

Paramedic - Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: *Pre-hospital administration of antibiotics for compound fractures*

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Clinical Scenario: *You are working as a Paramedic in rural British Columbia. You are called for a quad accident 23km up a logging road. The hospital is minimum an hour and a half drive from scene. On arrival you find a 37-year-old male patient with an isolated compound lower leg fracture. On inspection, the bleeding is slow and controlled easily with pressure and bandages, but the wound and exposed bone are grossly contaminated. You are able to initiate an IV and along with analgesia and anti-emetics, you administer a broad-spectrum antibiotic infusion en-route to the hospital as prophylaxis against infection development. On arrival at the ED, the infusion is almost complete.*

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

In patients who have sustained isolated compound extremity fractures, does early or pre-hospital administration of broad-spectrum antibiotics versus delayed administration of antibiotics in the emergency department, reduces the instances of infection development?

Search Strategy:

(((((compound fracture OR open fracture) AND (extremity OR long bone OR arm or leg*)) AND (antibiotics OR "broad-spectrum antibiotics" OR antibiotic* or prophylaxis)) AND (early administration OR early OR in the field OR without delay)) AND (((compound fracture OR open fracture) AND (antibiotics OR "broad-spectrum antibiotics" OR antibiotic* or prophylaxis)) AND (infection* OR sepsis OR SIRS criteria))) AND (infection* OR sepsis OR SIRS criteria)*

Search Outcome:

82 search results



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Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Leonidou, A. et al., 2014	161 patients (75 females, 86 males) with open long bone fractures	6-year prospective cohort study – single centre LOE II	Development of superficial infection Development of deep infection No development of infection	IV antibiotics administered within 3 hours in 80% of cases and greater than 3 hours in 20% of cases Infections rates were 14 and 12.5%, respectively (P=1.0) There was no statistically significant difference in the subgroups of deep (P=0.62) and superficial (P=0.73) infection	+ multiple interventions along with antibiotics were considered in this study + results were compared against their own previously employed protocol of management - exact time of abx no reported - single centre study - specific type of fracture not specified
Lack, W.D. et al., 2015	137 patients with type III open tibia fractures	Retrospective prognostic study – single centre LOE II	Development of deep infection within 90 days	Greater than 66 minutes to antibiotics (P=0.01) was a univariate predictor of infection Antibiotics administered beyond 66 minutes (odds ratio, 3.78; 95% CI, 1.16-12.31; P=0.03)	+ large sample size + other comorbid factors considered in study population + results were statistically significant



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				independently predicted infection	- only one type of open fracture was considered in the study - no obvious control group included
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Comments: There was a significant amount of PICO drift in this CAT. There is little to no studies out there that specifically look at the administration of pre-hospital antibiotics. Both of the studies that were included in this CAT looked at timing of administration for patients already arrived at the emergency department. This information can, however, be extrapolated and used for reference in the development of pre-hospital treatment guidelines.

Consider: There is still little available evidence regarding the administration of pre-hospital antibiotics in open fractures. Both of these studies included other treatment modalities in the care of patients with open fractures including level of surgeon, wound closing, debridement and surgery. More specific evidence pertaining to the specific and singular intervention of antibiotics would carry more weight for this intervention.

Clinical Bottom Line: It would appear that the immediate administration of antibiotics (within 1 hour of injury) significantly decreased the development of infection for patients who have sustained compound fractures. It seems however that the instances of infection plateau after 1 hour, as no statistically significant increase in infection rates was noted at less than 3 hours and greater than 3 hours.



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References:

Lack, W.D., Karunakar, M.A., Angerame, M.R., Seymour, R.B., Sims, S., Kellan, J.F., & Bosse, M.J. (2015). Type III Open Tibia Fractures: Immediate Antibiotic Prophylaxis Minimizes Infection. *Journal of Orthopedic Trauma*, 29(1). Retrieved from <https://pubmed.ncbi.nlm.nih.gov/>

Leonidou, A., Kiraly, Z., Galily, H., Apperley, S., Vanstone, S., & Woods, D.A. (2014). The effect of the timing of antibiotics and surgical treatment on infection rates in open long-bone fractures: a 6-year prospective study after policy change. *Strategies in Trauma and Limb Reconstruction*, 9(3) 167-171. DOI 10.1007/s11751-014-0208-9

