EVALUATING THE JUSTIFICATIONS FOR THREE PERSON PARAMEDIC RESCUE UNITS IN FLORIDA

STRATEGIC MANAGEMENT OF CHANGE

BY: Bruce D. Angier
Division Chief
Boca Raton Fire-Rescue Services
Boca Raton, Florida

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ABSTRACT

This research project evaluated Florida fire departments that utilize three personnel to staff paramedic rescue units and their reasons for determining that staffing level. The problem is Boca Raton Fire-Rescue Services has never evaluated the justifications for increased staffing of paramedic rescue units. As a result, current staffing levels and response configurations are based on historical practice, and the staffing levels may not be meeting the needs of the community or the department. The primary purpose of this research is to determine why some fire departments in Florida have chosen to staff paramedic rescue units with three personnel. Additionally, a secondary purpose is to determine if their performance objectives for those staffing levels has been achieved. The research employed an evaluative research technique to answer the following questions: 1) How many fire departments in Florida staff paramedic rescue units with three personnel? 2) Why did fire departments in Florida utilizing three personnel rescue units determine that staffing level? 3) Are fire departments in Florida that are staffing paramedic rescue units with three personnel realizing their performance objectives?

This applied research project included a survey in the procedures. The survey was distributed to the EMS managers of all 84 fire-based EMS agencies with transport licenses in Florida. A literature review was also completed to determine what has already been written on the subject and to discover any pertinent Florida statutes, county ordinances, and national standards concerning EMS transport staffing.

The results found that 25% of fire department based EMS organizations in Florida staff paramedic rescue units with three personnel, mostly located on the southeast Florida coast. Those agencies with three person paramedic rescue unit staffing determined that staffing level in an effort to enhance patient care, reduce engine company responses to medical alarms, and to
increase accountability and supervision of the paramedic team. The results also indicated the agencies that staff paramedic rescue units with three personnel are realizing their performance objectives. Therefore, it was recommended that Boca Raton Fire-Rescue study the current staffing level of two for paramedic rescue units and assess the potential impacts of increasing rescue unit staffing to three. It was also recommended that Boca Raton Fire-Rescue study the impacts of the current response configuration, which includes sending an engine and a rescue to all medical incidents to enhance paramedic staffing on emergency medical incidents. It was recommended, additionally, that Boca Raton Fire-Rescue conduct a pilot test of three person staffing for paramedic rescue units and evaluate patient care data, the number of procedures performed, and on-scene time as compared to current data.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>2</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>4</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Background and Significance</td>
<td>6</td>
</tr>
<tr>
<td>Literature Review</td>
<td>10</td>
</tr>
<tr>
<td>Procedures</td>
<td>15</td>
</tr>
<tr>
<td>Results</td>
<td>18</td>
</tr>
<tr>
<td>Discussion</td>
<td>21</td>
</tr>
<tr>
<td>Recommendations</td>
<td>25</td>
</tr>
<tr>
<td>References</td>
<td>27</td>
</tr>
<tr>
<td>Appendix A: EMS Manager's survey instrument</td>
<td>29</td>
</tr>
<tr>
<td>Appendix B: Anonymous comments from EMS Manager survey quest. 4</td>
<td>30</td>
</tr>
<tr>
<td>Appendix C: Anonymous comments from EMS Manager survey quest. 8</td>
<td>31</td>
</tr>
</tbody>
</table>
INTRODUCTION

Paramedic Rescue Units, for definition purposes, are vehicles equipped to provide advanced life support (ALS) medical treatment and patient transportation to the medical facility. They are staffed with personnel cross-trained as firefighters and paramedics or emergency medical technicians (EMT’s). The term “rescue” is commonly used in Florida to describe these vehicles, however, these vehicles provide minimal heavy rescue capabilities and are used chiefly for patient transport. Rescue units respond to fires, primarily to provide additional personnel for firefighting activities. Personnel protective equipment, including self-contained breathing apparatus, is carried on each vehicle. Boca Raton Fire-Rescue Services currently staffs rescue units with a total of two firefighter/paramedics, including one driver and one patient attendant. Neither person is a supervisor.

Recently, there have been informal discussions within the local emergency medical services (EMS) community to increase the staffing of rescue units to three persons. The staffing model would include two patient attendants and a driver. One of the patient attendants would be a supervisor or officer. This model is used by several south Florida fire-based EMS agencies, and is supported by local labor organizations.

The problem is Boca Raton Fire-Rescue Services has never evaluated the justifications for increased staffing of paramedic rescue units. As a result, current staffing levels and response configurations are based on historical practice, and the staffing levels may not be meeting the needs of the community or the department.

The primary purpose of this research is to determine why some fire departments in Florida have chosen to staff paramedic rescue units with three personnel. Additionally, a
secondary purpose is to determine if their performance objectives for those staffing levels has been achieved.

