FANSHAWE COLLEGE PARAMEDIC PROGRAMS

Paramedic – Evidence Based Medicine

Paramedic Critically Appraised Topic

Title: Pre-Hospital Wound Packing with a Hemostatic Agent

Reported By: Michal Barnard

Clinical Scenario:

Paramedics arrive to the scene of a 24 year old male who has been shot on the iliac crest. There is damage to the deep iliac circumflex artery and there is a significant amount of bleeding. The patient is at risk of dying from exsanguination. The paramedics decide that wound packing is the best option to stop the patient from bleeding out. They decide to use gauze with a hemostatic agent to fill the space that has been created from the injury and help the clotting process.

P-I-C-O (Population – Intervention – Comparison- Outcome)

In the prehospital environment, does wound packing with a hemostatic agent stop death from uncontrollable hemorrhage compared to only applying direct pressure.

Search Strategy: *See appendix for full copy of search history*

Bleed OR Bleeding OR trauma OR hemorrhage OR wound OR junctional wound

AND

Packing OR Pack OR Gauze OR Dressing OR bandage OR haemostatic OR hemostatic

AND

Survival OR Mortality

AND

Paramedic OR Prehospital Care OR ems OR emergency medical service OR prehospital OR pre-hospital OR ambulance OR emergency medical technician OR EMT OR military OR military medicine OR combat medic OR combat medicine OR combat medic specialist

AND

Limiters of Medline: Linked Full Text, 20120101-20170331, Search modes - Find all my search terms

Limiters of CINAHL Plus: Full Text; Published Date: 20120101-20170331; Peer Reviewed, Search Modes – Find all my search Terms

Search Outcome:

Medline – 16

CINHAL – 6

After removing duplicates there was a total of 6 articles. 3 of which were relevant papers and 3 of which were not relevant.

Relevant Papers:

Author & Date	**Population: Sample characteristics**	**Design**	**Outcomes**	**Results**	**Strengths / Weaknesses**
Sean P. Conley Lanny F. Littlejohn Jose Henao Sara S. DeVito Gregory J. Zarow November 2015	US Navy Corpsman working on 24 swine	Quantitative study – seeing the effectiveness of hemostatic dressings in a vascular punch in the femoral artery of a swine following theory based training.	Measuring the effect of a theory only training and effectiveness of wound packing with 3 different hemostatic agents. QuikClot = QCG Hemocon = HCG ChitoGauze = CTG	- 23 out of the 24 swine survived Initial Hemostasis - 63% in CTG & HCG -75% QCG Rebleed -25% in QCG & HCG -50% in CTG Blood loss not significant between different groups.	+ no prompting or demonstrations + same testing environment + Shows little training is needed - swine not humans - not a realistic environment - added fluid to boost MAP - small population
Brian T. Gegel Paul N. Austin Aruther "Don" Johnson December 2013	Swine studies 38 24 12 16 14 24 16 30 22 Human Studies 14 1 1	Systematic review of multiple studies looking at uses of hemostatic dressing and comparing it to standard dressing.	Reviewing these studies to see if there is evidence to use QuikClot for hemorrhage control.	Swine studies outcomes varied based on study and type of wound. There was a common theme where hemostatic dressings were effective. Human studies had an 11/14 success rate with 13/14 survival rate.	+ reviewed multiple studies + used human studies + looked at more than just QuikClot +little bias - too many swine studies - focused on QuikClot rather than hemostatic agents as a whole

Huixi Li Lin Wang Amjad Alwaal Yung-Chin Lee Amanda Reed-Maldonado Taylor A. Spangler Reginald B. O'Hara Guiting Lin April 2016	Swine 20	Quantitative study – comparing BloodSTOP iX Battle Matrix and QuikClot for achieving hemostasis and survival in an arterial hemorrhage	Determining which of the two products were better and faster at producing stable hemostasis.	Battle Matrix - 11/11 stable hemostasis - rebleed 1/11 - Initial hemostasis 4/11 - Hemostasis time 4.8 ± 2.5min -recanalization in survivors 5/11 QuikClot -5/9 stable hemostasis -rebleed 5/5 - Initial hemostasis 4/9 - Hemostasis time 58 ± 20.1 min recanalization in survivors 0/5	+ same testing environment for both + little bias + compared on multiple different areas - Swine not humans - not a realistic environment - added fluid to boost MAP - not equal populations for both products -small population -highly trained doctors doing the produce

