

# Dual Paramedic vs. Single Paramedic Ambulances in Santa Cruz County

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## Introduction

Paramedics provide a critical lifesaving role in our EMS system. They are the highest trained medical personnel on the scene and the only rescuers who can perform critical procedures such as endotracheal intubation (emergency airway) and intravenous medications. Most importantly they also bring a body of knowledge and experience to the scene that can recognize subtle presentations of life-threatening conditions.

While their importance in the EMS system is undisputed, there is little evidence to support the notion that a system saturated with paramedics is always better. Indeed, there is a growing body of evidence that shows that too many paramedics in a system can be wasteful, can impair proficiency, and in few select situations, can even be detrimental to patients.

Based on this data, the Santa Cruz County EMS Agency is proposing a change in the staffing of our 911 ambulances from a dual paramedic configuration to a 1 paramedic/1 EMT configuration, herein called a “1 and 1” configuration.

A 1 and 1 ambulance configuration will enhance patient safety, lower costs, improve response times, reduce rescuer fatigue and burnout and will continue to provide paramedic services on every EMS call as is currently the case.

There are compelling reasons to make this conversion well in advance of the next EOA contract start date. As the last remaining county in California to use dual paramedic ambulances, we are outside the industry standard and our existing staffing model makes our county less attractive to potential bidders.

## Background

There are 2 levels of EMS care in Santa Cruz County; basic life support (BLS) provided by emergency medical technicians and advanced life support (ALS) provided by paramedics. EMTs have about 200 hours of training and are capable of handling most acute medical emergencies including heart attacks and car accidents. Paramedics receive about 1500 hours of training and can handle the same types of incidents but provide added capabilities such as the ability to provide IV medications and perform advanced airways.

In Santa Cruz County nearly every fire first responder is EMT certified. Additionally, many fire agencies such as Santa Cruz City, Central Fire District, Aptos/La Selva Fire District, Scotts Valley, and Watsonville Fire Departments also employ firefighter/paramedics. Ambulances in our county are staffed with 2 personnel, both of whom are paramedics.

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While dual paramedic staffing configurations were once common, the industry trend over the past 15-20 years has been to staff ambulances with 1 paramedic and 1 EMT. This change was justified as fire departments started to add to firefighter/paramedics to their ranks, and stemmed from the recognition that the costs of extra paramedics were not justified. With our current staffing, it's not unusual to have 4 or more paramedics on the scene of a typical EMS call.

To the best of our knowledge, Santa Cruz County is the last remaining California county that continues to routinely staff ambulances with 2 paramedics. While staffing with an extra paramedic on each ambulance may appear on the surface to be superior to 1 and 1 configurations, there are a number of disadvantages.

## **Patient Care and Safety**

Many EMS systems have been traditionally designed under the belief, but without evidence, that more is always better. More paramedics, more devices and more medications all lead to improved patient care and patient outcomes. Since paramedics are trained to perform select lifesaving procedures, to establish intravenous lines and provide emergency medications, intuition would seem to indicate that the presence of more paramedics would increase the likelihood that these interventions were performed. More importantly, it was believed that patients did better as a result.

While paramedics provide unique and critical skills to certain types of clinical conditions, there is no evidence that the presence of more than one paramedic adds any value to patient outcome. Indeed, the evidence shows the opposite may be true.

## Cardiac Arrest

The landmark OPALS study (Stiell IG e. a., 1999), which generated multiple publications, is the best study to date which has examined the impact of paramedic care for a number of common conditions. OPALS evaluated survival before and after the addition of ALS care to a system that was previously all BLS. Surprisingly, there was no increase in survival with the addition of ALS care over that seen with BLS but it is important to note that their BLS system was optimized with high rates of bystander or early CPR and early defibrillation. These two factors, as shown elsewhere, are the most important predictors of cardiac arrest survival, and notably are provided by the public or first responders, not by ambulance paramedics.

Other studies have demonstrated a direct relationship between the number of paramedics on scene, the inexperience of those paramedics, and reduced survival rates of cardiac arrest. (Eschmann NM, 2010) (Sayre MR, 2006) (Wang HE, 2010) (Gold LS, 2009) In 2005, USA Today published a survey of EMS Medical Directors at 50 major cities and found that those cities with

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the lowest number of paramedics per capita had the highest cardiac survival rates (Seattle: 13.5 paramedics/100,000, survival 45%, Omaha: 44.6 paramedics/100,000, survival 3%.) (Davis R. , 2005) With 164 paramedics, Santa Cruz County has 61 paramedics/100,000. (US Census Bureau, n.d.)

