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County of Ventura
Emergency Medical Services
2323 Knoll Drive, Suite 100
Ventura, CA 93003

May 31, 2000

Richard E. Watson, Interim Director
State of California
Emergency Medical Services Authority
1930 9th Street, Suite 100
Sacramento, CA 95814-7043

Dear Mr. Watson:

Please accept this final report for the Ventura County Trial Study on EMT-1 insertion of Intravenous Catheters. We believe that this study demonstrates that EMTs can, under the supervision of a paramedic, safely and effectively insert peripheral intravenous catheters. We look forward to the review of this report by the EMDAC Scope of Practice Committee and the EMS Commission.

Please contact me at your convenience for any questions or comments.

Sincerely;



Angelo Salvucci, MD
Medical Director

cc: Stephen E. Frank, EMT/P
Meredith Mundell, RN, BSN

Trial Study Final Report

Emergency Medical Technicians Inserting Intravenous Catheters

Ventura County, California

March 2000

I. Background

In an effort to improve the efficiency of the pre-hospital care team, Ojai Ambulance, Ventura County Medical Center and Ventura County Emergency Medical Services began a trial study allowing specially trained Emergency Medical Technicians (EMTs) to insert peripheral intravenous (IV) catheters while under the direction of their Emergency Medical Technician – Paramedic (paramedic) partner. This program received approval from the State EMS Authority and has received Institutional Review Board (IRB) approval from Ventura County Medical Center.

This trial program is different from other EMT intravenous infusion programs in that it utilizes the knowledge base and assessment skills of the paramedic. This allows the EMT to proceed with the mechanical skill of establishing the intravenous line after receiving direction from the paramedic.

II. Demographics

The Ojai Ambulance service area (Ventura County Service Area 1) is primarily a rural community encompassing 154 square miles. The total population serviced is 33,000 and breaks down as follows:

Under 5 yrs. -	7.2%	5 - 14 yrs.	16.2%
15 - 17	3.4	18 - 20	3.0
21 - 24	3.0	25 - 34	12.7
35 - 44	17.3	45 - 54	13.3
55 - 64	8.2	65 - 74	7.1
75 - 84	6.3	85+	2.4

III. Study Review

Training of the first group of EMTs began in January 1997 with the first field IV lines established in March 1997. This core group consisted of two EMTs that had previously undergone special training to allow them to work with a paramedic on an Advanced Life Support (ALS) unit. These EMTs had six (6) and two (2) years of experience respectively. No issues or concerns were identified during the training program. All training was performed in accordance to the training outline approved for the trial program.

Though normal attrition a second group of three (3) EMTs received training in June of 1998. An additional two (2) EMTs were trained in January 1999.

IV. Adverse Reactions or Complications

Infection control staff at the primary receiving hospital (Ojai Valley Community Hospital) were advised of the study and asked to notify Ojai Ambulance of any adverse reactions or complications to patients enrolled in the study. In addition nursing staff at all receiving facilities inspected and "signed off" on all intravenous lines established by the EMTs once they arrived in the emergency department. To date, no adverse reactions or complications have been reported.

V. Results

Statistical data pertaining to the study is attached.

Table 1 presents the overall and semi-annual results. After the first year, success rates consistently exceeded 70%.

Table 2 describes the performance on individual EMTs. Success rates vary from a low of 66% to a high of 83%.

Table 3 presents success rates by groups of ten IV insertions. There is a weak trend toward improvement with increased numbers of insertions. The majority of the individual EMTs improved their success rate from the beginning of the study to its completion.

Table 4 compares the study EMT-Ds with paramedics. After correcting for the differing protocols (paramedics are allowed 3 IV insertion attempts while the study EMTs were allowed 2) and operational constraints (paramedics would occasionally) only allow the EMT one attempt), the success rates were similar.

VI. Conclusions

The rationale for this study was to determine if the efficiency of the prehospital team can be improved by adding this skill to the EMT scope of practice. Unfortunately many of these efficiencies cannot be identified in quantifiable terms. However, after polling paramedics involved in the study, it is their perception that the ability for them to utilize the EMT in this manner is a benefit not only to them, but to the patient as well.

This study has demonstrated that properly trained Emergency Medical Technicians can effectively insert IV catheters with a similar success rate as paramedics. The EMTs have consistently achieved a seventy-two percent (71%) success rate (percentage of patients in whom an IV is inserted). After adjusting for those patients with only one

unsuccessful insertion attempt by the EMT, an eighty-nine percent (88%) success rate was achieved. This compares favorably to the 85% adjusted success rate achieved by paramedics. The data from this study supports the hypothesis that, under the direction and supervision of a paramedic, properly trained EMTs can safely and effectively insert intravenous catheters.

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Ojai Ambulance, Inc.

