

# Paramedic - Evidence Based Medicine (P-EBP) Program

## Paramedic CAT (Critically Appraised Topic) Worksheet

**Title:** *Overview of Evidence for Crystalloid Fluid Administration in Major Trauma Patients*

**Report By:** *Angela Redman, Owen Thompson, Delan Vandenberg, Lola Vaslot, and Deanna Wolfe*

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### **Clinical Scenario:**

**Location:** 10 minutes to SMH and 20 minutes to RCH (Trauma receiving H )

Dispatched to a 45-year-old male, multiple stabbed wounds and combative. Police are on the scene. The patient is breathing and has an altered level of consciousness.

You are the first to arrive on the scene to find a 45-year-old male lying prone on the floor. Three police officers are holding him down, there is approx 2L of blood on the floor. The patient has suffered self-inflicting stab wounds to the left EJ, right carotid, bilateral brachial artery and left femoral artery. The patient has a tourniquet applied to the right arm by the police. You and your partner perform bleeding control by applying tourniquets and wound packing. The patient is a RASS +4 and is sedated by ACP on scene. Due to the EJ and carotid bleeds, the bleeding is not well controlled.

Pt has carried down 3 flights of stairs to the ambulance. Pt has two IO in humeral for access. Pt is now GCS 3, BP is 90/40 and HR 50. Pt was given a 500mL bolus of normal saline while en route from the scene to the hospital.

Do you continuously bolus this patient with normal saline? Will this improve survivability for 30 days?



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## PICO (Population – Intervention – Comparison – Outcome) Question:

**Patient Group:** In major trauma patients

**Intervention:** Does mass fluid infusions

**Comparison Group:** Compared to no fluid or fluid to maintain SBP of 90

**Outcome:** Improve survivability for 30 days

## Search Strategy:

((("emergency medical services"[MeSH Terms] OR ("emergency"[All Fields] AND "medical"[All Fields] AND "services"[All Fields]) OR "emergency medical services"[All Fields] OR ("emergency medical technicians"[MeSH Terms] OR ("emergency"[All Fields] AND "medical"[All Fields] AND "technicians"[All Fields]) OR "emergency medical technicians"[All Fields]) OR "paramedic\*"[All Fields] OR (("emerge"[All Fields] OR "emerged"[All Fields] OR "emergence"[All Fields] OR "emergences"[All Fields] OR "emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields] OR "emergent"[All Fields] OR "emergently"[All Fields] OR "emergents"[All Fields] OR "emerges"[All Fields] OR "emerging"[All Fields]) AND ("medic"[All Fields] OR "medical"[All Fields] OR "medicalization"[MeSH Terms] OR "medicalization"[All Fields] OR "medicalizations"[All Fields] OR "medicalize"[All Fields] OR "medicalized"[All Fields] OR "medicalizes"[All Fields] OR "medicalizing"[All Fields] OR "medically"[All Fields] OR "medicals"[All Fields] OR "medicated"[All Fields] OR "medication s"[All Fields] OR "medics"[All Fields] OR "pharmaceutical preparations"[MeSH Terms] OR ("pharmaceutical"[All Fields] AND "preparations"[All Fields]) OR "pharmaceutical preparations"[All Fields] OR "medication"[All Fields] OR "medications"[All Fields]) AND "technician\*"[All Fields]) OR ("prehospital"[All Fields] OR "prehospitally"[All Fields]) OR "pre-hospital"[All Fields] OR "out of hospital"[All Fields] OR "responder\*"[All Fields] OR ("ambulance s"[All Fields] OR "ambulances"[MeSH Terms] OR "ambulances"[All Fields] OR "ambulance"[All Fields])) AND ("major trauma"[All Fields] OR "trauma\*"[All Fields] OR ("traumatic"[All Fields] OR "traumatically"[All Fields] OR "traumatism"[All Fields] OR "traumatisms"[All Fields] OR "traumatization"[All Fields] OR "traumatizations"[All Fields] OR "traumatize"[All Fields] OR "traumatized"[All Fields] OR "traumatizes"[All Fields] OR "traumatizing"[All Fields])) AND (((((((("Controlled"[All Fields] AND ("resuscitability"[All Fields] OR "resuscitate"[All Fields] OR "resuscitated"[All Fields] OR "resuscitates"[All Fields] OR "resuscitating"[All Fields] OR "resuscitation"[MeSH Terms] OR "resuscitation"[All Fields] OR "resuscitations"[All Fields] OR "resuscitative"[All Fields] OR "resuscitator"[All Fields] OR "resuscitators"[All Fields])) AND "OR"[All Fields]) AND ("delay"[All Fields] OR "delayed"[All Fields] OR "delaying"[All Fields] OR "delays"[All Fields]) AND ("resuscitability"[All Fields] OR "resuscitate"[All Fields] OR "resuscitated"[All Fields] OR "resuscitates"[All Fields] OR "resuscitating"[All Fields] OR "resuscitation"[MeSH Terms] OR "resuscitation"[All Fields] OR "resuscitations"[All Fields] OR "resuscitative"[All Fields] OR "resuscitator"[All Fields] OR "resuscitators"[All Fields])))) AND "OR"[All Fields]) AND ("antihypertensive agents"[Pharmacological Action] OR "antihypertensive agents"[MeSH Terms] OR ("antihypertensive"[All Fields] AND "agents"[All Fields]) OR "antihypertensive agents"[All Fields] OR "hypotensives"[All Fields] OR "hypotension"[MeSH Terms] OR "hypotension"[All Fields]) OR



