

## Multivariate Analysis of Successful Intravenous Line Placement in the Prehospital Setting

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*Prehospital Emergency Care*, January-March 2013

### 1. Why is this topic important?

In EMS care, intravenous access (IV) is vital in delivery of time-sensitive or life-saving medications. It is important to know what factors are determinants of success or failure in order to improve paramedic IV skills. This study examined the probability of whether or not paramedic success rates were related to previous experience, and therefore, more attempts in the previous year would result in more success in the following year.

### 2. What does this study attempt to show?

This study hypothesized that the more experience, the higher chance of success for IV placement. In addition, the study authors also examined whether the variables of IV catheter size from 22 to 14 gauge), location of the IV site, patient age, systolic blood pressure, and chief complaint of trauma, patient history of drug abuse or renal disease would be associated with success or failure. Included paramedics were also matched with their specific IV success rate for the prior year (2008). Part-time paramedics were excluded from the study. Success was defined by documentation in the patient care report.

### 3. What are key findings?

Seventy-one paramedics performed 10,514 IV attempts in 2008, for which 8,058 were successful (76.6%). A total of 602 patient encounters met the study inclusion criteria and were reviewed retrospectively for calendar year 2009 from eleven urban and suburban Pennsylvania agencies. The following variables were associated with successful IV placement: patient age, trauma as the chief complaint, IV gauge, IV location, and number of successful attempts in the previous year. These were found to be statistically significant at the 0.10 level. However, only IV gauge had the greatest odds of successful IV placement when compared against all other variables in the analysis,  $p < 0.001$ . Findings showed that the larger the IV gauge, the greater the odds for success. The authors explained that this result may be due to the inclination of paramedics to use a larger IV gauge for patients for whom they believe the probability of success is higher. The take-away from this study according to the authors, is that EMS IV success will not be improved by requiring certain numbers of IV placements per year, but rather by “education in procedural technique.”

### 4. How is patient care impacted?

It is intuitive that improving IV access skill through experience may help improve patient care. This study suggests that the biggest variable may be procedural technique and not experience. Patient care may be impacted very little by these results as paramedics within this study criteria are doing well with IV access. Patient care, however, might be affected by different research which uses a pre-post study design measuring success before education in procedural technique, and success after education in procedural technique. Although, this would require a different study design, adjustments for differences between before and after samples, and a larger sample size, presumably it can be shown that IV success rates would become even higher with more education.

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