Meredith Mundell, RN, BSN
Director, Paramedic Studies
Ventura College, School of Prehospital
And Emergency Medicine

Previous
Prehospital Care Coordinator
Ventura County Medical Center

TABLE 1: OVERALL RESULTS

<i>Overall Program Statistics 3-01-97 to 2-1-2000</i>	
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Total Patients in Study: 352	Total IVs Established: 250
Total Attempts Made: 431	Average Attempts Per Pt.: 1.2
Success Rate (Per Attempt): 57%	Success Rate (Per Patient): 71%

<i>March 97 to July 97</i>	
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Total Patients: 50	Total Lines Established: 35
Total Attempts Made: 64	Success Percentage: 70%

<i>July 97 to December 97</i>	
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Total Patients: 50	Total Lines Established: 30
Total Attempts Made: 62	Success Percentage: 60%

<i>December 97 to August 98</i>	
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Total Patients: 50	Total Lines Established: 38
Total Attempts Made: 57	Success Percentage: 76%

<i>August 98 to January 99</i>	
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Total Patients: 50	Total Lines Established: 37
Total Attempts Made: 65	Success Percentage: 74%

January 99 to June 99

Total Patients:	50	Total Lines Established:	36
Total Attempts Made:	56	Success Percentage:	72%

June 99 to August 99

Total Patients:	50	Total Lines Established:	35
Total Attempts Made:	58	Success Percentage:	70%

Program Statistics August 99 to January 2000

Total Patients:	49	Total Lines Established:	39
Total Attempts Made:	58	Success Percentage:	79%

TABLE 2: PERFORMANCE OF INDIVIDUAL EMTs

EMT-D 171

Total Patients:	62	Total Lines Established:	41
Total Attempts Made:	74	Success Percentage:	66%
Average Attempts Per Pt.:	1.1		
Volume Replacement:	5	Medications:	24 Precautionary: 32

EMT-D 179

Total Patients:	78	Total Lines Established:	64
Total Attempts Made:	84	Success Percentage:	82%
Average Attempts Per Pt.:	1.07		
Volume Replacement:	5	Medications:	28 Precautionary: 45

EMT-D 185

Total Patients:	84	Total Lines Established:	66
Total Attempts Made:	94	Success Percentage:	78%
Average Attempts Per Pt.:	1.1		
Volume Replacement:	5	Medications:	21 Precautionary: 58

EMT-D 191

Total Patients:	64	Total Lines Established:	46
Total Attempts Made:	81	Success Percentage:	71%
Average Attempts Per Pt.:	1.2		
Volume Replacement:	6	Medications:	20 Precautionary: 38

EMT-D 192

Total Patients:	14	Total Lines Established:	11
Total Attempts Made:	15	Success Percentage:	78%
Average Attempts Per Pt.:	1.07		
Volume Replacement:	3	Medications:	1 Precautionary: 10

EMT-D 193

Total Patients:	6	Total Lines Established:	5
Total Attempts Made:	8	Success Percentage:	83%
Average Attempts Per Pt.:	1.3		
Volume Replacement:	0	Medications:	1 Precautionary: 5

EMT-D 194

Total Patients: 39

Total Attempts Made: 48

Average Attempts Per Pt.: 1.2

Volume Replacement: 0

Total Lines Established: 27

Success Percentage: 69%

Medications: 5 Precautionary: 34

TABLE 3:

**SUCCESS RATES CATEGORIZED BY
GROUPS OF 10 IV INSERTIONS**

<u>Group</u>	EMT:	<u>171</u>	<u>179</u>	<u>185</u>	<u>191</u>	<u>193</u>	<u>194</u>
1-10		80%	60%	100%	70%	80%	80%
11-20		60%	80%	70%	50%		50%
21-30		50%	70%	100%	50%		60%
31-40		60%	40%	60%	70%		80%
41-50		70%	70%	70%	90%		
51-60		70%	70%	80%	90%		
61-70		70%		70%	100%		
71-78		100%		80%			
81-85				90%			

TABLE 4: COMPARISON OF EMT-Ds AND PARAMEDICS

<u>Unadjusted Results</u>		Total Patients	IV Attempts	Successful Starts	Success Rate (per IV attempt) (per patient)
EMTs		352	440	250	57% 71%
Paramedics		597	720	512	71% 86%
Total		949	1160	762	

Since the EMTs were only allowed two attempts at IV cannulation, the following changes were made to the number of patients included in the study to more accurately compare success rates:

EMTs In 3 patient contacts where a third IV attempt was made, that attempt was deleted (3 attempts, 1 successful) 66 patient contacts were deleted as the EMT was allowed only one IV attempt (66 attempts, 0 successful)

Paramedics In 32 patient contacts where more than two IV attempts were made, the third attempt was deleted and the IV start was considered unsuccessful (32 attempts, 4 successful).

<u>Adjusted Results</u>		Total Patients	IV Attempts	Successful Starts	Success Rate (per IV attempt) (per patient)
EMTs		283	362	249	69% 88%
Paramedics		597	688	508	74% 85%