This study uses evaluative research methodology and seeks to answer these questions:

1. How many fire departments in Florida staff paramedic rescue units with three personnel?
2. Why did fire departments in Florida utilizing three person paramedic rescue units determine that staffing level?
3. Are fire departments in Florida that are staffing paramedic rescue units with three personnel realizing their performance objectives?

BACKGROUND AND SIGNIFICANCE

The City of Boca Raton is a municipality located on Florida’s southeast coast between West Palm Beach and Fort Lauderdale. Boca Raton’s 26 square miles has a population of 75,000 people. The Boca Raton Fire Rescue Services Department is the sole provider of emergency medical services for the community and started advanced life support paramedic services in 1974. The EMS system is comprised of six advanced life support capable fire apparatus, four 24 hour transport capable paramedic rescue units, and two peak hour paramedic rescue units staffed 12 hours a day.

Between 1974 and 1978, paramedic rescue units were staffed with three personnel. Since 1978, Boca Raton Fire-Rescue’s paramedic rescue units have been staffed with two firefighter/paramedics. One is designated a patient attendant, the other a driver. Both personnel are the same rank and neither is a supervisor. City of Boca Raton leaders reduced the number of personnel assigned to a paramedic rescue unit in 1978 to offset the cost of hiring additional personnel when a new unit was placed in service. There has never been a study to determine
appropriate staffing levels based on the tasks a paramedic rescue unit is expected to perform in the course of EMS delivery. The decision to reduce staffing was based on community economics and industry standards at the time.

Past impacts of this problem concern response configurations to medical emergencies. Although a specific study was never conducted, fire department managers recognized that two people assigned to paramedic rescue units would be insufficient to manage severe and moderate medical emergencies in a timely manner. When rescue unit staffing was reduced, therefore, fire department managers changed the response to a medical emergency to include a fire apparatus, as well as a paramedic rescue unit. This response configuration places five people at the scene of any medical incident and remains in effect today.

Most fire stations in Boca Raton house both a paramedic rescue unit and an ALS engine or ladder company. The two units respond to all medical emergencies in tandem. With both units responding to a single medical emergency in a given zone, the obvious impact is that one of the two units is unavailable to respond to a second call for service. This requires two additional units to come from a more distant zone, increasing response times. Simply put, despite having twelve ALS capable response vehicles, Boca Raton Fire-Rescue is unable to respond to twelve medical emergencies simultaneously.

Boca Raton Fire-Rescue enhanced its EMS system in 1994 and began transport services. Prior to 1994, private ambulance companies provided emergency patient transport. One Boca Raton Fire-Rescue paramedic attended to the patient in the back of the private ambulance with the ambulance company’s paramedic. The second Boca Raton Fire-Rescue paramedic followed the ambulance to the hospital in the paramedic rescue unit. The fire apparatus returned to the station with a full crew. The addition of transport services created an additional problem.
Since the addition of transport services, when paramedics encounter a critical patient, one of the firefighters assigned to the fire apparatus will drive the paramedic rescue unit to the hospital, allowing both paramedics to be patient attendants. With only two people, this procedure temporarily leaves the fire apparatus below the department staffing standard of three. The fire apparatus then follows the paramedic rescue unit to the hospital to pick up the firefighter before returning to the station.

Current impacts to this problem include issues with supervision and accountability. Within the table of organization, the officer assigned to the fire apparatus supervises the firefighter/paramedics assigned to the paramedic rescue unit. However, during the course of a normal workday, the paramedics assigned to the rescue unit often work independently and without supervision. As a result, routine work assignments go unchecked. Furthermore, and more significant, new employees assigned to the rescue unit are not closely monitored, nurtured, and trained to department standards. The officer must rely heavily on comments and opinions of the other, more senior, firefighter/paramedic assigned to the rescue unit to complete the new employee’s performance evaluation. In terms of accountability, the current lack of a supervisor is problematic. When a deficiency in work is identified, it is difficult for fire department managers to hold anyone accountable since no one is in charge of the paramedic team. Often the deficiency occurs without the station officer’s knowledge and when he or she was not present. Unless one of the two firefighter/paramedics voluntarily accepts responsibility, managers are forced to choose between taking corrective action on both members or not taking any corrective action at all.

Since an objective evaluation of paramedic rescue staffing has never been completed, it is expected that the problems associated with current staffing levels will continue in the future.
The current tandem response of a fire apparatus and a paramedic rescue unit to all medical emergencies directly correlates to the current staffing of paramedic rescue units. Boca Raton Fire-Rescue Services has experienced a 72 percent increase in alarm activity between 1990 and 2000 (Wood, 2001). This trend is expected to continue. As alarm activity increases in the future, department managers will have to evaluate increasing staffing on paramedic rescue units to allow them to work independently of the fire apparatus versus adding more units to keep response times in line with community expectations.

This research project is significant to Boca Raton Fire-Rescue for several reasons. The research:

- Identifies other fire departments in Florida that have chosen to staff paramedic rescue units with three personnel.

