Monitoring Field Performance of Emergency Medical Service in the Tainan Region

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At present, approximately eighty percent of firefighters are at EMT-I level, and of these 50% are at EMT-II level in Taiwan. However, no formal assessment program has measured the real impact of EMT training on practice behavior. The purpose of this study is to investigate the discrepancy in field performance reports between the EMTs and triage nurses in the receiving hospitals. From December 22, 1997 to January 21, 1998, a total of 617 run reports and special review sheets were collected from 8 receiving hospitals. Ninety percent of the fractional response times in the city and county were within 6 and 10 minutes respectively. Average on-scene time and average total transport time in the city was 5.5, and 15 minutes, and in the county 5 and 25 minutes. Motor vehicle accidents comprised 64% of run requests. Procedures such as applying a neck collar, nasal cannula, splinting of fractured limbs and CPR attempts were consistent with emergency room (ER) nurse's observation. Categories such as controlling bleeding and bandaging, keeping an open airway, mask ventilation, comforting patients and no specific intervention required were inconsistently reported by staffs of the receiving ERs. We concluded that incomplete recording of pre-hospital run reports is a major barrier to depicting the status of EMS care quality in Taiwan and it must be rectified quickly. Field performance assessments reviewed by ER triage nurses might serve to monitor as well as evaluate the care given by EMTs. However, validation of the present review process by a designated field inspector is mandatory to carry out continuous quality improvement for future EMS in Taiwan.

***Key words:* emergency medical service, quality assurance, fields performance**

Introduction

Quality assurance in Emergency Medical Service (EMS) is an essential component in promoting the quality of pre-hospital care[1-3]. The concept of EMS was foreign to many acute care health providers when the Department of Health in Taiwan first implemented EMS in 1989. Prior to 1989, EMS care was provided by the Fire Department and served mainly to transport the patient to the hospital with minimal life-saving skills. After 1989, firefighters were trained to provide Emergency Medical Technician One (EMT-I) level care. The EMT-I trainees underwent approximately 64 hours of training and became competent in basic life support (BLS). EMT-II firefighters, after approximately 264 hours of training, were able to provide BLS and start intravenous lines and maintain an airway by endotracheal intubation. Skills, rules and the knowledge-base of life support techniques were taught by emergency department physicians and nurses[4-7]. At present, approximately eighty percent of firefighters in Taiwan

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are at the EMT-I level, and 50% of these are the EMT-II level[8]. However, no formal assessment program has measured the real impact of EMT training on practice behavior. The purpose of this study was to investigate the discrepancy in field performance reports between the EMTs and triage nurses in the receiving hospitals. The run report is an official document filled out by an in-charge EMT on each mission. It includes time of initiation, on scene time as well as total transport time, the reason for the run request, and the skills and procedures applied by the EMT during the pre-hospital stage[9-10]. Comparisons among run reports serve to monitor how basic life support skills were applied to patients in terms of standards of pre-hospital care. Improvement strategies involving education, discipline, or a change in standards can then be developed to upgrade, as well as to substantiate, the quality of EMS care in Taiwan.

Methods

This is a prospective study conducted in southern Taiwan from December 22,1997 to January 21, 1998. Tainan (both city and county) has population of 1.8 millions with 500 firefighters. All of the ER triage nurses in eight receiving hospitals were recruited and instructed to record their observations on special review forms after the EMT brought patients into the ER. Run reports were filled out by the EMT-in-charge. The receiving triage nurse completed a field assessment review, which was different from the run report, and was designed by the internal quality improvement committee. EMTs were masked to the monitoring by triage nurses during the study period. The two separate patient assessment forms were then collected. Categories in the run reports including response time, scene time, total transport time, reasons for the request, and reported intervention procedures applied by the EMT were reviewed. The category of comforting the patient was checked by asking the patient or people accompanying the patient whether any verbal or behavioral comforts were given during the ride. The discrepancy between EMT reported intervention procedures and the verified results by the receiving triage nurse were compared using the Fisher exact test. A P-value less than .05 was considered to be statis-

Table 1. Fractional response time for Tainan city and county

Time (min)	City Runs	Accumulated percentage	County Runs	Accumulated percentage
1	12	3.0	7	3.4
2	66	19.7	31	18.7
3	114	48.5	42	39.4
4	88	70.7	26	52.2
5	66	87.4	30	67.0
6	19	92.2	17	75.4
7	12	95.2	11	80.8
8	8	97.2	10	85.7
9	1	97.5	5	88.2
10	4	98.5	9	92.6
>11	6	100	15	100

tically significant.

Results

From December 22, 1997 to January 21, 1998, a total of 617 run reports and special review sheets were collected from 8 receiving hospitals. Ninety percent of the fractional response times in city and county were within 6 and 10 minutes respectively (Table 1). Average on-scene time and average total transport time in the city was 5.5 and 15 minutes, and in the county 5 and 25 minutes (Table 2). Motor vehicle accidents comprised 64% of run requests (Table 3). The following discrepancies between EMT reported intervention procedures and receiving triage nurse verified results were considered to be statistically mismatched: (1) Controlling bleeding & bandaging; (2) keeping an open airway; (3) mask ventilation; (4) comforting patients and (5) No specific intervention (Table 4).

