envenomation with PIB treatment RCT	**Inclusion Criteria:** Ten anesthetized pigs were injected subcutaneously with a 27-gauge needle	Pigs were then randomized to either no treatment (c) or a PIB (i) using an elastic wrap, beginning at the site of the bite and wrapping proximally and	**1° endpoint:** Pigs receiving PIB were more likely to survive to the 24-hour period than pigs in the control group (3/5 (60%) vs 0/5 (0%); P = .08). Two pigs in the PIB group survived to 21 days. Of those that died in the PIB group, the median time to death was 1172 minutes versus 307 minutes in the	**Study Limitations:** The pigs in the PIB group that survived to the end point showed necrosis of the injected distal lower extremity and had nearly autoamputated limbs at time of death, however necropsy reveals no other findings

immobilization bandages in a porcine model of coral snake envenomation Am J Emerg Med. 2014;32(9): 1024-6.		at a depth of 3mm in the left distal foreleg with 10 mg of lyophilized *M. fulvius fulvius* venom.	having a circumferential fiberglass cast applied approximately 1 minute after envenomation.	control group (P = .10). Increased survival w PIB w local tissue damage observed	except for those on the envenomated extremity.

Nonrandomized Trials, Observational Studies

Study Acronym; Author; Year Published	**Study Type/Design; Study Size (N)**	**Patient Population**	**Primary Endpoint and Results (include P value; OR or RR; & 95% CI)**	**Summary/Conclusion Comment(s)**
Sutherland SK, Harris RD, Coulter AR, Lovering KE. First aid for cobra (Naja naja) bites. Indian J Med Res. 1982;73:266-8.	**Study Type:** A small observational animal study in which the studied the effects of PIB on Indian cobra (*Naja naja*), an elapid, envenoming in two monkeys (*Macaca fasicularis*).	**Inclusion Criteria:** Anaesthetized monkeys were restrained and injected with 300mg of venom into the right lower leg. One monkey was treated with PIB using a crepe bandage (i) with splinting. PIB was performed without manometry. The other monkey remained untreated (c).	**1° endpoint:** The control monkey developed neurotoxic effects at 65 minutes and required antivenin at that point. The treated monkey had the PIB removed at 60 minutes and did not develop neurotoxic symptoms until approximately 40 min after removal of the PIB. No local necrosis was noted at the site of injection.	The authors of this study recommended PIB for necrotizing venom as they propose that necrosis would be limited to the bite site and not extend up the limb.
Burgess JL, Dart RC, Egen NB, Mayersohn M. Effects of constriction bands on	**Study Type:** An observational crossover trial animal study to evaluate the use	**Inclusion Criteria:** ^{125}I labeled Western Diamondback rattlesnake (*Crotalus atrox*), a **viper**, venom was injected in anesthetized pigs with a 22	**1° endpoint:** Total venom absorption for the initial four hour period, measured by AUC of mean plasma venom concentration	The authors concluded that the application of a constriction band reduced the rate of systemic absorption and the peak venom concentration during a four