- Determines if other fire departments in Florida who have chosen to staff paramedic rescue units with three personnel previously experienced the same problems currently experienced by Boca Raton Fire-Rescue.

- Determines if other fire departments in Florida who have chosen to staff paramedic rescue units with three personnel were able to alleviate those problems with increased rescue unit staffing.

In summary, the research is meaningful to Boca Raton Fire-Rescue Services because of what can be learned from other fire-based EMS systems. By identifying other organizations that are currently staffing paramedic rescue units with three personnel, fire department managers can utilize other organization’s experiences, successes, and failures in the evaluation process. From this evaluation, managers can predict possible performance outcomes should paramedic rescue unit staffing be increased to three personnel at Boca Raton Fire-Rescue Services.
The National Fire Academy Strategic Management of Change course requires that each student complete an applied research project within six months of completing the classroom instruction. The Strategic Management of Change class is a component of the National Fire Academy Executive Fire Officer Program. This research is related to the analysis phase of the change management model. The analysis of the information gathered by this research will help Boca Raton Fire-Rescue Services identify organizational conditions for changing paramedic rescue unit staffing and determine the perspective of change, if needed.

LITERATURE REVIEW

The literature review has been divided into two parts. The first is a review of fire service and EMS literature regarding staffing levels for paramedic rescue units. The second part outlines pertinent industry standards, as well as state statutes and county ordinances regarding EMS transportation. The purpose of the literature review was to determine what has been written about the subject and identifies existing research on staffing levels for paramedic transport units. A secondary purpose was to identify legislative requirements for paramedic rescue unit staffing. The fire service literature review involved a search of fire service and emergency medical service journals and magazines. Summaries of the sources found to be relevant to this research project are included in this report.

Fire Service and EMS Literature

Only one journal article was discovered that dealt specifically with ambulance crew size in terms of the total number of personnel. One article suggested four personnel were needed for medical emergencies, but did not recommend a staffing level for paramedic rescue units. Many articles were, however, discovered that dealt with ambulance staffing in terms of the certification levels of personnel.
Brown, Owens, March, and Archino (1996) conducted a study analyzing the on-scene times and the number of interventions between two and three person ambulance crews in the Greenville, North Carolina Fire Department. The department had transitioned from three person ambulance crews to two person crews in July of 1993. The authors studied the two most common ALS call types in their system, seizures and chest pains. A retrospective study of ambulance reports was conducted of seizure and chest pain incidents for the month of June 1993. That data was compared to new data collected in August of 1993, after reducing ambulance crew staffing. The study concluded that there were no significant differences in the total number or types on interventions performed between two and three person ambulance crews. However, two person ambulance crews have significantly longer on-scene times than three person ambulance crews. The study further concludes, with the assistance of additional responders, such as an engine company, increases in on-scene times were statistically insignificant.

Morris (1993) outlined the ALS engine program in use by the Phoenix Fire Department, as well as the advantages and disadvantages of the program. An advantage to the ALS engine concept, according to Morris, is the ability to bring a larger amount of people to the EMS scene. This is in contrast to the traditional EMS model with a minimum of two people assigned to a paramedic vehicle. In regard to staffing, Morris states, “One can easily and dramatically illustrate the need for a minimum staff of four to manage medical emergencies” (p.41).

In a work by Maurno (1996), the common staffing configurations are described for fire-based EMS. Those configurations include; ambulances staffed by two paramedics, squad trucks staffed by two paramedics, fire apparatus staffed with two paramedics, plus two or more additional firefighters, and lastly, any combination of the aforementioned configurations. Based
on the configuration descriptions contained in the article, two personnel as a minimum are implied for ambulance staffing. Although, Maurno did not advocate any of the staffing models.

*EMS Best Practices* published an article concerning ambulance staffing. The author compared the clinical performance of EMS systems that staff ambulances with two paramedics to EMS systems that staff ambulances with one paramedic and one EMT. No specific staffing model was clearly advocated. Ambulance staffing requirements should be based on local laws and ordinances, as well as public expectations ("One Paramedic, Two Paramedic," 2000), according to the article.

Sachs (1997) describes the necessary considerations for expanding an EMS system to include transport services. He noted that ambulances should be staffed with a minimum crew of two personnel, 24 hours a day. Additionally, Sachs advocated at least one field supervisor 24 hours a day for each five to seven ambulances.

In a work by Nordberg (2000), the controversy surrounding a proposed plan to change ambulance staffing in Los Angeles from two paramedics to one paramedic and one EMT was discussed. Two personal are assigned to each ambulance in the Los Angeles system. Nordberg makes note that performance indicators need to be established when determining staffing. Since there is no staffing indicator, Nordberg reports that the International Association of Firefighters (IAFF) will commission a study to measure the efficiency of personnel, as well as the number of personnel.