Excluded Papers:

Search results contained 3 papers that were excluded

Author & Date	Title	Reason for Exclusion
Jason J Schrager Richard D Branson Col Jay A Johannigman August 2012	Lessons from the Tip of the Spear: Medical Advancements From Iraq and Afghanistan	Main focus of the article was surgery and blood replacement.
D. T. Martin M. A. Schreiber June 2014	Modern resuscitation of hemorrhagic shock: what is on the horizon?	Study was focused on blood and plasma transfusion.
Yin Wen Huang Wang Liu shan-shou November 2012	The outcome of 1120 severe multiple trauma patients with hemorrhagic shock in an emergency department: a retrospective study.	Study was done on an emergency room and didn't seem like a high quality journal.

Comments:

The scope of practice for paramedics in Ontario is to use a tourniquet for an uncontrollable hemorrhage and it is in a place that a tourniquet cannot be placed to continue adding layers of bandages and direct pressure. I decided to look into what the military has been doing since most paramedic practices have their roots in military medicine. The first two studies are a good starting point, but swine are not people and a surgical room is not where paramedics work (Conley, Littlejohn, Henao, DeVito, & Zarow, 2015) (Li, et al., 2016). The systemic review was great since it had a study done from the Israel Defense Force operation in the Gaza Strip which is a great comparison for the pre-hospital environment (Gegel, Austin, & Johnson, 2013). I did face challenges with my search results coming up with articles comparing different types of hemostatic gauzes to each other rather comparing it to direct pressure or other ways of controlling a hemorrhage (Conley, Littlejohn, Henao, DeVito, & Zarow, 2015) (Gegel, Austin, & Johnson, 2013) (Li, et al., 2016).

Consider: Why would you not change practice based on this article?

The main reasons I would not change paramedic practice based on the articles above is that the population size as was too small and for the majority of the studies are not done on humans (Conley, Littlejohn, Henao, DeVito, & Zarow, 2015) (Gegel, Austin, & Johnson, 2013) (Li, et al., 2016). The settings that the studies took place were not like what you would see in the pre-hospital environment (Gegel, Austin, & Johnson, 2013) (Conley, Littlejohn, Henao, DeVito, & Zarow, 2015) (Li, et al., 2016). The final reason why I would consider not changing practice was on the human study in Israel the population was too small to come to a proper conclusion on how effective this treatment is (Gegel, Austin, & Johnson, 2013).

Clinical Bottom Line:

With the data provided as well as the consideration of why not to change practice above, I think this is something that should be further looked into and implemented into the paramedic scope of practice. Even with the small population sizes and it being used on swine in a surgical setting the studies all showed a high success rate and high survival rate with one of the types of hemostatic agent product (Conley, Littlejohn, Henao, DeVito, & Zarow, 2015) (Gegel, Austin, & Johnson, 2013) (Li, et al., 2016). The reality of the situation is that these products are used in life and death situations in which tourniquets cannot be applied and there is a high risk of the patient death from exsanguination (Conley, Littlejohn, Henao, DeVito, & Zarow, 2015) (Gegel, Austin, & Johnson, 2013) (Li, et al., 2016). I would still like more human research to be done but, anything that can be used to prevent a patient's death should be added into the paramedic scope of practice.

References

Conley, S. P., Littlejohn, L. F., Henao, J., DeVito, S. S., & Zarow, G. J. (2015). Control of Junctional Hemorrhage in a Consensus Swine Model With Hemostatic Gauze Products Following Minimal Training. *Military Medicine*, 1189-1195.

Gegel, B. T., Austin, P. N., & Johnson, A. (2013). An Evidence Based Review of the Use of a Combat Gauze (QuikClot) for Hemorrhage Control. *American Association of Nurse Anesthetists*, 453-458.

Li, H., Wang, L., Alwaal, A., Lee, Y.-C., Reed-Maldonado, A., Spangler, T. A., . . . Lin, G. (2016). Comparison of Topical Hemostatic Agents in Swine Model of Extremity Arterial Hemorrage: BloodSTOP iX Battle Matrix vs. QuikClot Combat Gauze. *Internal Journal of Molecular Sciences*, 545-557.