rattlesnake venom absorption: A pharmacokinetic study. Ann Emerg Med. 1992;21(9):1086-93.	of a constriction band in pigs (n=5).	gauge needle 7mm deep at the center of the footpad 2 cm distal to the metatarsophalangeal joint. A pediatric sphygmomanometer was applied proximal to the metatarsophalangeal joint and inflated to 45 mmHg to serve as a pressure band. The cuff was kept inflated for 4 hours and then removed.	(counts/min/mL), was 33% less for the constriction band than the control group ($p<0.05$). Maximum plasma venom concentration decreased during this four hour period by 25% ($p<0.05$). There was no statistically significant difference in leg circumference between the groups over the 96 hours of measurements. Venom absorption was less with PIB. No increase in local swelling.	hour monitoring period in pigs.
Pe T, Thwin MM, Than MM, Myint AA, Myint K, Than T . The efficacy of compression immobilization technique in retarding spread of readio-labeled russell's viper venom in rhesus monkeys and "mock venom" NaI in human vomunteers Southeast Asian J Trop Med Public Health.	**Study Type:** An observational study using the Monash (local pad) method of pressure in both monkeys (n=6) using viper venom and humans using labeled tracer (Na ^{131} I, mock venom).	**Inclusion Criteria:** In the animal studies, three monkeys (*Macaca mulata*) were restrained and injected subcutaneously (5mm deep) 4 cm proximal to the lateral malleolus of the right hind limb with radioactive ^{125}I Russell's viper venom. A rubberized pad 55 x 28 x 16 mm was applied over the injection site and secured with hand-tight cotton bandage and the limb was immobilized with a bamboo splint. In the human studies, 22 healthy male volunteers (14 treatment; 8 control) were injected with Na ^{131}I	**1° endpoint:** Time to 80% maximum blood counts of radioactivity as measured by as Autogamma spectrophotometer was 70 min, 53.6 minutes and 65.6 minutes, respectively. Mean difference in pressure pad versus control was 26.9 minutes (95% CI 12.0 – 41.8) and 18.7 minutes (95% CI 6.25 – 31.15) for injections 10 cm proximal to the lateral malleolus and for those injected 10 cm distal to the head of the fibula, respectively. Pad was effective in reducing spread	The authors concluded that the "slow leak" of radioactivity into the blood in 2 monkeys was the result of leg muscular contraction, but that overall the technique was effective in preventing the spread of venom. The authors concluded that the pressure pad technique was effecting in preventing the spread of mock venom and concluded that the leakage of radioactivity present in 2 of the 14 in the treatment groups resulted from insufficient pressure being applied on the pad.

1994;25(2):349-353.		subcutaneously 10 cm proximal to the lateral malleolus (5mm deep) or 10 cm distal to the head of the fibula (15 mm deep). A firm rubber pad measuring 60 x 50 x 17 mm was secured with a cotton bandage (25 mm x 2.5 m) applied immediately over the site of the injection. The limb was immobilized with a bamboo splints.	of venom. Local effects unclear.	
Currie BJ, Canale E, Isbister GK . Effectiveness of pressure-immobilization first aid for snakebite requires further study. Emerg Med Australas. 2008;20(3):267-270.	**Study Type:** An observational trial on PIB in Australia. This study evaluated 348 subjects from the Australian Snakebite Project regarding the use of PIB	**Inclusion Criteria:** In this study PIB was evaluated qualitatively as of adequate quality (still firm and whole limb bandaged) or poor quality (loose and/or not covering the limb as required). It is unclear who did this assessment. Two hundred and seventy-one patients had evaluable data. Of these 214 (79%) attempted PIB.	**1° endpoint:** The bandage was assessed as adequate quality in 70% (149/191) Formal immobilization was determined to be inadequate in 70 of the 127 patients. Inconsistent to poor performance of PIB.	The authors concluded that while they would still promote the use of PIB, further research is needed to determine the utility and optimal application of this treatment.
Canale E, Isbister GK, Currie BL. Investigating pressure bandaging for snakebite in a simulated setting: bandage type, training and	**Study Type:** An observational study of 96 participants (78 health care workers and 18 lay persons) investigating the ability to	**Inclusion Criteria:** In the initial study 96 participants (78 health care workers and 18 lay persons) were randomized to perform PIB with both a crepe bandage and an elastic bandage. In the initial phase, participants performed PIB two times each with	**1° endpoint:** The median pressure generated under crepe bandages was 28 mmHg (IQR 17- 42 mmHg) compared with 47 mmHg (26 - 83 mmHg) with elasticized bandages, with most subgroups applying the elasticized bandage	The authors recommended that PIB should continue to be promoted as the standard in Australia, but PIB recommendations should be modified to specify the use of elastic bandages.

