

Evidenced-Based EMS Protocol Review: Peripheral Intravenous Access in the Pre-Hospital Setting.

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Title of Article	Type of study	Results	Conclusions/Comments
Out-of-Hospital Intravenous Access: Unnecessary Procedures and Excessive Cost. 1988 (1)	Retrospective consecutive case series	84% received an IV 7% of these received fluid bolus 37% received IV medications 56% overtreatment 7% undertreatment.	-Cost was the study's major outcome -\$560,000 extra cost to LAC EMS -Money could be saved with just saline lock or less IVs overall
Unnecessary Intravenous Access in the Emergency Setting. 1988 (3)	Retrospective chart review	-30% IVs in the field 38% of these IVs used -32% initiated in the ED 46% of these IVs used -Time to treatment was not different based on whether IV placed by EMS or not.	A significant percentage of IVs initiated in the emergency setting are used inappropriately. IV access without treatment in the field did not improve elapsed time to treatment once patients arrived to the ED. Worried about cost.

Indication and Usage of PIV in Adults During ED Care 2011 (2)	Cross-sectional study. Questionnaire given to EMS after transport	-39% of patients received IV - 70% of time b/c EMS planned to use it for therapeutics. - 22% of time IV never used	Most common reason for IV in the field was intent to use the catheter for medications or fluids in the field.
When are Pre-hospital IVs Used for Treatment 2009 (4)	Logistic regression used on 34,585 pts	-60% of pts got IVs -17% were utilized in the field. - Lowest utilization rate with post-seizure, abdominal pain, syncope, and weakness.	Study determined which complaints were associated with high utilization rates and which ones were with low utilization rates. However this was only EMS utilization rates not hospital.
Appropriateness of IV Cannulation by Paramedics 2000 (8)	Panel of emergency physicians judged each case for appropriateness	-81% of IVs placed in field deemed appropriate -Variation between how many times paramedics place IVs - Disagreement between reviewers	Overall appropriateness of IV placement judged to be high, but paramedics who placed more IVs frequently had the highest number of “inappropriate” IVs.
Complications from IV Therapy: Results From Field-Started and ED-Started IVs Compared 1988 (5)	Comparative 2 month study EMS vs. ED IVs	-Pre-hospital group RR 4.65 of phlebitis vs. ED placed lines -Unexplained fever was 5.58 times that of hospital placed lines.	There appear to be more complications from pre-hospital placed lines than hospital placed lines. Cause and effect not established.

Paramedic Decisions with Placement of Out-of-Hospital Intravenous Lines 1999 (9)	Prospectively study of IV placement not used by EMS or ED	-57% of pts received IV -29% had unused IV -2.4% that did not have IV placed by EMS received IV in ED	Almost everyone who needed an IV received one by EMS. Also the presence of a paramedic student statistically increased the chance of there being an unused IV.
Second IV Line for Trauma Patients 2011 (6)	Retrospective chart review	-Pts who received two IV lines received 350 ml more fluid. -No change in HR, O2sat, GCS, SBP, or mortality	Pt did receive more fluid with 2 IVs however there was no physiologic improvement. Authors' conclusion is that 2 IVs should not be placed in dogmatic fashion in every trauma.
IV Access During Out-of-Hospital Emergency Care of Non-injured Patients 2012 (7)	Population based outcome study	-50% EMS IV -Overall odds of hosp. mortality OR 0.68 (0.56 to 0.81) -high acuity OR 0.38 (0.17 to 0.9) -low acuity OR 1.38 (0.28 to 7)	There was an overall mortality benefit seen with IV access verse no IV on similar patient. Subset analysis only showed benefit in patients with high acuity. There was no cause and effect that could be est.

Pre-hospital EMS placement of peripheral intravenous access (IV) is a common procedure performed multiple times a day in emergency medical systems across the country. These IVs allow for many lifesaving measures to be performed: including the administration of fluid boluses, medications, and even Advanced Cardiac Life Support medications. In critical situations, usually an IV is attempted and if access is emergently needed then an intraosseous (IO) line is placed to deliver life saving medications.

In the previous mentioned critical situations it is obvious and imperative that quick IV or IO access be obtained. The purpose of this review is to discuss and review the literature on when IV access should be placed on routine EMS calls to the noncritical patient. Multiple studies have been conducted on the topic and the previous chart list several studies on the topic. There are no randomized control trials on the topic and it is difficult to study since the majority of the IVs are placed at paramedic/emergency medical technician (EMT) discretion. After reviewing the literature it appears that for the majority of the time, patients that need IV access in the field get

IV access, but there is a more significant number of patient that get IVs in the field and these IVs are non-utilized.

In the author's opinion there are two ways you can view the many non-utilized IV lines. The first view is that you should just leave IV access placement up to the paramedic/EMT and if they are cautious and want an IV in most of their patients in case anything happens it is their choice. In addition, the most common reason for IV placement in the field was intent to use the catheter to deliver fluids or medications. (2) This view that we should leave the decision to paramedic/EMT discretion definitely has several advantages including giving the paramedic/EMT quicker administrations of medications if the scenario changes and convenience for the emergency department if IV access is already obtained.

On the other hand, one could argue that the amount of over placed IVs in the field is unnecessary and that it takes up the time and resources of the ambulance. Los Angeles County EMS alone estimates that they spend over 500,000 dollars a year on unnecessary IV placement. (1) There also appears to be more complications of phlebitis and fever in patients who have IVs placed in the pre-hospital setting instead of IVs placed in the hospital. (5) It has even been shown that having a paramedic student on board increases IV placement rate. (9)

There are pros and cons to both under and over placement of intravenous lines and in this literature review no clear guidelines or solid evidence is available stating which patients should definitely have IV access established pre-hospital. There is data that trends chief complaint with how often IVs are used. The highest utilization rates of IVs were associated with hypotension, bradycardia, slow respirations, and abnormal skin color. The lowest utilization rate was associated with patients presenting post-seizure, with abdominal pain, syncope, or weakness. (4) This study only addressed whether the IV was utilized by EMS and not by the ED and this data is not randomized or prospective and it would be unwise to make practice guidelines stating that certain chief complaints should not get IVs because there is a low probability of the line being used. Every patient is different and every clinical scenario is also different thus making guidelines about IV placement in the field even more ambiguous.

In conclusion, the author's opinion after researching the literature on the topic is that there is not strong evidence to provide guidelines for whether or not IV access should be

established in the field. Since there is no evidence to support criteria, then the individual paramedic/EMT should use their best judgment when deciding whether or not IV access is needed as they are the only ones seeing the patient undifferentiated in real time. In addition, the patient's course is dynamic and not static and the patient's clinical status can change rapidly at anytime. With that being said, the paramedic/EMT should also keep in mind that there is a fairly high rate of non-utilization of IVs and they are not completely without complication and cost. Better studies are needed to further illicit who needs IV access and who does not. This prospective randomized trial would be difficult to do because of many reasons including: cost, consent, undifferentiated patients, time, and many other variables. So at this point in time, it is probably best to continue using paramedic discretion on whether or not intravenous access is needed.

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