Martin, D. T., & Schreiber, M. A. (2014). Modern resuscitation of hemorrhagic shock: what is on the horizon? *Springer*, 641-656.

Schrager, J. J., Branson, R. D., & Johannigman, J. A. (2012). Lessons From the Tip of the Spear: Medical Advancements From Iraq and Afghanistan. *Respiratory Care*, 1305-1313.

Wen, Y., Yang, H., Wei, W., & Shan-shou, L. (2012). The outcomes of 1120 severe multiple trauma patients with hemorrhagic shock in an emergency department: a retrospective study. *BMC Emergency Medicine*.

Appendix: *see below & attached pdf*

EBSCOhost

Friday, March 10, 2017 2:36:49 PM

#	Query	Limiters/Expanders	Last Run Via	Results
S34	S21 AND S32	Limiters - Linked Full Text Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	16
S33	S21 AND S32	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	20
S32	S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	20,432
S31	(combat medic specialist) AND (S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28)	Expanders - Apply related words Search modes - SmartText Searching	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	454
S30	(combat medic specialist) AND (S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28)	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	0
S29	(combat medic specialist) AND (S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28)	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	0
S28	combat medic specialist	Limiters - Linked Full Text; Date of Publication: 20120101-20171231 Search modes - SmartText Searching	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	12
S27	combat medic specialist	Limiters - Linked Full Text; Date of Publication:	Interface - EBSCOhost Research Databases	0

		20120101-20171231 Search modes - Find all my search terms	Search Screen - Advanced Search Database - MEDLINE	
S26	combat medicine or combat medic	Limiters - Linked Full Text; Date of Publication: 20120101-20171231 Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	860
S25	military medicine	Limiters - Linked Full Text; Date of Publication: 20120101-20171231 Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	3,369
S24	military	Limiters - Linked Full Text; Date of Publication: 20120101-20171231 Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	10,169
S23	ems or emergency medical service or prehospital or pre-hospital or ambulance or emergency medical technician or emt	Limiters - Linked Full Text; Date of Publication: 20120101-20171231 Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	7,373
S22	prehospital care	Limiters - Linked Full Text; Date of Publication: 20120101-20171231 Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	275
S21	S7 AND S15 AND S18	Limiters - Linked Full Text; Date of Publication: 20120101-20171231 Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	160
S20	S7 AND S15 AND S18	Limiters - Date of Publication: 20120101-20171231 Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	1,244
S19	S7 AND S15 AND S18	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced	3,397

			Search Database - MEDLINE	
S18	S16 OR S17	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	1,592,434
S17	survival	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	977,660
S16	mortality	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	915,629
S15	S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	110,039
S14	haemostatic	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	5,281
S13	hemostatic	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	24,614
S12	bandage	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	18,833
S11	dressing	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	21,922
S10	gauze	Expanders - Apply related	Interface - EBSCOhost	3,843

		words Search modes - Find all my search terms	Research Databases Search Screen - Advanced Search Database - MEDLINE	
S9	pack	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	15,826
S8	packing	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	31,445
S7	S1 OR S2 OR S3 OR S4 OR S5 OR S6	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	882,170
S6	"junctional wound"	Expanders - Apply related words Search modes - SmartText Searching	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	425
S5	wound	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	325,142
S4	hemorrhage	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	244,351
S3	trauma	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	240,714
S2	bleeding	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	348,699

3/10/2017 Print Search History: EBSCOhost

S1	bleed	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE	7,400

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3/10/2017 Print Search History: EBSCOhost

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#	Query	Limiters/Expanders	Last Run Via	Results
S5	S1 AND S2 AND S3 AND S4	Limiters - Full Text; Published Date: 20120101-20170331; Peer Reviewed Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	6
S4	Survival OR Mortality	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	251,692
S3	Paramedic OR Prehospital Care OR ems OR emergency medical service OR prehospital OR pre-hospital OR ambulance OR emergency medical technian OR emt OR military OR military medicine OR combat medic OR combat medicine OR combat medic specialist	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	69,742
S2	Bleed OR Bleeding OR trauma OR hemorrhage OR wound OR junctional wound	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	322,643
S1	Packing OR Pack OR Gauze OR Dressing OR bandage OR haemostatic OR hemostatic	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	21,486

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