the effect of transport. Emerg Med Austral. 2009;21(3):184-90	perform PIB and whether training improved correct application. In the initial study PIB dressings tested before and after training and during ambulance transport.	randomization of the first attempt method. Two subjects served as simulated patients for all the trails. A blood pressure cuff placed positioned under the PIB and attached to a pressure transducer was used to measure the pressure generated. In the second phase of the study PIB application with elasticized bandages was repeated by 36 participants (18 general public and 18 health professionals) with feedback (i) on pressures attained during these attempts. On the subsequent sixth attempt, data regarding the adequacy of PIB was collected. In a final phase of the study, pressure was also measured under correctly applied bandages during an ambulance ride.	closer to the estimated optimal pressure (55–70 mmHg). Following training, the median pressure for closer to the optimal range than initial attempts [65 mmHg (IQR 56-71 mmHg versus 47 mmHg (IQR 27-75 mmHg)]. On initial bandaging, 14% (5/36) achieved optimal pressure range with elasticized bandages, compared to 50% (18/36) after training (p=0.002). Crepe bandages that initially were correctly applied did not maintain desired pressure during ambulance transport on urban roads over 30 min whereas elasticized bandages maintained pressure (raw data not given).	
Meggs WJ, Courtney C, O'Rourke D, Brewer KL. Pilot studies of pressure-immobilization bandages for rattlesnake envenomations	**Study Type:** Animal study in a pig model (n=6) for rattlesnake envenomation and PIB. Observational, no apparent randomization.	**Inclusion Criteria:** Six anesthetized pigs were injected with 200 mg of *C. atrox* venom subcutaneously in a distal hind leg. One minute after injection, pigs received either no treatment (c) (n = 3) or PIB (i) (n = 3) using an elastic wrap, beginning at the site of the	**1° endpoint:** Control group pigs died at 13.68 ± 3.42 h, PIB treated pigs survived to 24 h (p = 0.014). Potassium was 17.767 ± 5.218 mEq/L in the control group and normal at 24 h in treated animals. Increased survival w PIB w local tissue damage observed	The authors concluded that PIB bandages prevented fatality at 24 h and did not recommend the routine use of PIB, but suggested that consideration of the use of PIB in severe envenoming with a long time period to definitive treatment is reasonable.

Clin Toxicol. 2010;48(1):61-3		bite and wrapping proximally, and splint by a single researcher		

Reviewer Comments (including whether meet criteria for formal review):

While additional studies were found in this 2020 update of the initial search, all are either animal studies (n=5), rely on mock venom (n=2), or are educational studies (n=2). Human studies included in the 2010 review either relied on mock venom (n=2) or were observational in nature (n=1). Animal studies seem to suggest that pressure immobilization bandaging delays mortality from snake envenomation, however these studies are often poorly controlled. Significant controversy still exists, even in organizational guidelines, on whether pressure immobilization bandaging could worsen local tissue necrosis from tissue toxic snake venoms. Mock venom studies in humans are not able to address this concern, leaving only one observational study enrolling 19 participants to comprise data on treatment in humans. Educational studies suggest that correct application by both trained and untrained providers is poor, increasingly concern that these bandages would either be ineffective or could potentially cause harm. Overall, not enough human data is currently available to warrant a formal systematic review as the data would be of such low certainty that a recommendation could not be made. A systematic review conducted by Avau et al in 2016 came to a similar conclusion.

First Aid Task Force	**Approval Date** **15 February 2021**
Evidence Update coordinator	
ILCOR board	

***Once approval has been made by Evidence Update coordinator, worksheet will go to ILCOR Board for acknowledgement.**

Reference list

Updated References:

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Prior References:

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3. German B, Brewer K, Hack JB, Meggs WJ. Efficacy of a Pressure-Immobilization Bandage in Delaying the Onset of Systemic Toxicity in a Porcine Model of Eastern Coral Snake (Micrurus fulvius) Envenomation. Ann Emerg Med. 2005;45(6): 603-608.
4. Howarth DM, Southee AE, et al. Lymphatic flow rates and first-aid in simulated peripheral snake or spider envenomation. Med J Aust. 1994;161(11-12): 695-700.
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9. Sutherland SK, Coulter AR, Harris RD, Lovering KE, Roberts ID. A study of the major australian snake venoms in the monkey (Macaca fascicularis). I. The movement of injected venom, methods which retard this movement, and the response to antivenoms. Pathology. 1981;13(1):13-27.
10. Sutherland SK, Coulter AR. Early management of bites by the eastern diamondback rattlesnake (Crotalus adamanteus): studies in monkeys (Macaca fascicularis). Am J Trop Med Hyg. 1981;30(2): 497-500.
11. Sutherland SKA, Coulter R, et al. Rationalisation of first-aid measures for elapid snakebite. Lancet. 1979;1(8109): 183-5.