## Trauma

Furthermore, for trauma patients, one might think that the ability to provide IV fluids and advanced airways would be important to patients in hemorrhagic shock (low blood pressure from blood loss) or traumatic respiratory distress. However, several studies suggest that ALS interventions such as IV fluids and endotracheal intubation may be *harmful* rather than beneficial in this particular situation. (Eckstein M, 2000) (Isenberg D, 2005; Stiell IG, 2008) How could this be? Prolonged scene times associated with performing these interventions may be contributing to mortality, and IV fluids may worsen blood loss by the combined effect of increasing blood pressure and increasing the hemorrhage rate as well as diluting the natural clotting factors and impairing hemostasis. In San Diego and elsewhere, endotracheal intubation (discussed further below) was found to increase mortality in head injured (Davis D. P., 2004) and in pediatric patients (Gausche M, 2000).

## Procedural Skill

The medical literature is also replete with evidence that the quality of procedure based care is directly proportional to the number of procedures recently performed by the clinician. In the realm of interventional cardiology, the American College of Cardiology stipulates that only cardiologists who perform percutaneous coronary interventions on a regular basis should be considered eligible to be on-call for emergency cases, regardless of the intensity or quality of their initial training. (Cohen, 2000) (Halm, 2002) Similarly, training programs in emergency medicine require physicians in training to perform a minimum number of life-saving interventions, such as endotracheal intubation, central lines, chest tubes etc. before graduation from residency programs.

Endotracheal intubation, a quintessential paramedic skill, must be performed quickly and expertly. Unlike in the hospital, paramedics must perform the skill in the most difficult conditions, with dim light, high noise, poor patient positioning and without benefit of sedating and paralytic medications. Successful intubation is one thing, but the consequences of performing it incorrectly is catastrophic, either by causing hypoxia during multiple attempts, by failing to provide lifesaving benefit of the procedure or worse, by directly causing the patient's death through suffocation. Survival from cardiac arrest has been found to be dependent on the rescuer procedural experience level (Wang HE, 2010).

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In today's EMS environment, paramedics have an extraordinary challenge mastering and maintaining proficiency in this skill. This was not always the case. When paramedic programs were originally conceived in the 1970s, there were far fewer paramedics. Hands-on training was extensive and students routinely performed many endotracheal intubations in a hospital under the direct supervision of an anesthesiologist or emergency physician. Having mastered the skill in the hospital and now on the street, these paramedics had many opportunities to practice and maintain this skill on patients in the field.

Over the past 40 years, however, the number of paramedics in US cities has risen dramatically. There are many more training programs today. Consequently, this increase of paramedic students, along with liability concerns, has made it difficult for students to get OR time to practice this critical skill on real patients. (Johnston, 2006) Many paramedics graduate from their training programs without ever having had the opportunity to perform this procedure on real patients.

Furthermore, once on the street, there are fewer opportunities to perform the procedure. Most fire departments now use paramedics on their first response fire engines and new paramedics now must compete with fellow paramedics on the scene for those few opportunities that do arise. Today, it is not uncommon to have 4 or 5 paramedics on the scene of a routine EMS call.

There are fewer clinical indications for field endotracheal intubation today. Many patients qualify for less invasive options requiring fewer skills. In cardiac arrest, endotracheal intubation has been deemphasized as a priority, and when necessary, is often substituted with less invasive airway management techniques such as oral airways, bag mask ventilation and supra-glottic airways, each of which is equally effective in this setting and requires only EMT level certification. Congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) patients are usually well managed using Continuous Positive Airway Pressure devices (Hubble MW, 2006) (Thompson J, 2008), another non-invasive airway management technique that uses a special mask. With about 110 intubations per year in Santa Cruz County our paramedics on average have the opportunity to perform this procedure less than twice per year, a rate far lower than considered acceptable for maintaining proficiency.

Given the discussion above, one might incorrectly conclude that paramedics add no value for these and other clinical conditions. This is not the case. Despite alternatives mentioned previously, the intubation procedure remains the only viable option for many patients whose life depends on it being done quickly and properly in the field. The consequences of getting this wrong can be devastating: when improperly placed, an endotracheal tube is uniformly fatal regardless of the underlying condition. Paramedics still need to be experts in this technique. (Katz, 2001)

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Paramedics are much more highly skilled in recognizing clinical conditions and their potential causes. For non-traumatic chest pain, shortness of breath, altered mental status, seizures, and allergic reactions, paramedics, unlike EMTs, can provide medications that can mitigate or completely treat these conditions.