Table 2. Average on-scence time and Total Transport time

	City	County
Time on Scene	5.0(min)	5.5(min)
Total transport time	14.9(min)	25.1(min)

Table 3. Run requests recorded by EMT and triage nurses

	EMT	Triage nurse
MVA	396	394
Penetrating injuries	4	4
Other injuries	79	86
Intoxication	6	2
Burn injuries	1	1
Suicide	10	13

MVA: motor vehicle accidents

Discussion

EMS development takes much time and effort. When we first introduced EMS concepts to fire rescue professionals, there was great resistance due to lack of awareness. Training and education programs started by dedicated emergency physicians and ER nurses have contributed to the knowledge and skills gained by EMTs. However, we were unclear how life saving knowledge turned into day-to-day practice by the EMTs. Follow up monitoring was needed to examine the educational impact on real behavior change. We then designed a method of monitoring field performance by using first contact medical personnel (ER triage nurse) when the patient arrived at the ER. We assumed that very limited change would occur when we estimated EMT field performance in the ER. We revealed that procedures like applying a neck collar, and nasal cannula, splinting of fractured limbs and CPR attempts were consistent with ER nurses' observations (Table 4)[11-12]. However, reports by EMTs and ER staffs were inconsistent in the categories of controlling bleeding and bandaging, keep an open airway, mask ventilation, comforting patients and no specific intervention required. Possible explanations are as follows: (1) Sometimes, controlling bleeding required only a small amount of gauze. If no tape is applied, the gauze might fall off during the move, whereas a bandaging maneuver is identified with more ease. However, they were included in a single category (2) Keeping an airway open by the chin lift maneuver is not detectable in the present study design. (3) Mask application during transport is used inside the ambulance. EMTs often remove it when the patient leaves the ambulance so the nurse was no opportunity to see it. (4) Defining the action "comforting patients" is subject to personal variation. Concise protocols and care standards therefore need to be instituted in order to serve monitoring purposes. (5) A total of 255 nurses stated that they actually saw no specific intervention applied by the EMT, but only 31 EMTs admitted that they merely transported the patient to

Table 4. Discrepancy in field performance reports between EMTs and triage nurses

Categories	EMT	Nurse	Both	p-value
Controlling bleeding & bandaging	129	70	59	0.001 *
Neck collar	14	9	8	0.579
Splinting	27	22	17	0.704
Keep an open airway	63	23	20	0.001
Suction	1	1	1	
CPR	12	7	6	0.545
Nasal cannula	29	20	13	0.357
Mask ventilation	34	14	13	0.036 *
Comforting patients	304	134	85	0.001 *
Heimlich maneuver	1	1	0	
Spinal board	3	4	2	
No specific intervention done	31	255	21	0.001 *
Total	648	560	245	

* $p<0.5$ statistically significant

the ER. Skills-based and rule-based patient assessment for EMTs thus needs to be reinforced in training. Our data revealed that 78.7% patients arrived in the ER with full Glasgow coma scores; 93.5% had a systolic blood pressure over 90 mmHg; and 89.3% had a respiratory rate of 10 to 29 per minute.

There was limitation in this study. We could only reported devices that were left on the patient in the ER to assure intervention procedures were performed by the EMTs during transport. Furthermore, we were unable to find more reliable means to assess whether comforting patient action was carried out by the EMTs. However, this review process can hopefully identify system flaws or policy blind spots, and individual errors and areas where EMTs might benefit. We concluded that incomplete recording in pre-hospital run reports is major barrier depicting the status of EMS care quality in Taiwan and it must be rectified quickly. Field performance assessment reviewed by ER triage nurses might serve to monitor as well as evaluate the care rendered by EMTs. However, validation of present review process by a designated field inspector is mandatory to carry out continuous quality improvement for future EMS in Taiwan.

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台南地區緊急救護現場舉措監控之評估

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目前在台灣地區約有百分之八十的消防隊員接受過初級救護技術員訓練，並有一半亦接受過中級救護技術員的訓練。然而台灣至今尚無對這些訓練成果是否落實於平日的救護工作，做過正式的評估報告。本研究乃藉各責任醫院急診室之檢傷護士對經由緊急救護系統所送來的病患做現場記錄，再與救護技術員所填寫之救護記錄出勤表中各種施救舉措做比較，以探詢這當中的落差，爲日後的複訓與品質改進提供參考。在我們於617例中發現當救護技術員在救護記錄出勤表中記載曾在現場爲病患上頸圈，鼻管給氧、施以骨折固定與心肺復甦術施行等項目與急診檢傷人員所觀察到是一致的。但其他項目如：止血、包紮、維持呼吸道、面罩給氧、心理支持和無任何舉措等五項則統計上明顯不同於急診護理人員的報告。本調查指出當前在台灣發展到院前緊急救護的障礙是救護技術員對於救護出勤記錄表的填寫並不確實，這對欲改善緊急救護服務品質的決策形成上是有很大妨礙的。臺灣今後嘗試發展急救現場的救護品質監控人員，不失爲值得考慮的方向。

關鍵字：到院前緊急救護，品質保證，現場舉措

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