Other References:

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2021 Evidence Update Worksheet
Appendix B4 First Aid 2

Worksheet author(s): Jestin Carlson
Date Completed: 11 February 2021

PICO / Research Question:
Population: Adults and children experiencing anaphylaxis requiring the use of epinephrine
Intervention: Administration of a second dose of epinephrine
Comparison: Administration of only one dose
Outcomes: Resolution of symptoms (critical), adverse effects (critical), complications (critical)

Outcomes: Resolution of symptoms (critical), adverse effects (critical), complications (critical)

Type (intervention, diagnosis, prognosis): Intervention

Additional Evidence Reviewer(s): None

Conflicts of Interest (financial/intellectual, specific to this question): None

Year of last full review: 2019

Last ILCOR Consensus on Science and Treatment Recommendation:
We suggest a second dose of epinephrine be administered by autoinjector to adults and children with severe anaphylaxis whose symptoms are not relieved by an initial dose (weak recommendation, very-low-quality evidence). (Unchanged from 2015)

Current Search Strategy:
(((((("multiple dose"[TI] or "multiple doses"[TI] or repeat[TI] or second dose[TI] or second doses[TI]) AND epinephrine[TI])))) OR (((((((("Epinephrine"[Mesh] OR Epinephrine[TIAB] OR Adrenaline[TIAB] or adrenalin[TIAB]))) AND (("administration and dosage" [Subheading] OR "therapeutic use" [Subheading:NoExp] OR "repeat epinephrine"[TIAB] OR dose[TIAB] OR dosage[TIAB] or doses[TIAB] or "second injection"[TIAB] or "next injection"[TIAB] or "2 injections"[TIAB] or "two injections"[TIAB] or Twinject[TIAB] or "additional injection"[TIAB] or "additional injections"[TIAB] OR "repeated injection"[TIAB] or "repeated injections"[TIAB] or "repeat injection"[TIAB] or "repeat injections"[TIAB] or multiple[TIAB])))) AND ((("Anaphylaxis"[Mesh] OR Anaphylaxis[TIAB] or anaphylactic[TIAB] or "severe allergic reaction"[TIAB] or "severe allergic reactions"[TIAB]) AND ("therapy" [Subheading:NoExp] OR "drug therapy" [Subheading] OR "prevention and control" [Subheading])))))))) NOT ((animals[mh] NOT humans[mh]) NOT ("letter"[pt] OR "comment"[pt] OR "editorial"[pt] or Case Reports[ptyp]))

Database(s) searched: Pubmed

Date Search(es) Completed: 11 Feb 2021 for 2019-2021

Search Results (Number of articles identified / number identified as relevant): 0

Inclusion/Exclusion Criteria: Inclusion: Randomized controlled trials (RCTs) and non-randomized studies (non-randomized controlled trials, interrupted time series, controlled before-and-after studies, cohort studies), unpublished studies (e.g., conference abstracts, trial protocols).
Exclusion: Animal studies

Link to Article Titles and Abstracts (if available on PubMed):

Summary of Evidence Review:
Number of studies identified: 0

Relevant Guidelines or Systematic Reviews: No

RCT: No

Nonrandomized Trials, Observational Studies: No

Reviewer Comments (including whether meet criteria for formal systematic review): No new studies were identified with the search results. Treatment recommendations remain valid. Of note, a scoping review was completed on this topic in 2020.