### **Resource Deployment and Efficiency**

A dual paramedic ambulance is costly yet two-thirds of Santa Cruz County EMS calls require only BLS intervention (basic first aid and transport) in which case neither paramedic is needed and an EMT can appropriately provide the care. Approximately 35% of all Santa Cruz County patients require some form of ALS care such as a medication or cardiac monitor, the vast majority of which can be provided by a single paramedic. Very few calls require more than one paramedic to attend to the patient while enroute to the hospital, and when this situation occurs it is usually provided by the fire department. In either case the second ambulance paramedic is relegated to driving the ambulance and is unavailable for patient care.

Our current resources are spread thin, with ambulances running multiple calls each day throughout a 24 hour period, fatigue and burnout become real concerns. Since paramedics cost more than EMTs, a 1 and 1 configuration would reduce the hourly cost for that ambulance and provide revenue that could be invested in additional ambulance hours.

Funding for additional ambulance hours will not come from new revenue. Financing of the EMS system comes directly from patient billing. However, the reimbursement for ambulance transports continues to fall short. While the Affordable Care Act vastly increased the number of insured patients, most of that increase is in Medi-Cal, which at \$108 per transport does not come close to covering the cost of staffing and maintaining an ambulance. With inadequate primary care resources for these newly enrolled patients, many have turned to the EMS system as their primary access to health care. Others insured under the ACA chose high deductible plans which, in effect, make them uninsured for the first \$5000 or \$10,000 in medical expenses, which includes the ambulance bill. These bills often go unpaid. Finally, commercial insurers appear to no longer be interested in supplementing the system and now frequently deny claims, paying only what they believe to be a fair rate. Consequently, typical ambulance providers collect only \$0.23 for every dollar billed. It is possible to raise ambulance transport rates but given the limitations mentioned, each additional dollar rate increase would only yield about 10 cents, making a rate increase and ineffective way to improve EMS system finance

With continued stress on EMS finances, it is difficult to justify an all ALS ambulance when, in most cases, no paramedics are needed. For the 35% when ALS care is needed, a single paramedic is sufficient. In rare cases where a second attendant is needed in the back of the ambulance while en-route to the hospital, a firefighter (who often is also a paramedic) may ride along.

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For areas served in the county by non-ALS fire agencies, the only paramedic on scene would come from the ambulance crew. Except in very rare situations, a single paramedic is sufficient, and in the few cases where the second attendant is required in the back of the ambulance while enroute to the hospital, that provider is typically tasked with performing BLS skills such as bag mask ventilation.

## **Staff Education and Development**

Training and skill retention for paramedics is costly and time consuming. The cost and effort to maintain ALS skills is proportional to the number of paramedics. By reducing the number of paramedics in the system, training officers can focus their time on a core group, ensuring that cognitive and motor skills are optimized.

The addition of EMTs to ambulance workforce creates new opportunities for development of employees who may eventually wish to become paramedics. This promotes job satisfaction and longevity by providing an organization promotional path that prehospital personal may find more fulfilling.

Since all neighboring counties use a 1 and 1 configuration we have an improved ability to recruit local EMTs to Santa Cruz County and to increase the potential for cross county certification to facilitate temporary staff shortages.

## **Exclusive Operating Agreements and Early Conversion**

The Santa Cruz County EMS agency is currently developing a RFP for a new EOA contract with an ambulance provider organization to have exclusive right to 911 ambulance traffic in the County. Converting our system to a 1 and 1 system reduces costs to potential bidders and potentially makes the prospect of bidding for a contract in Santa Cruz County more attractive. Consequently, we will create a wider selection of contractors to choose from.

The timing of this conversion is important and there are compelling reasons to allow the current contractor, through contractual amendment, to begin the inevitable transition during the final year and a half of this current contract.

On the other hand, if we chose to wait to convert to 1 and 1 at the start of the next EOA contract, we would likely include contractual language that protected the incumbent workforce only allowing the reduction in paramedic ranks to occur through natural attrition rather than through layoffs. Those requirements could dissuade some bidders who would have to bear additional labor costs during the transition period. However, if the transition were to occur well

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before the new contract, then the appropriate ratio of EMTs and paramedics could be achieved without the need for layoffs.

Despite the increased number of paramedic training programs previously noted, there is a current shortage of paramedics and AMR, the existing contractor, is having difficulty filling the current openings. This is primarily due to increased hiring by fire departments, but no doubt this is exacerbated by the reasonable perception that Santa Cruz, as the last remaining California County to use dual paramedic ambulances, will one day convert to a 1 and 1 configuration. To create a situation where recently recruited paramedics might then be laid off at the start of the next EOA contract would be unfortunate.

## Conclusion

Our current dual paramedic ambulance staffing configuration is outdated and inefficient. Conversion to a 1 and 1 ambulance frees up revenue that could be invested elsewhere in the system, improves paramedic skill retention, avoids paramedic layoffs, simplifies training activities, is more financially sustainable, and makes our system more attractive to potential bidders.

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