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## Search Outcome:

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## Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Sung et al., 2022	31,735 adult trauma patients from six countries in Asia. 6035 received fluid, which was propensity-matched.	Retrospective cohort study  LOE II	Change to in-hospital mortality  poor functional outcomes (MRS score)	Overall mortality between groups was 2.5% from the fluid group and 0.6% from the control, Odds ratio 4.26, 95% CI, p<0.001 15.2% had poor functional outcomes with fluid resuscitation, compared to	<u>Strengths:</u> Large data set in both the number of enrollments and geographic areas studied Looked patients initially with BP over and under



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			demographics of trauma patients more prone to negative effects of fluid resuscitation	7.1% without. Odds ratio 2.33, 95% CI, p<0.001 No significant difference between mortality between demographic groups, while poor functional outcome risk was increased in fluids being given to a male, major trauma patients involved in non-slip/fall events compared to all other groups	90 mmHg systolic and found no difference between mortality or disability between fluid and non-fluid groups Propensity matching to compensate for lack of randomization <u>Weaknesses:</u> no consideration for the reason of fluid administration or fluid type/volume given large geographic area covers multiple healthcare systems with differences between the ambulance and hospital treatment guidelines.
Bickell et al., 1994	598 adults (age >=16years with penetrating torso injuries with a prehospital systolic BP <= 90mmHg.  Study took place in city of Houston over a 37 month period  Patients were transported to the only trauma receiving hospital Ben Taub General	Prospective trial comparing two groups: #1: 309 Patients in immediate group received standard fluid resuscitation prior to hospital  #2: 289 Patients in delayed group: received no fluid until the operating room	To test the hypothesis that the survival of hypotensive patients with penetrating injuries to the torso would be improved if fluid was restricted until the time of operative intervention	Out of 598 patients, 70 patients died prior to the operating room  528 underwent operative intervention : 268 immediate (87%) 260 in delayed (90%) (p=0.028)  Fluid Volumes: 870ml of Ringers acetate in immediate group (prehospital) vs. 92ml in delayed group (p<0.001)	There was no evaluation of the efficacy of titrating blood pressure control  Sample size not large and was specific to one city. However, the groups were well matched  Once patients in surgery there was no limit on fluids given  Each group was

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		LOE :		<p>The mean rate of fluid admin to maintain a systolic bp of 100mmhg was higher in immediate group vs delayed group (117+126ml/min vs. 91+80ml/min, P=0.008</p> <p>Overall rate of survival was higher in delayed group vs. immediate (70% vs. 62%, P=0.04, 95%confidence interval.</p>	<p>treated with a standard paramedical protocol. Benefits of one city study</p>
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**Comments:** Further randomized trials with larger sample sizes are required to conclude that permissive hypotension is beneficial definitively.

**Consider:** *Patients who have sustained traumatic injuries need surgery. Using fluids to sustain a systolic blood pressure of 100mmHg has proven to be beneficial in stabilizing patients until surgery can be performed.*

**Clinical Bottom Line:** Aggressive Fluid resuscitation has previously been the mainstay of prehospital care and has been shown to have negative effects; of increasing blood loss and requiring blood product utilization. Permissive hypotension is achieved by restricting the amount of intravenous fluids given in the prehospital environment. The studies provided found increased functional outcomes and enhanced survivability in fluid-restricted groups. Until further higher-quality studies provide data showing the deleterious effects of permissive hypotension, this fluid resuscitation strategy is recommended.



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## References:

Bickell WH, Wall MJ, Jr, Pepe PE, Martin RR, Ginger VF, Allen MK, et al. Immediate versus delayed fluid resuscitation for hypotensive patients with penetrating torso injuries. *N Engl J Med.* 1994;**331**(17):1105–9. doi: 10.1056/NEJM199410273311701.

Sung, C. W., Sun, J. T., Huang, E. P., Shin, S. D., Song, K. J., Hong, K. J., Jamaluddin, S. F., Son, D. N., Hsieh, M. J., Ma, M. H., Hsu, L. M., Chiang, W. C., & PATOS Clinical Research Network (2022). Association between prehospital fluid resuscitation with crystalloids and outcome of trauma patients in Asia by a cross-national multicenter cohort study. *Scientific reports*, 12(1), 4100. <https://doi.org/10.1038/s41598-022-06933-x>

