

Paramedic - Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: Is Pentrox a viable alternative to more widely used prehospital analgesics for treating patients with moderate to severe pain caused by trauma?

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Clinical Scenario: A Primary Care Paramedic crew arrives on scene for a 54 year old male that fell from the top of a ladder while climbing down from his roof. The fall was approximately 5 feet to the ground and he landed on his left side. The paramedics complete their assessment, noting the patients vitals are all normal aside from a slight elevation in heart rate and blood pressure, pain rating currently 8/10, no loss of consciousness. No spinal, neck, or head injury noted. Patient does have an obvious deformity of the left shoulder/humerus. They are approximately 35 minutes from the nearest Emergency Department. There is no ALS intercept available at this time, however, they just recently had Pentrox added to their scope of practice by their medical director. Is Pentrox a more appropriate analgesic for these Paramedics to administer as opposed to the Acetaminophen and Entonox that they also have available?

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

Population - Patients experiencing moderate to severe acute pain caused by trauma.

Intervention - Patient administered Pentrox via inhaler.

Comparison - Other prehospital analgesics including IV opioids/opiates, oral analgesics, and inhaled Nitrous Oxide(Entonox).

Outcome - Effectiveness of Pentrox compared to more commonly used analgesics in adults with moderate to severe pain caused by trauma.



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Search Strategy:

#10 - Search: penthrox[tiab] OR methoxyflurane[tiab] OR "green whistle"[tiab]

1,45116:16:34

#9 - Search: pain[tiab] OR discomfort [tiab] OR "pain control"[tiab] OR injury[tiab] OR analgesia OR agony

1,641,57916:13:59

#1 - Search: "Emergency Medical Services"[mh] OR "Emergency Medical Technicians"[mh] OR paramedic*[tiab] OR "emergency medical technician*" [tiab] OR prehospital[tiab] OR pre-hospital[tiab] OR "out of hospital"[tiab] OR first responder*[tiab] OR emergency responder*[tiab] OR ambulance[tiab])

"Emergency Medical Services"[MeSH Terms] OR "Emergency Medical Technicians"[MeSH Terms] OR "paramedic*" [Title/Abstract] OR "emergency medical technician*" [Title/Abstract] OR "prehospital" [Title/Abstract] OR "pre-hospital" [Title/Abstract] OR "out of hospital" [Title/Abstract] OR "first responder*" [Title/Abstract] OR "emergency responder*" [Title/Abstract] OR "ambulance" [Title/Abstract]



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Warnings

"Emergency Medical Services"[mh] OR "Emergency Medical Technicians"[mh] OR paramedic*[tiab] OR "emergency medical technician*" [tiab] OR prehospital[tiab] OR pre-hospital[tiab] OR "out of hospital"[tiab] OR first responder*[tiab] OR emergency responder*[tiab] OR ambulance[tiab])

Search Outcome: 201,583 hits.

Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Smith Murray D. 2022	Adults with moderate to severe pain treated prehospitally.	Non randomized control trial. Level 2 Green	Effectiveness of pentrox compared to more common analgesics in adults with moderate to severe pain caused by trauma.	Found that Pentrox was effective at reducing a patient's level of pain to =<4 following first administration as compared to other prehospital analgesics used in the study (P=0.001).	Stengths: Clear evidence of the effectiveness of Pentrox. Weaknesses: Study was not randomized nor blind.
Trimmel Helmut 2022	109 Adult patients suffering minor trauma with a pain score of =>4.	Prospective non randomized control trial. Level 2 Green	Effectiveness of Pentrox for adult patients experiencing pain secondary to trauma, with a pain	Found that in 109 patients Pentrox sufficient analgesia was achieved(reduction of=>3 on pain scale) in 67 patients (61%).	Strengths: -Clear evidence of effectiveness of Pentrox. Weaknesses:



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			score of =>4 (no comparison).	Effectiveness was progressively better with increasing age.	-Small sample size (109 patients) -Study cut short due to pandemic.
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Comments: Researching this topic revealed thousands of articles regarding Pentrox usage in the emergency paramedical setting, however, most were found to be associated with in-hospital studies and clinical trials, thus irrelevant to our question of its use in the prehospital setting.

Consider: Although Pentrox is shown to be effective in these studies, more data needs to be collected through studies performed on larger populations and more random controlled trials to provide a more conclusive answer to our question.

Clinical Bottom Line: In the small sample sizes of studies researched, Pentrox does seem to be an effective prehospital analgesic when compared to other more common, frequently used forms of analgesia. It has few side effects and is effective at reducing the level of traumatic pain quickly, for longer periods of time and is particularly effective in older patients($p=0.099$).

References:

PMID 35033003 Murray D. Smith, Elise Rowan, Robert Spaight, and Aloysius N. Siriwardena
- Smith et al. BMC Emergency Medicine (2022) 22:122 <https://doi.org/10.1186/s12873-022-00664-y>

PMID 35799131 Helmut Trimmel, Alexander Egger, Reinhard Doppler, Mathias Pimiskern and Wolfgang G. Voelckel
- Trimmel et al. BMC Emergency Medicine (2022) 22:8 <https://doi.org/10.1186/s12873-021-00565-6>