**Legislation and Standards**

The Raymond H. Alexander, M.D., Emergency Transportation Services Act (1998) establishes staffing standards for emergency medical transport units. The Florida statute states in section 401.27, “Each permitted ambulance not specifically exempted from this part, when
transporting a person who is sick, injured, wounded, incapacitated, or helpless, must be occupied by at least two persons, one of whom must be a certified emergency medical technician, certified paramedic, or licensed physician and one of whom must be a driver who meets the requirements for ambulance drivers.” This legislation also specifically authorizes the Florida Department of Health to establish rules for the staffing of advanced life support vehicles. A review of the Florida Department of Health Emergency Medical Services Rule (2000) revealed that there are no State rules describing the number of personnel required for routine and emergency patient transports. There are, however rules describing minimum staffing for neonatal interfacility transfers. The rules require a minimum of two patient attendants with a driver. It also describes the certification levels required of each.

The Palm Beach County (Florida) Emergency Medical Services Ordinance of 1996 authorizes the EMS Administrator to prepare rules and regulations necessary to carry out the purpose of the Ordinance. According to the Rules and Regulations of the Department of Public Safety Emergency Medical Services Section, “Every ALS service vehicle or ambulance shall be staffed according to the standards identified in the Rules and Regulations of the Florida Department of Health and Florida Statute Chapter 401 as it pertains to paramedic and emergency medical technician patient attendants”(1996).

The Palm Beach County (Florida) Trauma Ordinance (1991) authorizes the Executive Director of the Palm Beach County Trauma Agency to establish rules for the emergency transportation of trauma patients. The Rules and Regulations of the Palm Beach County Trauma Agency (1991) mandates that a minimum staff of three personnel are necessary for the transport of a major trauma patient to a trauma center. The rules indicate that the staff of three has to
include at a minimum, an emergency medical technician and a paramedic, in addition to the
driver.

The current language contained in the May 2001 draft of the National Fire Protection
Association Standard 1710, entitled *Standard for the Organization and Deployment of Fire
Suppression Operations, and Special Operations to the Public by Career Fire Departments* also
contains information regarding EMS staffing. Information is located in two sections of the draft.
The first section states, “On-duty EMS units shall be staffed with the minimum numbers of
personnel necessary for emergency medical care relative to the level of EMS provided by the fire
department.” Additional language is contained in the draft standard that pertains to staffing of
transport units, “Units that provide ALS transport shall be staffed and trained at the level
prescribed by the state or provincial agency responsible for providing emergency medical
services licensing” (NFPA, 2001).

The Commission on Fire Accreditation International (CFAI) also establishes a standard
for EMS staffing. There are performance indicators for fire departments providing EMS located
addressing staffing is general and indicates that fire service agencies must provide adequate
staffing to meet agency objectives.

**Summary**

The literature review established that there is no national standard on the total number of
personnel assigned to a paramedic rescue vehicle, although two people appears to be the most
widely used. Much of the literature establishes the needs and expectations of the local
community as the determining factor for staffing. State and local EMS administrative rules
require a minimum of two personnel on most ALS calls. However, local trauma administrative
rules require a minimum of three for major traumas, and State rules require a minimum of three for neonatal transfers.

**PROCEDURES**

**Literature Review**

A fire service literature review was conducted during the week of January 8 to January 19, 2001 at the National Fire Academy’s Learning Resource Center. The literature review targeted trade journals, magazines, textbooks, and previously written EFOP applied research projects that contained information on EMS staffing levels. The author’s personal library was also reviewed for similar information.

A review of pertinent legislation and fire service standard was conducted the week of May 21 to May 25, 2001 at Boca Raton Fire-Rescue Service’s administration complex. The review targeted National Fire Protection Association standards, fire service accreditation standards, state statutes, and county ordinances.

A survey was conducted to answer the research questions. The survey is detailed here.

**EMS Manager Survey**

A survey was mailed to every fire department based EMS transport provider with an advanced life support ground license in the State of Florida. The questionnaire was pilot tested on the EMS Managers present at the Palm Beach County EMS Providers Association on March 27, 2001. Minor modifications were made on the final draft. A copy of the survey questionnaire is located in Appendix A. The mailing list was obtained from the Florida Department of Health, Bureau of Emergency Medical Services. In total, 84 surveys were mailed on April 9, 2001. Respondents had until May 1, 2001 to return the surveys. The postmark on the envelope was used to determine timeliness of the response. Of the 84 surveys mailed, 69 surveys were
completed and returned by the deadline. The goal of the survey was to answer research question one, and provide data for research questions two and three.

Question #1 identified the size of the community. The four categories were: 24,999 or less, 25,000 to 49,999, 50,000 to 99,000, and over 100,000. Question #2 asked if the EMS agency is a full time paid, all volunteer, or a combination paid and volunteer department. These questions were asked to gather demographic information only.

Question #3 asked how many personnel does the respondent’s agency routinely staff paramedic rescue units with. The three possible answers were; three, two, or other. An answer of three prompted the respondent to continue to question #4. If the respondent answered two or other, he or she was prompted to skip to question #8.

Question #4 asked why the respondent’s organization decided to staff paramedic rescue units with three personnel. The respondent was asked to select all answers that applied. The possible answers were; reduce injuries; reduce engine company responses; increase accountability, supervision, and line of authority; enhance patient care; unsure, always been that way since beginning transport services; and other. If the respondent chose other, he or she was asked to write in specifics.

Question #5 asked the respondent if his or her organization benefited from staffing paramedic rescue units with three personnel as expected, based on their answers to question #4. Respondents could select only one answer. The possible answers were; yes, no, or not sure.

Question #6 asked if one of the three personnel assigned to the paramedic rescue unit was a supervisor. There were two possible answers, and the respondent could only select one. The answers were yes or no.
Question #7 asked if the respondent’s organization conducted a formal study to determine the three-person staffing standard for paramedic rescue units. Possible answers were yes or no. Respondents could only select one answer.

Question #8 asked when the respondent’s organization sends an engine company on medical incidents. Respondents could select all that applied. The possible answers were; always, on every medical incident; when first due paramedic rescue unit is not available; on specific types of medical emergencies; never; and other. If the respondent chose other, he or she was asked to provide specifics.

Question #9 asked if the respondent’s organization is considering increasing the staffing of paramedic rescue units to three personnel. There were two possible answers, yes or no. Respondents could select only one answer.

Assumptions

It is assumed that the authors cited in the literature review conducted unbiased and objective research. It is assumed that all respondents of the EMS manager's survey were knowledgeable in the subject matter and answered all questions honestly.

Limitations

The EMS manager's survey is not representative of the entire population of EMS providers in Florida. No statistical analysis was made to determine the margin of error in the survey's results. The small amount of literature written on the subject was also a limitation.

RESULTS

1. How many fire departments in Florida staff paramedic rescue units with three personnel?
Agencies that serve a variety of community sizes responded to the survey. There were 17 responses (25%) from fire based EMS agencies that served communities of less than 24,999 people, 19 responses (27%) from communities between 25,000 and 49,999 people, 11 (16%) responses from communities with 50,000 to 99,999 people, and 22 (32%) responses from communities with over 100,000 people.

Overwhelmingly, most fire based EMS agencies surveyed were staffed with full time paid personnel, with 62 responses (90%). No respondents indicated they were staffed with a fully volunteer workforce. The remaining 10% of respondents indicated they utilize a combination volunteer and paid workforce, with seven responses.

Agencies that staff paramedic rescue units with three people encompass 25% of the agencies surveyed, as indicated by 18 responses. Two of those agencies indicated that they routinely staff some rescue units with three people, and others with two personnel. Most fire based EMS agencies that returned the survey indicated that they routinely staff paramedic rescue units with two personnel. Of the 69 total respondents, 52, or 74% indicated they staff rescue units with two people. Only one agency indicated they staff paramedic rescue units with something other than two or three personnel. That agency was identified as a combined police/fire/EMS public safety organization and uses police officers to augment EMS staffing.

Only a few respondents, 6 or 12% of those agencies that staff paramedic rescue units with two people, indicated their agencies were considering increasing staffing to three people. Most respondents, 45 or 88%, indicated their agencies were not considering increasing staffing of paramedic rescue units to three personnel.

Agencies that staff paramedic rescue units with three personnel serve an array of community sizes. A total of three, or 16%, of agencies with three person rescue staffing serve
communities of less than 25,000 people. The same number, three, indicated they serve communities of 25,000 to 49,000 people. There were six respondents (33%) that staff paramedic rescue units with three people that indicated they serve communities of 50,000 to 99,000 people. Likewise, six respondents also indicated they serve large communities of greater than 100,000 people. All of the agencies that indicated they utilize three person staffing for paramedic rescue units were full time paid departments. As indicated in Table 1, over half (55%) of respondents that serve communities of 50,000 to 99,000 indicated they staff paramedic rescue units with three people. This was the only population category with more organizations indicating they staff rescue units with three people than organizations indicating they staff rescue units with two people.

Table 1.

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<th>Paramedic Rescue Unit Staffing by Population</th>
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<tr>
<td>Community Population</td>
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<tr>
<td>24,999 or Less</td>
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<tr>
<td>25,000 to 49,999</td>
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<tr>
<td>50,000 to 99,999</td>
</tr>
<tr>
<td>100,000 or More</td>
</tr>
<tr>
<td>Paramedic Rescue Unit Staffing</td>
</tr>
<tr>
<td>Three</td>
</tr>
<tr>
<td>3 (18%)</td>
</tr>
<tr>
<td>3 (16%)</td>
</tr>
<tr>
<td>6 (55%)</td>
</tr>
<tr>
<td>6 (27%)</td>
</tr>
<tr>
<td>Two</td>
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<tr>
<td>13 (76%)</td>
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<tr>
<td>16 (84%)</td>
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<tr>
<td>5 (45%)</td>
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<tr>
<td>16 (73%)</td>
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<tr>
<td>Other</td>
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<tr>
<td>1 (6%)</td>
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<td>0</td>
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<td>0</td>
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</table>

2. How did fire departments in Florida utilizing three person paramedic rescue units determine that staffing level?

Most agencies, 15 (83%), indicated they determined a three person staffing level to enhance patient care. Reducing engine company responses to medical incident was the second
most cited reason, with 10 responses, or 55%. Increasing accountability, supervision and line of authority was indicated by 38%, or seven, agencies as a reason for determining a three person staffing level. Furthermore, 16 of the 18 departments that staff paramedic rescue units with three people indicated that one of the three is a supervisor. A list of the anonymous comments concerning the reasons for determining staffing paramedic rescue units with three people is located in Appendix B. Only six agencies (33%) indicated they decided to staff paramedic rescue units with three people to reduce injuries. A few agencies, four (22%) indicated that they were unsure how that staffing level was determined; it had always been that way. Most agencies with three person paramedic rescue units did not conduct a formal staffing study to determine their staffing level. Of the 18 respondents, just three (16%) indicated they conducted a study.

Related to reducing engine company responses, 15, or 22%, indicated they send engine companies on every medical incident. There were 23 (33%) respondents that indicted they send an engine company to medical incidents when the first due paramedic rescue unit is not available. Over half, 60%, of the respondents indicated they send an engine company on specific types of medical emergencies, as indicated by 42 responses. There was one agency that indicated they never send an engine company on medical incidents. Some respondents, 18 (26%) indicated they send an engine to medical emergencies for instances other than those listed. A list of the miscellaneous comments from the EMS Manager’s survey concerning engine company responses to medical incidents is located in Appendix C.

3. **Are the fire departments in Florida that are staffing Paramedic Units with three personnel realizing their performance expectations?**

   Overwhelmingly, most agencies indicated that they benefit from staffing paramedic rescue units with three people as expected. Of the EMS agencies identified with three-person
paramedic rescue unit staffing, 16, or 88%, indicated their organization benefits as expected from that staffing level. A few, two organizations, indicated they were unsure if their organization benefits as expected from that staffing level. Not a single agency indicated that they did not benefit as expected from staffing three people on paramedic rescue units.

DISCUSSION

It can be determined from the survey that tendency for three-person staffing of paramedic rescue units is largely based on the southeast coast of Florida. All except one agency with three person staffing, Longboat Key Fire-Rescue, are located within the tri-county area of Miami-Dade, Broward, and Palm Beach counties. Furthermore, all Miami-Dade County fire departments staff paramedic rescue units with three people. It can be inferred from the survey that this staffing level is based mostly on local history, since only three respondents indicated they conducted any sort of study to determine paramedic rescue unit staffing. This inference is supported by literature. Brown, et al. (1996) notes when discussing ambulance staffing, “All of these practices are based on unstudied principles or anecdotal experience. There are no studies published in the peer-review literature comparing the effectiveness of ambulance crews of different sizes” (p.72). The work by Brown et al. further describes ambulance crew sizes as being based on local history, personnel management priorities, and operational concerns.

The lack of scientific study identified in the survey for determining ambulance crew size appears contrary to the recommended standards of both the NFPA and the Commission on Fire Accreditation International. Survey results indicate that most, approximately 83%, of fire service EMS agencies that staff paramedic rescue units with three people did not conduct a study, as previously mentioned. Both NFPA 1710 (2001) and the CFAI self-assessment manual (2000) advocate staffing EMS units to with a minimum of personnel to meet agency performance
objectives. Staffing should be, additionally, relative to the level of EMS provided by the fire department. Meeting the EMS staffing standards published by the NFPA and the CFAI should inspire fire service agencies to conduct scientific study of the issue and thereby quantify that agency performance objectives are being met. Nordberg (2000), supported by Brown et al. (1996), both identified the need for further study of the issue.

The Emergency Transportation Act (1998) mandates a minimum of two personnel for emergency medical transports. A minimum of two persons is also advocated by Sachs (1997), Maurno (1993), and implied by Nordberg (2000) for ambulance staffing. Further, the Rules and Regulations of the Department of Public Safety (1996), EMS Best Practices (“One Paramedic,” 2000), and NFPA 1710 (2001) provide language that recommends staffing at a level prescribed by the state agency responsible for EMS licensing. The survey results appear to be consistent with these staffing recommendations and mandates.

There is, however, an exception. The Rules of the Rules and Regulations of the Palm Beach County Trauma Agency (1991) require a minimum of three people to transport serious trauma patients to trauma centers. Although this rule only applies to Palm Beach County fire departments, only three agencies within Palm Beach County routinely staff paramedic rescue units with three personnel, according to the survey results. It is assumed that those agencies with two people assigned to paramedic rescue units augment staffing with engine company personnel for trauma transports, as is the case with Boca Raton Fire-Rescue Services.

Brown et al. (1996) makes note that lengthy on-scene times associated with two-person ambulance crews can be reduced with the assistance of additional responders. Morris (1993) also concluded that EMS agencies can easily demonstrate the need for a minimum staff of four people to manage severe medical emergencies and advocated the use of ALS engine companies.
Accordingly, half of those survey respondents (26) that indicated they staff paramedic rescue units with two people send engine companies to medical incidents on specific types of medical emergencies. Agencies that send an engine company to all medical incidents was 15, or 28% of those with two-person paramedic rescue units. It was expected only a few agencies would indicate that they send an engine and a rescue unit to all medical emergencies, similar to Boca Raton Fire-Rescue Services. The larger amount of agencies sending both an engine and a paramedic rescue unit to all medical incidents was a surprise result of the survey, and seems consistent with the Brown et al. study and the Morris article.

Agencies that staff paramedic rescue units with three people indicated one of the reasons for three person staffing was to reduce engine company responses to medical incidents. Agencies selected this survey response ten times, or 55% of those agencies with three-person paramedic rescue unit staffing. Over three quarters of those agencies, 14, or approximately 78%, indicated they send an engine company to medical emergencies only when the first due rescue unit is not available and only on specific types of emergencies. No agencies with three-person rescue unit staffing send an engine company on every medical incident. Therefore, it can be inferred that those agencies have accomplished their performance objective of reducing engine company responses to medical alarms.

Interpretations of the study indicate that the trend to staff paramedic rescue units with three people is based primarily on local history and without scientific study. Additionally, it is a trend located primarily on the southeast Florida coast. Anecdotal comments from several respondents even indicated that their EMS staffing was “based on the Miami model”. Furthermore, the survey can be interpreted to indicate that those agencies with three-person paramedic rescue unit staffing are achieving their performance objectives in determining that
staffing level. Those objectives being; enhancing patient care, reducing engine company responses, and increased accountability and supervision. It should be noted, however, that measuring the performance objective of enhancing patient care requires scientific study. It is not apparent from this survey whether patient care studies were conducted by those agencies with three-person paramedic rescue unit staffing when determining that they have met that performance objective. It can also be interpreted from the survey, since no departments with three-person paramedic rescue units send engine companies to all medical incidents, that the redundancy lacking in Boca Raton’s EMS system, is accomplished in those EMS systems. This is assuming that those engine company resources remain available to answer the next call for EMS service in a given district.

The findings of this survey have organizational implications to Boca Raton Fire-Rescue Services. The study shows three people per paramedic rescue unit is arguably the industry standard for fire-rescue departments on the southeast coast of Florida. Those agencies are achieving their organizational objectives that justify that staffing level, according to the survey. When comparing our organization to others in the south Florida region, Boca Raton Fire-Rescue’s paramedic rescue unit staffing may be considered below the norm. This will further intensify the call for more staffing by the labor organization, and fire department managers need to be prepared to respond. However, in contrast, another implication to Boca Raton Fire-Rescue Services concerns the lack of study on the total number of personnel assigned to paramedic rescue unit. Although three-person paramedic rescue units may be becoming the standard for the southeast Florida region, this research indicates that EMS staffing levels are rarely based on any scientific study, and therefore, there is no proof that such staffing is justified in terms of patient care.
RECOMMENDATIONS

It is recommended that Boca Raton Fire-Rescue conduct a study, or contract with a vendor to conduct a study, of current staffing levels for paramedic rescue units. The study should focus on the current staffing level of two persons and the impacts on patient outcomes and on-scene times. The study should also evaluate the impact of the temporary reduction of engine company staffing, as well as the impact of the engine being out of its zone when traveling to the hospital, as a result of Boca Raton Fire-Rescue’s current rescue unit staffing configuration. Additionally, the study should evaluate any possible repercussions due to the lack of supervision on the paramedic rescue unit, as well as the impact on new employee paramedic training and evaluation.

It is recommended that Boca Raton Fire-Rescue conduct a study, or contract with a vendor to conduct a study, of Boca Raton Fire-Rescue’s medical emergency response configuration. The study should scientifically evaluate the impacts of assigning both an engine company and a paramedic rescue unit to medical emergencies in terms of on-scene times, as well as travel times impacted by units responding to a medical incident from a more distant district because both closer ALS units are unavailable and assigned to a separate medical incident. Moreover, the study should evaluate the response configuration in terms of efficient deployment of resources and the lack of redundancy in a given district. The study should also compare and contrast the impact of adding a third person to existing paramedic rescue units versus the impact of adding additional new rescue units in terms of response times and cost benefit.

It is recommended that Boca Raton Fire-Rescue conduct a pilot test of three-person staffing for paramedic rescue units. The test could be implemented on one or two of the paramedic rescue units utilizing overtime staffing. Furthermore, with the additional staffing
during the test, engine company responses to all medical incidents should be discontinued for the
district participating in the pilot test. An evaluation of response times, on-scene times, ALS
interventions, and patient outcomes from the pilot test rescue unit compared to a retrospective
review of the same data collected during our current staffing and response configuration would
assist managers in determining the impacts of increasing Boca Raton Fire-Rescue’s paramedic
rescue unit staffing. In terms of keeping response times and level of service at community
expectations, this evaluation will help determine if increasing the staffing levels of paramedic
rescue units to three people, and allowing them to operate independently of engine companies,
will accomplish the goals of the department without having to increase the total number of
paramedic rescue units.
REFERENCE LIST


National Fire Protection Association (May 2001). Draft of NFPA 1710 *Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by career fire departments*. Quincy, MA: Author.


Palm Beach County Emergency Medical Services Ordinance, 96-16. § 12 (1996).

Palm Beach County Trauma Ordinance, 91-20. § III (1991).


Rules and regulations of the Palm Beach County Department of Public Safety Emergency Medical Services Section. 96-16 (1996).

Rules and regulations of the Palm Beach County Health Care District Trauma Agency Division. 87-27 (1987).


APPENDIX A
Appendix A is the survey instrument (reduced) used for the EMS manager's survey.

Paramedic Rescue Unit Staffing
Survey Questionnaire

NAME OF EMS AGENCY

1) Size of the community served by your agency - population (circle one)
   A.  24,999 or less
   B.  25,000 - 49,999
   C.  50,000 - 99,999
   D.  More than 100,000

2) Is your EMS agency (circle one)
   A.  Full time paid
   B.  All volunteer
   C.  Combination paid/volunteer

3) How many personnel do you routinely staff Paramedic Rescue Units with?
   A.  Three
   B.  Two
   C.  Other
      If answer was "A", please continue to question 4.  If answer is "C" or "B", please skip to question 8.

4) Why did your organization decide to staff Paramedic Rescue Units with three personnel? (circle all that apply)
   A.  Reduce injuries
   B.  Reduce engine company responses to medical incidents
   C.  Increase accountability, supervision, and line of authority
   D.  Enhance patient care
   E.  Unsure, always been that way since beginning EMS transport services
   E.  Other, please specify:

5) Based on your answers to question 4, Did your organization benefit from staffing paramedic rescue units with three personnel as expected? (circle one)
   A.  Yes
   B.  No
   C.  Not sure

6) Is one of the three people assigned to the Paramedic Rescue Unit a supervisor? (circle one)
   A.  Yes
   B.  No

7) Did your organization conduct a formal study to determine a three person staffing level for paramedic rescue units? (circle one)
   A.  Yes
   B.  No

8) When do you send an engine company on medical incidents? (circle all that apply)
   A.  Always, on every medical incident
   B.  When the first due Paramedic Rescue Unit is not available?
   C.  On specific types of medical emergencies
   D.  Never
   E.  Other, please specify:

9) Is your organization considering increasing the staffing of paramedic rescue units to three personnel? (circle one)
   A.  Yes
   B.  No

Thank you for completing this survey. Please feel free to include any additional comments on the reverse side.

PLEASE RETURN BY MAY 1, 2001 TO:
DIVISION CHIEF BRUCE ANGIER
BOCA RATON FIRE-RESCUE
2333 W. GLADES RD., BOCA RATON, FL 33431
APPENDIX B

Appendix B is a list of the miscellaneous comments from question #4 of the EMS Managers survey.

“Modeled after the City of Miami”

“Having the ALS engine remain in the station provides the redundancy in that service area and decreases ALS response time for the second call in the area.”

“Been that way for almost 20 years.”

“Our units are staffed with 3 personnel. One is a paramedic Lieutenant, and 2 are Firefighter paramedics. If staffing does not allow, we will run the unit with the Lieutenant, and one Firefighter paramedic and one Firefighter EMT, never less.”

“Based on workload statistics”

“All of the above apply – followed City of Miami model when our department was established.”
APPENDIX C

Appendix C is a list of the miscellaneous comments from question #8 of the EMS Managers survey.

“Shootings, stabbings, unconscious, signal 4, and poss. drownings”

“When paramedic unit request.”

“i.e., cardiac arrest (workable)”

“Auto accidents, all calls on I-95 for crew safety.”

“Medical Priority Dispatch System”

“Engine rolls on BLS calls and ALS calls when Rescue is out.”

“Closest available unit”

“Cardiac arrest and entrapment”

“ALS or as needed for staffing”

“Engine and Rescue dispatched to all chest pains, trouble breathing, OB, suicide, cardiac arrests.”

“As specified by dispatch policy-severity of call”

“It is very rare that a rescue and engine are not dispatched together to a medical alarm.”

“On any EMS calls when the Engine is the closest unit.”

“In the development stage of modified dispatching utilizing MPDS (single response or dual response) depending on nature.”

“Special extensive operations, such as extrication”

“At request of Rescue unit”

“Per EMD protocol”

“When on-scene crew requests assistance”