	Date
Presented to taskforce	**February 2021**
Plan for next presentation	**As data requires**

Reference list

2021 Evidence Update Worksheet
Appendix B4 First Aid 3

Worksheet author(s): Jestin Carlson
Date Completed: 11 February 2021

PICO / Research Question: FA 795
Population: Adults and children with symptomatic hypoglycemia
Intervention: Administration of dietary forms of sugar
Comparison: Standard dose (15 - 20 gm) of glucose tablets
Outcomes: Time to resolution of symptoms, complications, blood glucose level after treatment, hypoglycemia (defined as the persistence of symptoms (yes/ no) or recurrence of symptomatic hypoglycemia >15 min after treatment), hospital length of stay

Outcomes: Time to resolution of symptoms, complications, blood glucose level after treatment, hypoglycemia (defined as the persistence of symptoms (yes/ no) or recurrence of symptomatic hypoglycemia >15 min after treatment), hospital length of stay

Type (intervention, diagnosis, prognosis): Intervention

Additional Evidence Reviewer(s): None

Conflicts of Interest (financial/intellectual, specific to this question): None

Year of last full review: 2019

Last ILCOR Consensus on Science and Treatment Recommendation:
We recommend that first aid providers administer glucose tablets for treatment of symptomatic hypoglycemia in conscious adults and children (strong recommendation, low-quality evidence).
We suggest that if glucose tablets are not available, various forms of dietary sugars such as Skittles®, Mentos©, sugar cubes, jellybeans, or orange juice can be used to treat symptomatic hypoglycemia in conscious adults and children (weak recommendation, very-low-quality evidence).
There is insufficient evidence to make a recommendation on the use of whole milk, cornstarch hydrolysate, and glucose solution, or glucose gels as compared with glucose tablets for the treatment of symptomatic hypoglycemia. (Unchanged from 2015)

Current Search Strategy:
(((((("multiple dose"[TI] or "multiple doses"[TI] or repeat[TI] or second dose[TI] or second doses[TI]) AND epinephrine[TI]))))) OR (((((((("Epinephrine"[Mesh] OR Epinephrine[TIAB] OR Adrenaline[TIAB] or adrenalin[TIAB]))) AND (("administration and dosage" [Subheading] OR "therapeutic use" [Subheading:NoExp] OR "repeat epinephrine"[TIAB] OR dose[TIAB] OR dosage[TIAB] or doses[TIAB] or "second injection"[TIAB] or "next injection"[TIAB] or "2 injections"[TIAB] or "two injections"[TIAB] or Twinject[TIAB] or "additional

injection"[TIAB] or "additional injections"[TIAB] OR "repeated injection"[TIAB] or "repeated injections"[TIAB] or "repeat injection"[TIAB] or "repeat injections"[TIAB] or multiple[TIAB]))))) AND ((("Anaphylaxis"[Mesh] OR Anaphylaxis[TIAB] or anaphylactic[TIAB] or "severe allergic reaction"[TIAB] or "severe allergic reactions"[TIAB]) AND ("therapy" [Subheading:NoExp] OR "drug therapy" [Subheading] OR "prevention and control" [Subheading])))))))) NOT ((animals[mh] NOT humans[mh]) NOT ("letter"[pt] OR "comment"[pt] OR "editorial"[pt] or Case Reports[ptyp]))
Database(s) searched: Pubmed

Date Search(es) Completed: 11 Feb 2021 for 2019-2021

Search Results (Number of articles identified / number identified as relevant): 0

Inclusion/Exclusion Criteria: Inclusion: Randomized controlled trials (RCTs) and non-randomized studies (non-randomized controlled trials, interrupted time series, controlled before-and-after studies, cohort studies) were eligible for inclusion.
Exclusion: Unpublished studies (e.g., conference abstracts, trial protocols) were excluded.

Link to Article Titles and Abstracts (if available on PubMed):

Summary of Evidence Review:
Number of studies identified: 0

Relevant Guidelines or Systematic Reviews: No

RCT: No

Nonrandomized Trials, Observational Studies: No

Reviewer Comments (including whether meet criteria for formal systematic review): No new studies were identified from this search; previous treatment recommendations valid.

	Date
Presented to taskforce	**February 2021**
Plan for next presentation	**As data requires**

Reference List: