EMERGENCY MEDICAL SERVICES EVIDENCE-BASED SYSTEM DESIGN WHITE PAPER FOR EMSA

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Executive Summary

This innovative, evidence-based medical analysis for optimal EMS system design was commissioned by the Emergency Medical Services Authority, the public utility emergency medical services agency serving metropolitan Oklahoma City and Tulsa, Oklahoma. The analysis contributors are expert physicians engaged daily in the dynamic practice of EMS medical oversight. These authors are internationally renowned for their academic, administrative, and clinical achievements in medicine's newest recognized subspecialty, EMS medicine. Many are viewed as the consensus leading voice in their area of analysis contribution.

All authors were recruited by Dr. Jeffrey M. Goodloe, Associate Professor of Emergency Medicine and Director of the EMS Division within the Department of Emergency Medicine at The University of Oklahoma School of Community Medicine. Dr. Goodloe serves as an editor of this analysis and serves EMSA and its affiliated fire department-based EMS agencies as Medical Director for the Medical Control Board. Joining Dr. Goodloe in providing editorial review is Dr. Stephen H. Thomas, the George Kaiser Family Foundation Professor and Chair of the Department of Emergency Medicine at The University of Oklahoma School of Community Medicine.

The authors and their editors were charged with a straight-forward, but vanguard task: apply the peer-reviewed, evidence-based medical literature to the analysis and recommendations for an EMS system's architecture to achieve clinical outcome excellence, with acknowledgements to regulatory and financial realities. While many in the EMS profession speak of adopting "best practices", the stark reality is political, fiscal, and labor-related restraints most often curtail successful pursuit and incorporation of medical science's sage instructions.

This analysis should be given significant weight when considering the volume and quality of citations utilized in the critical appraisals of 1) Response Configuration and Modality, 2) Response Time Standards, 3) Basic and Advanced Life Support Considerations, 4) Scheduling Deployment Models, and 5) Staffing and Clinical Efficacy.

Given the importance of truly understanding the depth of evidence-based medicine contained herein, the editors purposely will limit the executive summary to only the most basic of tenets and editorial commentary, lest the reader utilize the executive summary alone to form opinions and pursue directives.

Dr. Jeff J. Clawson, instantly recognized as the pre-eminent authority on the science behind the practice of emergency medical dispatch, opens this analysis with a thought-provoking review of how an EMS system can reliably match clinical needs with scaled response configurations, mobilizing with judicious lights and siren utilization. The reader will come to the appropriate conclusion that limiting use of additional responding apparatus and personnel as well as avoiding lights and siren travel for probable lower

acuity clinical conditions, as ascertained through a validated emergency medical dispatch query system, does not limit an EMS system's ability in serving its community.

In stark contrast to service limitations, adherence to scientifically-driven response matrices will enable an EMS system to have non-transport, emergency medical response apparatus and personnel more consistently available for responses to higher acuity, time-sensitive illness and injury where critical clinical impact is needed the most. Limiting lights and siren use in an EMS system, also based upon scientifically-driven matrices, will similarly be of ultimate service to a community as its emergency medical demands can be met in a clinically appropriate manner, yet safer to all involved.

Dr. Thomas H. Blackwell, having conducted clinical research on the topic of EMS system timeliness, discerns the science, or often the lack thereof, behind many of today's "industry standard" response time expectations. The reader will find an engaging analysis that should guide EMS leaders to better match anticipated clinical conditions with response time standards, rather than forcing the spectrum of patient acuities into a response time standard derived solely from cardiopulmonary arrest data. Drs. Clawson and Blackwell provide solid reasons for change, though effective transitions in these realms will involve significant education of political leaders, EMS professionals, and the public served by both. The widely espoused beliefs of "more is better" and "faster makes a difference" applied to all EMS system clinical encounters are historically enabled and must be addressed with precision.

Dr. Marc K. Eckstein, tenured and admired in innovative medical oversight achievements in one of America's busiest EMS systems, gives the reader an excellent comparison of today's basic and advanced life support paradigms. Not surprisingly, many clinical developments introduced into EMS solely available for paramedic application are now widely provided by all levels of EMS professionals, and in some situations, the lay public itself. Dynamic changes in the clinical scopes of practices compel EMS systems of excellence to question use of traditional staffing models. The reader will reasonably question the utility of increasing paramedic staffing disproportionally to the increases in paramedic-required clinical service volume as is commonly occurring in EMS systems across America.

Dr. Charles Miramonti, a highly-trained EMS physician serving as the Administrative Chief for a particularly dynamic, urban EMS system, provides thoughtful review of available shift staffing models. The intersection of operational efficiency and clinical proficiency can prove elusive. EMS system leaders, administrative, operational, and clinical, must work cooperatively to ultimately promote optimal clinical outcomes within fiscal capabilities.

The harsh reality in staffing for clinical excellence comes with costs, both in financial and lifestyle terms, borne by EMS professionals. The willingness to accept these sacrifices for patient beneficence is integral to EMS providers being justly recognized as professionals on par with other providers within the house of medicine. For modern, high-volume, urban EMS systems, the 24-hour ambulance shift finds itself occupying a

prominent place on the stage of ideas appropriate for times past. Significant efforts should be directed to successfully transitioning to the shortest clinical shifts possible when factoring the myriad of internal and external variables applied to EMS systems as Dr. Miramonti discusses.

Dr. Henry E. Wang, prolific among EMS physician researchers, concludes this White Paper with a directed review of the medical literature related to paramedic proficiencies and patient outcomes. While the cited studies clearly support the need for paramedic care, the results are far from suggesting an unlimited number of paramedics best serve communities. Dr. Wang's findings lead to conclusions that multiple-tier EMS systems, fully utilizing the Emergency Medical Technician in his or her scope of practice for many patient encounters, may prove clinically advantageous. Considerable design impacts are involved and require particularly productive working relationships between administrative, operational, and clinical decision-makers.

While discerning the above inter-woven issues as well as identifying their definitive solutions, the Strategic-Based EMS Blueprints for Oklahoma City and Tulsa continue to serve as guidance in the clear and appropriate vision for the future in Oklahoma City's and Tulsa's EMS System. Citizens in these two vibrant metropolitan areas are fortunate their governmental and EMS system leaders have already firmly committed to the collective wisdom generated in the document's development and adoption. This document was provided for each author's reference and is provided for the reader in Appendix A. Similar reference to the last Request for Proposal issued by the Emergency Medical Services Authority for its 2008 contract was provided to each author and can be found as Appendix B.

In concluding the executive summary, the Department of Emergency Medicine at The University of Oklahoma School of Community Medicine is proud to present this thought and action-provoking analysis to the Emergency Medical Services Authority. We highly commend EMSA's leadership for the vision and dedication to patient care in the commissioning of this analysis. We gratefully thank the authors for their collective hundreds of hours dedicated not just to the communities of Oklahoma City and Tulsa, but by extension to all communities served by thoughtful, committed EMS leaders and professionals. We are enthusiastically hopeful that application of the evidence-based medicine referenced throughout this document and guided by each author's respective appraisal of such will lead EMS systems to ever greater capabilities in clinically-meaningful service.

Genesis, Scope, and Limitations of Analysis

The Emergency Medical Services Authority commissioned the Department of Emergency Medicine at The University of Oklahoma School of Community Medicine to review the "Official Announcement of Invitation to Submit Proposal" as issued by EMSA in 2008. The specific aim of the review was to apply relevant evidence-based medicine in preparation of an analysis that EMSA will use in updating and changing the document for its next release. Specific areas for the review to address included:

- Response Time Performance, Reliability, and Measurement Methods
- Integration of First Responders
- Communication System Management
- Data and Reporting Requirements
- Clinical and Employee Provisions, Work Schedules, Number of Paramedics in the System

Each author was tasked with a content area specific to their appreciated expertise and instructed to simply report what evidence-based medicine supports. The Strategic-Based EMS Blueprint for Tulsa, nearly identical to that for Oklahoma City, and the 2008 EMSA RFP were provided for contextual reference only.

The limitation of analysis is simply the recognition that medical literature illuminates evolving evidence. This White Paper for EMS System Design can be referenced itself and used with confidence in current decision distillations. The reader of this document is cautioned in far future times to consider the salience of the contents at its time of issuance and to ensure interval evidence-based medicine is reviewed when making related decisions for a particular EMS system's design.

Analysis Editors & Authors

Editors

Both editors have objectively amassed significant experience and leadership in EMS. Utilizing their combined 45 years of EMS service, these two emergency medicine physicians carefully consider the evidence-based medicine reports from expert EMS physicians in the United States in regards to the future of EMS system design in Oklahoma City and Tulsa. Further, these editors summarize the evidence-based advancements that are possible given the dedication and skill of the men and women comprising Oklahoma City's and Tulsa's EMS system with consistently tangible support from City of Oklahoma City and City of Tulsa government leaders.

Jeffrey M. Goodloe, MD, NREMT-P, **FACEP** is the Medical Director for the Medical Control Board, which provides physician medical oversight for EMS system for metropolitan Oklahoma City and Tulsa. As such, Dr. Goodloe is the Medical Director for the Emergency Medical Services Authority (EMSA) and all EMSA-affiliated EMS agencies, including the Oklahoma City Fire Department and the Tulsa Fire Department. Dr. Goodloe is Associate Professor and Director of the EMS Division in the Department of Emergency Medicine at The University of Oklahoma School of Community Medicine. During his undergraduate and medical school education, he garnered considerable experience as an EMT-Basic, EMT-Intermediate, and Paramedic within 911-based EMS systems in the Texas cities of Waco and Pasadena. He has continuously maintained state and/or national certification as a Paramedic since 1990. He is board-certified by the American Board of Emergency Medicine (ABEM) and is a Fellow of the American College of Emergency Physicians. He completed a residency in emergency medicine at Methodist Hospital of Indiana in affiliation with the Indiana University School of Medicine. During residency training, Dr. Goodloe served as the Associate EMS Medical Director for a county consortium of fire-service based EMS agencies and as a helicopter EMS flight physician. Upon residency graduation, he helped create the EMS fellowship training program at The University of Texas Southwestern Medical Center at Dallas, serving as its inaugural fellow and as attending faculty in Parkland Memorial Hospital's Emergency Department. Prior to being recruited to Tulsa in August of 2007, Dr. Goodloe served 8 years as the EMS Medical Director for the Plano, Texas Fire Department, an EMS organization providing both first response and EMS transport. Dr. Goodloe is the only physician in the United States currently credentialed as an on-site reviewer for the Commission on Accreditation of Ambulance Services and as an organization and course reviewer for the Continuing Education

Coordinating Board for Emergency Medical Services. These organizations promulgate "gold standard" accreditation criteria for ambulance services and EMS CE, respectively.

Stephen H. Thomas, MD, MPH, FACEP is the George Kaiser Family Foundation Professor and Chair of the Department of Emergency Medicine at The University of Oklahoma School of Community Medicine. Dr. Thomas is board-certified by the American Board of Emergency Medicine (ABEM) and is a Fellow of the American College of Emergency Physicians. He completed both a residency in emergency medicine and a subsequent fellowship in helicopter emergency medical services at East Carolina University in Greenville, North Carolina. Dr. Thomas holds a Masters of Public Health from Harvard College. Immediately prior to being recruited to Tulsa in January of 2009, he served in multiple leadership roles over 15 years with Harvard Medical School's Department of Emergency Medicine, Massachusetts General Hospital, and Boston MedFlight. Distinguished among academic emergency physicians, Dr. Thomas is frequently invited to present scientific work at medical conferences around the world. He is one of the most widely published authors of peer-reviewed evidence-based medical literature in helicopter EMS and pre-hospital analgesia.

Authors

Jeff J. Clawson, MD is internationally regarded as "the father of modern emergency dispatch." An EMS World review of the pioneers of modern era EMS described Dr. Clawson as follows:

In the late 1970s, as part of its program to improve survival of vehicle crash victims on the nation's highways, the U.S. Department of Transportation drafted curriculum guidelines for Emergency Medical Dispatch (EMD). A plan to train EMTs to be dispatchers was developed, but never took off. In 1978, Dr. Jeff Clawson, medical consultant for the Salt Lake City Fire Department, established a second set of protocols, based in part from these federal guidelines, as part of an attempt to reduce the number of Code 3 medical runs and, relatedly, the number of fire department-related vehicle accidents. These protocols employed key questions, prearrival instructions and dispatch

priorities for a full range of medical emergencies. Although not widely embraced initially, Clawson's system has since evolved into the Medical Priority Dispatch System, the nation's leading commercial EMD product. The recognition of EMD as a vital link in the emergency medical response chain led to the founding of the National Academies of Emergency Dispatch in 1988. Throughout the years, Clawson has worked tirelessly to promote high standards in training and education and a universal emergency dispatch protocol, impacting countless lives.

Without equal in peer, Dr. Clawson is imminently qualified to analyze the response configuration and modality appropriate for a large, urban EMS system to utilize in relation to its emergency medical dispatch capabilities.

Thomas H. Blackwell, MD, FACEP served as Medical Director for the Charlotte, North Carolina EMS system, including the Charlotte Fire Department and Mecklenburg EMS Agency (MEDIC) for nearly 20 years. He retired earlier in 2011 to become the principal physician architect for the EMS system in the country of Zambia. Dr. Blackwell is quickly recognized among EMS physicians and field practitioners as a leading voice in the development of EMS medicine. During his successful tenure in Charlotte, he was the Medical Director of The Center for Prehospital Medicine in the Department of Emergency Medicine at Carolinas Medical Center. He developed an EMS fellowship training program that produced a multitude of successful EMS physicians and that is widely indexed in the development of other EMS fellowships. He also served as an attending physician in the Emergency Department at Carolinas Medical Center. Among his varied research interests and published studies, Dr. Blackwell is known for his scientific analysis of EMS response times-related clinical outcomes. Dr. Blackwell was integral in the development of the prototype mobile hospital known as Carolinas Med-1. Med-1 was deployed to the Gulf Coast on September 2, 2005 in response to the aftermath of Hurricane Katrina and continues to be utilized in the response to many of America's most devastating natural disasters. He is Executive Director and Chief Medical Officer for MED-1 Partners. Dr. Blackwell received his undergraduate degree with honors from The Citadel Military College in Charleston, South Carolina. Post graduation, he finished medical school Cum Laude at Creighton University School of Medicine in Omaha, Nebraska. Blackwell completed his residency in emergency medicine at the University of Cincinnati College of Medicine. He is board-certified by the American Board of Emergency Medicine (ABEM) and is a Fellow of the American College of Emergency Physicians.

Marc K. Eckstein, MD, MPH, FACEP is a Professor of Emergency Medicine at the Keck School of Medicine of University of Southern California, and the Director of Prehospital Care at the Los Angeles County/University of Southern California (LAC/USC) Medical Center. Dr. Eckstein also serves as the Medical Director of the Los Angeles Fire Department. A former New York City paramedic, he has over 20 years experience in EMS. He is responsible for introducing major changes in the Los Angeles EMS system, including tiered dispatch, 12- lead ECG, waveform capnography, standing field treatment protocols, and cardiac centers. After obtaining his Bachelor of Science Degree with a major in microbiology from Cornell University in 1985, Dr. Eckstein obtained his Doctor of Medicine from the Mount Sinai School of Medicine in New York in 1989. He completed his residency training in Emergency Medicine at the Los Angeles County/University of Southern California School of Medicine Medical Center in 1993, serving as Chief Resident during his fourth year of training. Dr. Eckstein then became the Director of Prehospital Care at LAC/USC Medical Center in 1993, additionally being named the Medical Director of the Los Angeles Fire Department in 1996. Dr. Eckstein is the Co-Principal Investigator for the Los Angeles Prehospital Stroke Screen study, which was incorporated into the 2000 American Heart Association Guidelines, and the Field Administration of Magnesium for Stroke (FAST-MAG) study, which is a multi-million dollar, multi-center, NIH funded prehospital stroke trial. He is a certified instructor in WMD with the Office of Domestic Preparedness. He has published over 75 peer-reviewed articles, abstracts, and book chapters, and lectures around the world on EMS and disaster preparedness topics. He is board-certified by the American Board of Emergency Medicine (ABEM) and is a Fellow of the American College of Emergency Physicians.

Charles Miramonti, MD, FACEP is the inaugural Chief of Indianapolis EMS. A well-respected EMS physician, he was recruited to establish this administrative leadership role in one of the most innovative organizational paradigm changes involving a large, urban EMS system. Indianapolis EMS reflects the merger of the EMS-related administrative and clinical operations from Indianapolis Fire Department, Wishard Ambulance Service, Speedway Fire Department, Perry Township Fire Department, and Wayne Township Fire Department. Among the myriad of

administrative oversight duties integral to the success of the establishment of Indianapolis EMS, Dr. Miramonti was and continues to be tasked with staffing and shift design to promote desired clinical outcomes. He graduated from both the emergency medicine residency and the Out of Hospital Care/EMS fellowship at Indiana University (IU) School of Medicine. He is board-certified by the American Board of Emergency Medicine (ABEM) and is a Fellow of the American College of Emergency Physicians. Dr. Miramonti serves as a core faculty member within the IU Department of Emergency Medicine, as Deputy Medical Director of Out of Hospital Care with responsibilities for Operations within the Division. Dr. Miramonti also manages several disaster preparedness grants and projects related to acute healthcare for the city of Indianapolis and for multiple surrounding counties. He is also the co-director of the Out of Hospital Care Fellowship at IU School of Medicine.

Henry E. Wang, MD, MPH, MS is Vice Chair for Research at the University of Alabama - Birmingham (UAB) Department of Emergency Medicine. He is widely regarded as an international authority in EMS airway management and skill proficiency analysis among paramedics. Dr. Wang continues to lead multiple scientific investigations, having already amassed a prolific compendium of peer-reviewed, published studies focusing upon paramedic-performed intubation and related events and clinical outcomes. Dr. Wang's research in prehospital airway management is supported by a K08 Clinician Scientist Development Award from the Agency for Healthcare Research and Quality, and is believed to be the first grant of this type awarded in the area of prehospital care. He plays a leading role in the multi-institutional NIH-sponsored Resuscitation Outcomes Consortium (ROC) as the UAB ROC Principal Investigator, as well as conducting his own NIH-funded research. Given his unparalleled involvement in the scientific analysis of paramedic airway skills, Dr. Wang is particularly well qualified to discern effects of paramedic staffing numbers upon critical procedural dilution. His research interests extend to sepsis and post-cardiac arrest therapeutic hypothermia. Dr. Wang serves as the Director of the Therapeutic Hypothermia Program at UAB, leading the provision of this therapy within the Emergency Department and Intensive Care Units. In addition to his core faculty role in the UAB Department of Emergency Medicine, Dr. Wang serves as the Co-Director of UAB's Center for Emerging Infections and Emergency Preparedness. Dr. Wang earned his MD degree from the University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School, Piscataway. He is an emergency medicine residency graduate from Christiana Care Health System in Newark, Delaware. He is board-certified in emergency medicine by ABEM. After residency graduation, he successfully completed the Emergency Medicine Research Fellowship at University of Pittsburgh, additionally earning both the Master of Public Health and Master of Science degrees from the University of Pittsburgh.

Response Configuration and Modality

Jeff J. Clawson, MD

The EMS system serving metropolitan Oklahoma City and Tulsa could save substantial resources, reduce liability, and incur considerably less risk of emergency vehicle collisions and their resultant injuries. These desirable goals can be accomplished, while continuing to provide first-rate patient care, by implementing a comprehensive, tiered response plan that reduces the number of emergency lights-and-siren responses and the number of times first-responder units are deployed. By fully employing the Medical Priority Dispatch System (MPDS) priority levels and codes to set responses more in line with the patient's condition and the actual need for EMS resources, a safer, more efficient EMS system will result.

The argument for reducing unnecessary emergency lights-and-siren response (also known as running "HOT") is compelling. Numerous incidents of death and disability occur each year owing to emergency vehicle collisions. In a 10-year study, the Denver EMS system reported that 59 of 82 claims (72 percent) against it were related to motor-vehicle collisions involving an ambulance, and these led to six lawsuits. For the cases where run status was known, 59 percent of the accident-related claims involved HOT response mode, compared with 10 percent of such claims for COLD response mode (traveling to the scene of EMS request without use of lights-and-siren). Emergency lights-and-siren utilized runs were involved in five of the six claims that went to litigation.[1] Numerous other sources have similarly confirmed risks of HOT response.[2-4] Several studies have examined the amount of time actually saved in responding HOT and have found minimal time differences between HOT and COLD response.[5,6]

The Principles of Emergency Medical Dispatch – 4th Edition (Clawson, Dernocouer, Rose; 2008) states: "The collective perception of lights-and-siren is that their use indicates a real emergency situation. The principles of priority dispatch have resulted in a redefining of emergency. When a person's life clearly depends on quick action and rapid unit response, lights-and-siren is an important tool. However there are many times when a situation that appears urgent in the field will not be helped by the use of lights-and-siren. The time saved using them (either going to the patient or to the hospital) is long gone before the patient benefits from definitive care."[7]

Given the potential risks and the lack of evidence of significant time saved and any clinical benefits derived from the practice of running HOT, a prioritization and response plan that includes the use of a COLD response for lower acuity calls is essential for both system management and risk management. The safety and efficacy of the MPDS in assigning EMS calls into low, moderate, and high acuity levels has been well established in several published studies. In a study of the Long Beach, California system published in the Journal of Prehospital and Disaster Medicine in 1992, Stratton, et. al., concluded:

"Emergency Medical Dispatchers, medically controlled and trained in a nationally recognized dispatcher triage system, were able to provide medical triage to incoming emergency medical 9-1-1 calls with minimal error for under-triage of ALS runs and high selectivity for non-emergency situations."[8]

As an National Academy of Emergency Dispatch (NAED) Accredited Center of Excellence (ACE), Oklahoma City's and Tulsa's EMD centers operated by the Emergency Medical Services Authority have consistently demonstrated a high level of compliance to MDPS protocols. This high compliance ensures coding accuracy (the basis of safe pre-set response assignments), and reduces the chance of a dispatch triage error when tiered response is used, particularly in the case of ALPHA and OMEGA level codes, where fewer resources and somewhat longer response times are necessary to maintain system balance and efficiency.

Below is a commonly used model for response, in systems utilizing ALS transport ambulances and BLS/ALS trained fire department first responders. The response units listed in this table are considered a standard, baseline response to the MPDS priority levels.

MPDS PRIORITY LEVEL	**RESPONSE UNITS**	**MODE**
ECHO	AMBULANCE FIRE DEPARTMENT	HOT HOT
DELTA	AMBULANCE FIRE DEPARTMENT	HOT HOT
CHARLIE	AMBULANCE	COLD
BRAVO	FIRE DEPARTMENT AMBULANCE	HOT or COLD COLD
ALPHA	AMBULANCE	COLD
OMEGA	AMBULANCE or REFERRAL TO ALTERNATE CARE	COLD

Exceptions to Baseline Responses:

In addition to the MPDS Priority Level, the complete MPDS code contains a determinant descriptor and in some cases a sub-defining suffix to allow for further refinement of the local response assignment. It is common for local authorities to create some notable exceptions to the standard baseline responses listed in the table above. These exceptions are selected based on historical, data-based case outcomes, suggesting an increased risk of specific patients – in a specific MPDS code – having greater potential for cardiac arrest or other severe outcomes. Below are several examples:

1. CHARLIE-level cases coded as 'Not Alert' or 'Altered Level of Consciousness:' (13-C-1; 18-C-1; 23-C-1; 26-C-1; 28-C-1); 33-C-1) will get an ALS ambulance responding HOT.
2. CHARLIE-level cases involving fires and hazardous materials (7-C-1-4; 8-C-1) will get fire department first responders (HOT)/ALS ambulance (COLD).

ECHO and DELTA codes:

In Tulsa, these two codes together comprise approximately 27% of all EMS cases (ECHOs at 1.39% and DELTAs at 25.9%). Since over 90% of all cardiac arrests and the vast majority of cases with severe patient outcomes will be contained within the DELTA and ECHO level MPDS codes, these two priority levels receive a maximum response utilizing a first responder vehicle and an ALS transport ambulance, both HOT. In recent studies, the traditional upper response time limit of 8 minute, 59 seconds for ALS arrival on DELTA- and ECHO-level codes has been shown to be of little or no value in achieving improved survival and better outcomes overall. However, some research suggests that early defibrillation by first responder crews will increase survival for cardiac arrest patients. And given that an ALS ambulance may be the closest unit to any given cardiac arrest call location, the rapid response by both units is still believed to have some value. A number of systems have switched to an ALS-response time upper limit of 10 minutes, 59 seconds without any reported decrease in patient survival or adverse outcomes. This is likely due to the widespread use of automated defibrillators by first responder BLS crews who are able to arrive at the patient's side several minutes before the ALS crew.

CHARLIE codes:

Most CHARLIE-level calls do not require a first responder. Notable exceptions are listed in the examples above. While many systems stipulate a lights-and-siren (HOT) response for all or most CHARLIE-level calls, there is no evidence that running HOT to the vast majority of CHARLIE calls improves patient outcomes, or even saves a significant amount of time, as mentioned above. Our recommendation, therefore, is that the majority of CHARLIE-level codes be handled as COLD response. Exceptions for "Not Alert" CHARLIE level cases, as noted above, can be made to include these specific codes as HOT responses. Some may argue that in an all-ALS transport system such as exists in Oklahoma City and Tulsa, there is no response difference between an ALPHA level and a CHARLIE level. While the resource assigned does not differ, what should change is the degree of urgency and the acceptable upper response-time limit. While not truly scientific, it is generally thought of as good practice to set an upper response-time limit of under 15 minutes for COLD CHARLIE level calls. Many high-performance EMS systems set this response time standard at 12 minutes, 59 seconds. Since CHARLIE-level codes constitute approximately 20% of the total EMS cases in the Tulsa-based system, setting the majority of these cases as a single ALS unit COLD response will reduce collision risk and potentially keep first responders available for the more critical DELTA- and ECHO-level cases.

BRAVO codes:

BRAVO-level codes in the MPDS are those cases that require a rapid BLS response for initial assessment. Since most of these cases do not require ALS-level treatment, or involve acutely ill or injured persons, it is sufficient to have only the closest BLS unit respond HOT (or even COLD in some cases). Many BRAVO codes contain one or more unknown elements, information that was unavailable to the EMD, and therefore prevented her/him from assigning a higher or lower priority level to the case. Other

BRAVO cases include moderately serious trauma and bleeding, conditions that frequently can be managed with splinting, bandaging, bleeding control, or other BLS-type treatment. One BRAVO code of particular interest is the 32-B-3 (Unknown Problem, Unknown Status). In a recent NAED/IAED study done on a very large data set from London Ambulance Service, the 32-B-3 code contained the highest incidence of cardiac arrest of all the BRAVO-level codes.[9] Given this data, an exception to the baseline BRAVO-level response could be justified. Sending two response vehicles HOT, including the ALS transport ambulance, would be a suitable response for the 32-B-3 code.

A recent review of the Tulsa-based EMS data for 2010 revealed 4 cardiac arrests coded in the BRAVO level for the entire year – all 4 coded as 32-B-3.

Some agencies may respond COLD to some, or all, BRAVO-level calls. This practice works best in urban areas where fully staffed fire stations are able to provide adequate first responder resources with relatively short driving distances to the majority of call locations. For example, the Salt Lake City Fire Department has been responding COLD to all BRAVO calls since 1998. This amounts to over 90,000 responses where a HOT response was spared. To date, there have been no adverse incidents reported as a result of this practice. It is worth noting here that Salt Lake City Fire Department compared BRAVO-level response times for 1st responding BLS engine companies before and after the COLD BRAVO response policy was instituted (1997 vs. 1998), and the average BRAVO-response time was lengthened by less than 30 seconds.[10]

ALPHA and OMEGA codes:

Since these two priority levels combined make up approximately 22% of all EMS responses in the Tulsa-based system, significant time and expense is saved for first responder agencies such as the Tulsa Fire Department, by not responding at all. A single transport ambulance response, no lights-and-siren (COLD), is the typical ALPHA-level response. A COLD response is able to deliver sufficient resources to the scene, while reducing the risk of emergency vehicle collision. A response time of 20 minutes or less is generally considered safe to meet the needs of these patients (some agencies report using a response time standard of 29:59). The low-acuity nature of ALPHA-level codes in the MPDS has been well documented. In a 2007 study of over 2000 ALPHA level patients, Hinchey, et al., state:

"Ninety-nine percent of EMS requests for service triaged as ALPHA by Emergency Medical Dispatchers using Medical Priority Dispatch System ProQA™ software did not meet any high-acuity criteria."[11]

Of the less than 1% of patients who did meet the high-acuity criteria, there were no cardiac arrests, 1 stroke case, and 1 patient who met trauma criteria. The others were 10 patients with abnormal vital signs and 9 patients who received medications.

One common exception to the baseline ALPHA response is the response needed for the 17-A-3 (Fall, Public Assistance) and 17-A-3G (Fall, Public Assistance, on the Floor/Ground). These patients are often best served with a fire department 1st responder

crew, since they are often uninjured, but need an assessment to determine nothing serious is going on, and before, in certain cases, providing assistance getting up from the floor.

OMEGA codes can be considered for referral to other healthcare agencies and treatment at non-emergency facilities, or treatment at an emergency department using non-ALS, non-emergency transportation. Tulsa uses the OMEGA version of the MPDS, which provides 30 more OMEGA-level codes and cases than the standard MPDS version. Tulsa should explore implementing the NAED Emergency Clinical Assessment System (ECAS) that utilizes a registered nurse linked with the 911 center to provide OMEGA-level patients with treatment and transport options outside of the ALS transport system. Several NAED accredited sites in North America have already implemented the ECAS program, and many others are considering it as a safe, cost-effective, alternative to an EMS response and ambulance transport to an emergency department for every EMS request to 911.

Benchmark Systems:

Two EMS systems of comparable size and similar resources to Tulsa are Richmond, VA and Salt Lake City, UT. Both have EMS systems that employ only MPDS-trained Emergency Medical Dispatchers, and like Oklahoma City and Tulsa, their communications centers are NAED Accredited Centers of Excellence. In conclusion, the tables below show the current EMS response plan for each system.

Salt Lake City, UT

MPDS PRIORITY LEVEL	**RESPONSE UNITS**	**MODE**
ECHO	Closest Apparatus (any) Closest Fire Engine (ALS or BLS) ALS Ambulance	HOT HOT HOT
DELTA	Closest Engine (ALS or BLS) ALS Ambulance	HOT HOT
CHARLIE	ALS Ambulance	COLD
BRAVO	Closest BLS Engine BLS Ambulance	COLD COLD
ALPHA	BLS Ambulance	COLD
OMEGA	BLS Ambulance or Referral	COLD

Richmond, VA

MPDS PRIORITY LEVEL	**RESPONSE UNITS**	**MODE**
ECHO	Closest BLS Engine ALS Ambulance	HOT HOT
DELTA	Closest BLS Engine ALS Ambulance	HOT HOT
CHARLIE	ALS Ambulance	HOT (or COLD)
BRAVO	ALS Ambulance	HOT (or COLD)
ALPHA	ALS Ambulance	COLD
OMEGA	Referral to ECAS (Nurse Triage)	N/A

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EMS Response Time Standards

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Case History

Charlotte, North Carolina is in Mecklenburg County and resides in the Southern Piedmont Region of the State. A third-service Emergency Medical Services (EMS) system was established in 1978 by the Mecklenburg Board of County Commissioners. This system started as a basic life support (BLS) provider and upgraded to the advanced life support (ALS) level in 1984. While this service is supported and endorsed by the Board of Commissioners, adequate support and funding did not keep pace with the service requirements for a rapidly growing and expanding community. Annualized call volume was approximately 60,000 and this was supported by 20 ambulances; however, only about two-thirds of those were available to respond due to staff and operational issues. Between 1994 and 1995, the 90% fractile response time for EMS was approximately 16 minutes. Whether this was clinically significant remains unclear.

The Chief of the Charlotte Fire Department recognized that this prolonged response time issue was a potential problem and saw a civic need to improve the system by suggesting the consolidation of EMS into the fire service, as he felt that he had the resources required to improve the timeliness of service delivery. At that time, the local newspaper published a series of featured stories on this political issue and many citizens testified as to their personal accounts of problems they had encountered and felt needed correcting. One story involved a stroke patient. It was reported that "if life-saving oxygen would have been available a few minutes earlier, the stroke would not have occurred." The two major issues of concern were the response times and financial support.

Since EMS was a County agency and the Charlotte Fire Department was under City Government, the Board of County Commissioners felt it would be appropriate to assemble a "Blue Ribbon Commission" to study the future of EMS in Mecklenburg County. The commission was comprised of civic leaders and physicians. A consultant was hired and various system design models were presented and entertained. Proposals for system enhancements were also submitted to the Commission by the Charlotte Fire Department and Mecklenburg County EMS.

Towards the end of the decision timetable, the Chief Executive Officers of the two competing healthcare systems in the County agreed to co-manage the system, to set up an Executive Board with representatives from both systems and the County, and to establish a medical control board with four physician members from each system. After hearing and understanding this proposal, the Board unanimously voted to adopt the hospital's plan. Thus, the Mecklenburg EMS Agency was created in 1998 and along with many operational and administrative specifications, a new set of response time criteria was adopted with penalties for failure to comply.

EMS System Design

A discussion on response times cannot be complete without mention of EMS system design, for this is probably the most important and fundamental composite of a system strategy for operational success. It drives other performance indicators and is probably the most significant aspect as to what "really matters" in a community. The design includes all components of an EMS system including communications infrastructure; first responder support; response; scene activity and care; destination transport; performance specifications; levels of provider and scope of practice outlined by State and local protocols; and prospective and retrospective medical direction. While an EMS system design should be based on quality patient care, there may not be substantial supporting evidence for each component. Prehospital research is lacking because of the difficulty in developing prospective, randomized, case-controlled trials in the field setting. So many practices in EMS are not based on evidence-based, peer-reviewed literature, but rather what "intuitively makes sense" and what has been historically successful.

Basically there are two categories of patients to consider when developing a system and the specifications: (1) medical, or those suffering acute or chronic illness and (2) trauma, specifically those critically injured. Several prehospital interventions for medical patients actually save lives, specifically early cardiopulmonary resuscitation (CPR), airway support using manual maneuvers, ventilations using bag-valve mask and now blind insertion airway devices, early defibrillation for particular cardiac dysrhythmias, epinephrine administration for anaphylaxis, and emergent medication administration and positive pressure support for acute asthma or chronic obstructive pulmonary disease exacerbation. Interventions for many acute medical conditions are very similar if not the same in the prehospital and hospital settings, with less focus on rapid transportation.

For traumatic injuries, there are few prehospital interventions that improve survival. Airway support, hemorrhage control and spinal and/or fracture immobilization are important, but recognition of potential internal injury and rapid transport to an appropriate receiving facility for definitive care is critical.

The EMS system design can and should capitalize on these issues in order to maximize care delivery and resource utilization. The scope of practice for emergency medical technicians (EMT) at the basic and paramedic levels both follow a similar approach, initiating basic life support (BLS) care and then progressing to advanced life support (ALS) as required, understanding that only about 5-10% of an urban EMS system's calls actually require interventions at an ALS level. Basic emergency medical technicians (EMT) typically have the ability and capability to save lives depending on local system protocols and what the state allows in the EMT scope of practice. For the medical case, airway support and protection, CPR, automatic defibrillation, and epinephrine administration using an autoinjector may all fall within the basic life support scope of practice. These time-sensitive interventions matter and can save lives. For trauma, airway support and ventilation, bleeding control, and immobilization may all be performed prior to arrival of ALS care and ambulance transportation.

Prehospital Response Intervals

There are multiple prehospital response intervals that may be considered for a system. Most have been described in detail earlier.[1] An understanding of some important intervals will be important when considering prehospital response times.

Calls for request received at the primary public safety answering point (PSAP) officially starts the clock. Such primary PSAPs are nearly universally operated by law enforcement agencies. There is little influence upon improving time from illness onset or injury to when the emergency services system is accessed apart from community education through emergency medical condition symptom recognition programs and injury prevention interventions. Call-takers at the primary PSAP may also provide all public service communications or they may ascertain the request and transfer the call to a secondary PSAP for a specific response (fire or EMS). Depending on the relationship with the entity providing the primary PSAP functions, mechanisms to reduce response times in call handling may be difficult. However, performance may be monitored and studied from the time a call is received at the secondary PSAP.

From this point, there are several definitions as to when the response time clock may start, including the following in chronological order:

1. Time call received at the secondary PSAP

2. Time when chief complaint and/or address is verified

3. Response unit dispatched (non-transport or transport unit)

4. Response unit deployed or wheels turning (non-transport or transport unit)

Similarly, there are multiple times when the response time clock stops:

1. Response unit arrival on-scene (non-transport or transport unit)

2. Response staff arrival at the patient's side (non-transport or transport unit)

The time between arrival on-scene and arrival at the patient's side may be substantial, for instance when access to the patient involves entry through security-protected or high-rise buildings and apartment complexes, additionally compounded where parking is remote.

The actual method of measuring response times is another issue for consideration. Using the mean, or average response time for a system does not adequately reflect an accurate measure of a system's performance. The average is just that, there will be outliers at both ends of the spectrum and such could potentially misrepresent the system's performance, with half of the calls meeting a standard, but the other half not. Median times are better because this will be a "middle of the road" mark. However, there will be an equal number of outliers on each side of that mark. Fractile times are truest measure in the report of response time performance. This method requires that a preset standard for response time be set, then determining the percentage of calls that fall within this time standard, e.g. a 90% fractile response time of 10 minutes:59 seconds means that 90% of the calls have response times at 10 minutes:59 seconds or less.

Evidence-Based Prehospital Response Time

Some EMS systems have advocated standards that support that a 90% fractile response time of 4-minutes for BLS first responders and 8-minutes for the ALS transport ambulance. Such standards are laudable and attainable, but the question is at what cost and what is the evidence that supports such recommendations.

There is one study that continues to be referenced today that recommended this time standard for EMS performance.[2] This was perhaps the first article that actually looked at EMS response times and survival. The investigators concluded that the most important determinant in survival from cardiac arrest is the time from collapse until defibrillation and that victims of non-traumatic cardiac arrest have a better chance of survival if BLS CPR is initiated within 4 minutes of collapse, and ALS with defibrillation is provided within 8 minutes. There was less emphasis on response time, but only time to defibrillation.

Further, this article was published over 30 years ago and supported defibrillation within 8 minutes which is unacceptable under today's standards now that public access defibrillation and first responder defibrillation programs have been established. In addition, response time recommendations from this paper were extended to all patients; however, the results only addressed cardiac arrest from a medical etiology with no consideration for trauma. Despite these limitations, this article continues to be referenced as a basis for the response time standards set in many modern EMS systems.

Pell, et. al. attempted to determine the association between ambulance response times and cardiac arrest survival and to estimate the effect of reducing response times on survival.[3] This study was performed in Edinburgh, Scotland with the Scottish Ambulance Service that at the time had a 50% fractile response time of 7 minutes and a 90% fractile response time of 14 minutes. Further, the service was all BLS, though with defibrillation capability. Their analysis determined that reducing response times from 14 to 8 minutes and 5 minutes would increase the proportion of survivors from 6 to 8% and 10 to 11%, respectively. The model proposed, however, was based solely on numerical modeling and not actual patients. It is interesting to note that similar results would be appreciated in future studies described herein.

A recent study published from the Resuscitation Outcomes Consortium (ROC) challenged the "golden hour" for trauma.[4] The objective was to evaluate the association between EMS time intervals and mortality in high-risk trauma patients. This study was conducted in 10 ROC sites, and involved 51 trauma centers, 146 EMS systems, and 3700 patients in the dataset. The investigation was unable to support the contention that shorter prehospital times improve outcome from critical injuries, and these findings persisted across many variables including response time, scene time, transport time, and injury severity score (ISS).

Pons, et. al. published the first paper that scientifically looked at EMS response time impact in trauma care by evaluating the effects of exceeding an 8 minute response time guideline on survival from traumatic injuries.[5] This was a retrospective study conducted with the Denver Paramedic Division over a 6 month time period. The investigators used

an arbitrary assigned response time mark of 8 minutes and determined what the effect would be on survival from traumatic injuries if this time was exceeded. A total of 3490 patients were categorized into 2 groups: those who had a response time of 8 minutes or less (n=2450) and those with a response time of greater than 8 minutes (n=1040).

Patients were further stratified by age, mechanism of injury, and Injury Severity Score (ISS). The results showed no difference in survival between the 2 groups, even when stratified by the above criteria with one unexpected exception. Survival actually increased in the prolonged response time group in patients with an ISS of greater than 25. One would predict that this group would have the lowest chance of survival (more critical injuries and prolonged response time), but this was not observed.

The investigators further stratified each patient in each group into 2 minute incremental response times controlling for ISS, endotracheal intubation, and injury type. From this analysis, there were no differences in survival for any of the response time intervals. Finally, a logistic regression analysis was performed relating survival to the independent variables of response time, age, gender, ISS, injury type, and intubation. Again, there was no effect of response time on survival. Results from this study concluded that response time had no effect on survival, and that exceeding the standardized 8-minute response time criterion had no effect on survival from traumatic injury.

Since 2002, there have been 3 papers focusing upon prehospital response times for medical and trauma patents. Blackwell and Kaufman attempted to determine the effect of standardized response time specifications (90% fractile = 10:59 and 12:59) on survival to hospital discharge and to calculate the probability of mortality as a function of arbitrarily assigned response times, in an effort to determine if reducing operational response times would confer improved clinical survival.[6]

This study was retrospective in design and conducted in an urban setting. Over a 6 month time frame, 5424 patients were included in the dataset. Each patient was categorized as a Priority 1 (emergent, life-threatening) or 2 (emergent, non-life threatening) and each was transported to a level-1 trauma center. The mean response time for survivors was 6.9 minutes and 7.06 minutes for non-survivors, for a difference of 6 seconds. The median response times were 6.4 minutes for survivors and 6.8 minutes for non-survivors, or 24 seconds (p=0.10). There were a total of 71 non-survivors that translated to a mortality prevalence of 1.31% (95% CI: 1.02%, 1.65%). The probability of mortality as a function of response time was determined by plotting the proportion of patients who did not survive at each integer response time (1 to 2 minutes, 2 to 3 minutes, and so forth up to 12 minutes) with the number of non-survivors that would have been expected if the overall observed death proportion of 1.31% was uniform across all times, thus evaluating what would be expected compared to what was actually observed. There were no inequalities between the actual observed deaths and those that were expected.

It was noted, however, that the number of actual deaths consistently fell below the expected number for response times that were less than 5 minutes, but exceeded the number at response times ranging from 5 to 12 minutes. So, a post- hoc test was performed for the effect on survival of response times dichotomized at less than 5 minutes and greater than or equal to 5 minutes. There were 7 deaths in the group with

less than a 5 minute response time and 64 deaths in those with greater than or equal to 5 minutes (p=0.002). The mortality risk curve was generally flat over the response time intervals exceeding 5 minutes.

Translated, this means that in the first 5 minutes, survival could be improved if response times were less than 5 minutes, but after 5 minutes the curve flattened. Thus, decreasing response times from 10:59 minutes to 9:59 minutes, 9:59 minutes to 8:59 minutes and so forth down to 5 minutes would not improve the potential for survival. It was concluded that when comparing actual and expected survival based on arbitrarily assigned response times, there were no statistically significant differences for times between 5 and 10 minutes and that mortality risk appeared to be sensitive to times less than 5 minutes. While there was little evidence to support reducing the current response time specification of 10:59 and 12:59 minutes, there was evidence to suggest that very low response times (less than 5 minutes) are associated with a low risk of mortality and may theoretically save as many as 6 to 10 lives per year. The results are challenging in that the costs in resources to save this many lives would be substantial.

Pons, et. al. then attempted to evaluate the effect of paramedic response time on unselected patient survival to discharge, controlling for confounders.[7] This was a retrospective study in an urban ALS system that used a multivariable logistic regression model to assess the effect of response time on survival controlling for age, gender, scene time, transport time, and 3 categories of condition severity. A total of 9559 patients were placed into 1 of 3 categories (low, intermediate, and high risk of mortality) based on their predicted risk of mortality from information obtained from the emergency department record.

Using this logistic regression where response time was modeled as a continuous variable, there was no effect on survival. When response time was arbitrarily categorized as less than or equal to 4 and greater than 4 minutes, a survival benefit was identified in the less than or equal to 4 minutes group for intermediate and high-risk patients. There was no survival benefit identified in medical patients with a non-cardiac arrest etiology. When response times were categorized into less than or equal to 8 and greater than 8 minutes, there was no survival benefit identified at the 8 minute cutoff. These results demonstrated that paramedic response times of greater than 4 minutes did not influence mortality, even after controlling for confounders, but a survival benefit was identified for response times less than 4 minutes for patients determined to have an immediate or high risk of mortality.

The final of these three studies within the last decade examined EMS response times, the clinical care provided, and patient outcome for high acuity 9-1-1 calls with the aim to determine if the local response time specifications and clinical care provision assets for that community were appropriate.[8] This investigation concerned the relationship between the duration of time defined by the period measured between a call received at the 9-1-1 dispatch center, arrival of an ambulance at the scene, and outcome of the patient, testing the hypothesis that patient outcomes do not differ substantially based upon an explicitly chosen ALS response time specification. This was a case-controlled, retrospective design conducted in an urban EMS system for a period of 12 months. All patients (cases and controls) were categorized as emergency life-threatening and transported to a level-1

trauma center. Cases comprised the 373 patients who had response times exceeding 10:59 minutes. Controls were 373 computer-randomized patients with response times less than or equal to 10:59 minutes. Survival to hospital discharge was 80% for the cases (95% CI: 76%to 84%) and 82% for the controls (95% CI: 77%to 85%). This yielded a 95% CI for the 2% difference in proportions of -6% to +4%.

This analysis suggests that when compared with patients who wait less than 10:59 minutes for an ALS response, priority patients who wait longer than 10:59 minutes could experience between a 6% increase to a 4% decrease in mortality. Further, there was no evidence of increased mortality for priority patients where ALS response time exceeded 10:59 minutes.

Evidence Conclusion

Many studies (mostly those involving non-trauma patients) include response times as part of the dataset, but most focus upon scene time and total prehospital time. Only a few studies looked at actual response time, but it is this parameter that has often become a measure by which an EMS system is judged effective or not. Many existing response time standards adopted for EMS systems were developed based on the one intervention of defibrillation. Three studies demonstrated no improvement in outcome based on short response times; however, it was demonstrated that a response time of less than 4 or 5 minutes may improve survival. Perhaps a better method of setting standards would be to establish response time standards for certain interventions, and not applied to EMS calls universally. Setting response standards for initiation of CPR for cardiac arrest, epinephrine administration for anaphylaxis, and manual maneuvers for foreign body obstruction, or BLS or ALS ventilation for a compromised airway likely represents a better clinical outcomes-linked model.

Methods to decrease Response Time

The advantages and disadvantages of using warning lights and sirens (WLS or referred to as HOT by Clawson) to decrease response and transport times have been studied with variable results and conclusions. Policies governing use of WLS should be based on a thoughtful risk:benefit analysis. Between 1991 and 2000, 300 ambulance crashes occurred involving 82 fatalities of EMS vehicle occupants, 27 of which were EMS workers, and 275 occupants of other involved vehicles and pedestrians.[9] In addition, EMS vehicle collisions also result in significant property damage, personal injury including death, lawsuits, and public and political discord.

The earliest study that looked at the use of WLS was conducted in rural Greenville, North Carolina by Hunt and colleagues to determine if response from scene to the emergency department is faster with WLS.[10] The study used a convenience sample of patient transports from scene to hospital with an observer following the same route at a later date and time. Of the 50 calls evaluated, WLS saved an average of 43.5 seconds with a range of 2 minutes 42 seconds faster to 2 minutes 49 seconds slower (p=0.0001). No clinical outcome data was evaluated.

O'Brien, et. al. attempted to determine if WLS during transport to a hospital reduces time and if so, does the time saved result in clinically significant changes in emergency department interventions or patient management.[11] This study was also a convenience sample with an observer following the exact route at a later time, but in an urban system. Of the 75 calls, the mean time using WLS was 11 minutes 6 seconds and without WLS was 14 minutes 56 seconds, or a difference of 3 minutes 50 seconds ($p<0.0005$). Clinically, 61 patients (81%) had no emergency department intervention while 14 (19%) did with 4 (5%) being considered a critical intervention. These researchers concluded that while WLS decreased transport time by 35%, the time saved was not clinically significant for the majority of patients with only 5% of patients (actual number of 4) possibly benefiting from the time saved using WLS.

Ho and colleagues published the first studies that addressed the use of WLS for scene response in the urban and rural environments.[12,13] Both time studies were random samples of EMS vehicle scene responses using WLS and observers following the same route in both urban and rural settings. Results were similar and demonstrated that the use of WLS resulted in an average time savings of 38.5% in the urban and 30.9% in the rural setting.

While the aforementioned evidence demonstrates that time is typically saved using WLS, the clinical relevance is markedly unclear. There are no studies that demonstrate a significant clinical benefit using a response mode that is associated with public safety concerns and risk. The National Association of EMS Physicians (NAEMSP) published a Position Paper on WLS use in 1994, but this has not been updated and it is not evidence-based.[14]

Another method used in attempts to reduce response times is the addition of more resources, specifically increasing the number of ambulances on the street. By necessity, the number of EMS workers also increases to staff those ambulances. While intuitively this makes sense, the risk:benefit ratio may be suspect and there may be other unforeseen disadvantages.

In the 2002 response time study previously described,[6] it was determined that if there was the desire to drop the response time specification by 1 minute, it would cost approximately $1 million based on local data and figures outlined by the American Ambulance Association where the cost of a single ambulance and involved labor for around the clock daily coverage is approximately $500-600,000 per annum. It follows, if the addition of a single ambulance to an EMS system would decrease overall system response times to the extent that evidence-based studies predict the ability to save, on average, 6 additional patients per year, the cost would translates to about $167,000 per such patient per year. The average age of all deaths in the study was 53 and if one predicts that a typical 53-year old individual may have an additional 20 years of productive life, this would equal about $8350 per life saved per year. This type of calculation is an important consideration when comparing such commitments by an EMS system with other public health interventions, e.g. immunizations, many of which are markedly less costly.

Another consideration involves the issue of saturating the involved EMS practice of medicine with EMTs and paramedics. Such operational practices, without careful overall clinical impact considerations, may lead to problematic dilution in critical thinking and psychomotor treatment skills across the spectrum of involved professionals.

High performance system status management practices are worth consideration. Such methodology uses the existing resources available and maximizes their use by conducting historical research that predicts call location for time of day, day or week, week of month, and month of year. Understanding this prediction model will allow system administrators to strategically deploy and place resources where calls are likely to originate. Using demand analysis techniques will further refine when resources are required and appropriate unit-hour utilization is maximized.

Factors that Increase Response Time

Various environments are typically associated with prolonged response time despite best efforts to control for such factors. Individuals who choose to live in rural and frontier locations because of their preference for such lifestyles may not fully appreciate public service needs in responding to a variety of service requests, including EMS. Cities that have rivers, viaduct systems, light rail, or rail and trolley lines may also face response obstacles that are difficult to control. Systems where resources are dispatched from fixed or static facilities without use of fluid deployment plans may also experience delays when populations tend to move throughout a location depending on times of the day and days of the week.

Governance of Response Time Standards

Currently there are no federal or state laws that regulate EMS response time performance. Requirements are typically set by local jurisdiction government leaders or system administrators and are based on history or estimated public expectations. Many municipal EMS systems based in their own branch of government (3rd service, municipal) and fire-based systems may strive to reach some performance standards, but typically there are few if any penalties for non-compliance.

Contractual agreements stipulating response times often exist in many non-municipal, e.g. public utility, hospital-based, or private service agencies because such specifications are usually components of the contractual agreement. These typically have provisions for compliance as well.

The National Fire Protection Association's (NFPA) 1710 document titled *Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the Public by career fire departments* was published in 2010, sets advocated standards for the organization and deployment of emergency medical operations and provides EMS benchmarks for career fire departments.[15]

Among numerous EMS standards listed in NFPA 1710 are the following:

Turnout time:	1 minute
First responder or higher trained arrival:	4 minutes
Objective met:	90% of the time

If a fire department provides ALS services, arrival of an ALS company within an 8 minute response time must be met for 90% of incidents. This standard also stipulates that personnel dispatched to an ALS emergency include a minimum of 2 EMT-Basics and 2 EMT-Paramedics.

NAEMSP published a Position Paper in 2003 that outlined various issues regarding response times.[16]

When do Response Times Matter?

While clinical evidence may be lacking, intuitively it would be important to consider some emergency medical conditions where rapid response may make a difference in morbidity and mortality and should be considered when establishing or adjusting response time specifications. Decreasing response times may result in improved survival for the following clinical conditions:

1. Pulmonary
    a. COPD exacerbation
    b. Asthma exacerbation
    c. Toxic inhalation

2. Cardiovascular
    a. Cardiac arrest
    b. Acute myocardial infarction
    c. Malignant dysrhythmia
    d. Decompensated heart failure
    e. Acute aortic dissection

3. Neurological
    a. Thrombotic cerebrovascular accident
    b. Status seizure

4. Other
    a. Choking
    b. Diabetic reaction (hypoglycemia)
    c. Overdose where the drug may have cardiovascular effects
    d. Childbirth
    e. Trauma associated with an unstable airway, or uncontrolled or intracranial hemorrhage
    f. Anaphylaxis

Conclusion

Evidence in the peer-reviewed medical literature suggests that EMS system response times may not be a significant factor in improving clinical outcomes from acute illness or injury as currently encountered in the prehospital setting. Response time is simply one of multiple variables that comprise the evaluation and performance of an EMS system. Other time intervals such as scene time, transport time, and total prehospital time may be important as well. Aligning the needs of a community with the system's standard of care creates the need for ongoing evaluation by EMS administrators, medical directors, and politicians as they carefully balance fiduciary and clinical mandates with ever increasing public expectations. Decreasing EMS system response times is laudable on any first contemplation, but careful analysis yields realizations that the costs are great, the benefits suspect, and the perceptions substantial.

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Basic and Advanced Life Support Considerations (BLS vs ALS - What Does It Mean for System Design?)

Marc Eckstein, MD, MPH, FACEP

What is the "ideal" EMS system? Are there any EMS systems out there that are the "ideal" system? The reality is that most EMS systems today were developed in a piece-meal fashion, driven more by politics, the influence of labor unions, and past practice, as opposed to an efficient, patient-care centered, evidence-based system.

Background

Historically, EMS system designs were predicated upon the fundamental differences between advanced life support (ALS) and basic life support (BLS). Providing a defibrillatory shock to a victim's heart during a cardiac arrest was once solely relegated to physicians. Through the work of pioneers such as Drs. Frank Pantridge and Nancy Caroline, laypersons and firefighters were trained to provide life-saving therapies to patients in the out-of-hospital environment.[1,2] As technology improved, automated defibrillation has become part of the BLS scope of practice. EMS medical directors recognized that defibrillation was truly a time-critical skill, and as such, it did not make sense to delay this intervention by BLS providers (such as emergency medical technicians or certified first responders) until arrival of paramedics.

The timeliness of defibrillation is an excellent example of evidence-based medicine providing the foundation for change in EMS. As a result of the prolific cardiac arrest research published by Drs. Cobb and Eisenberg, physician leaders in the renowned Seattle-area Medic One paramedic program, it was determined that for every minute that defibrillation was delayed, a cardiac arrest patient's chances of survival decreased by almost ten percent.[3,4] This research, accompanied by the advance in technology in automated external defibrillators (AEDs), has led to further moving defibrillation from being a BLS skill to an intervention that is now routinely performed by lay citizens. The expansion of public access AEDs has saved countless lives.[5,6]

ALS vs. BLS

What treatments and interventions should be considered uniquely ALS as opposed to allowable for BLS? Are these terms really relevant in 2011? Over the past thirty years in the development and maturation of prehospital care, several "ALS" interventions beyond defibrillation have now become part of the BLS scope of practice.

In order to determine which interventions or therapies should be relegated to ALS vs. BLS, medical directors must first evaluate what are the time-critical conditions that are readily identified by prehospital providers. Can BLS providers (e.g. EMTs) reliably identify these conditions based upon presenting signs and symptoms, using the training and limited diagnostic tools available? Secondly, are those treatments or medications potentially harmful if erroneously administered for the wrong condition?

There are some examples of medications and other therapeutic interventions that meet the above-mentioned criteria, and several EMS systems have made great strides in making these changes. The administration of albuterol for acute asthma exacerbations is one such example. If a patient has a known history of asthma and complains of shortness of breath, an EMT is capable of auscultating the patient's breath sounds for the presence of wheezing. If these three parameters are present, then the administration of albuterol via a hand-held nebulizer is reasonably safe.

Administration of nitroglycerin for patients with suspected chest pain of cardiac origin is another example of a treatment once exclusively relegated to ALS providers, but one which has been extended to BLS providers in some jurisdictions. Administration of nitroglycerin is not without risk, especially for patients with chest pain of non-cardiac origins, or those patients taking certain classes of medications. Thus, the risk versus benefit analysis is perhaps less compelling, and one which requires more training and more medical oversight with ongoing quality improvement efforts and close monitoring to ensure that there are no adverse incidents.

Other treatments that were traditionally restricted to ALS that may now be administered by BLS providers include aspirin for chest pain of suspected acute coronary sydrome etiology, naloxone for suspected opiate overdose, and epinephrine for anaphylactic reactions. With each of these examples, a careful risk versus benefit analysis must be performed by the medical director and/or the medical advisory board prior to any implementation. Beyond such initial decisions, an ongoing analysis with 100% review of these incidents after initial implementation, with random reviews thereafter are mandatory to ensure that there is an acceptable margin of safety and no "sentinel events".

Evidence-Based Medicine

The approval of any treatment modality for a prehospital provider, credentialed as ALS or BLS, should only be made after determining whether the perceived benefits outweigh the potential risks. This risk versus benefit analysis must be made prior to the finalization of any prehospital policy, treatment algorithm, or approval of a new medication or device.

One of the difficulties in this process is the paucity of evidence to support most of what is now considered to be the "standard of care" in EMS. Most of the current practices in EMS are based upon past practice or medical intuition, rather than real science. The history of EMS is replete with examples of devices or medications that seemed to be a good idea at the time, only to be finally subjected to scientific scrutiny many years later.

After a small, retrospective case series of only two dozen patients, Military Anti-Shock Trousers (MAST pants) soon became mandatory equipment on just about every ambulance in the US.[6,7] Over a decade later, a randomized trial was published which showed that hypotensive penetrating trauma patients who had MAST pants applied by EMS professionals had *worse* outcomes than those without MAST pants.[8] How did this happen?

EMS research has historically suffered from surrogate outcome measures. What is the real outcome variable that matters? Should it be whether the intervention that is being studied decreases morbidity and/or mortality? Very little peer-reviewed research in prehospital care is well-designed, using randomized trials with meaningful clinical outcome variables. Closer analysis of the MAST pants saga is a perfect example of this fundamental, yet pervasive flaw in so much of EMS research.

As almost any EMT or paramedic who applied MAST pants can attest, patients often had an improvement in their vital signs soon after field application. However, without actually following these patients through to their hospital discharge, one would mistakenly believe that MAST pants represented a true life-saving advance. Sadly, EMS has yet to learn consistently from this type of earlier intermediate outcome analysis error.

High dose epinephrine seemed to revolutionize advanced cardiac life support (ACLS) in the late 1980s. Patients seemed to miraculously regain pulses in clinical scenarios that used to be uniformly associated with futility.[9] The medical explanation behind this early "success" was strikingly similar to that of MAST pants, e.g. the proposed pathophysiology made sense. However, the annals of modern medicine are filled with therapies and interventions that made clinical sense on the surface, but which never withstood the scrutiny of real science. These failures are by no means restricted to prehospital care, but rather aptly apply to medicine as a whole.

If success can be defined as restoration of spontaneous circulation (ROSC) in previously pulseless patients, then wide-spread utilization of high dose epinephrine was a "success". If, however, successful outcomes from sudden cardiac arrest were clinically and narrowly defined as those yielding neurologically-intact survivors, high dose epinephrine administration proved an abysmal failure, serving only to prolong the inevitable by filling up already crowded hospital ICUs with patients destined to soon die.[10]

A more recent example of an EMS treatment accompanied by initial enthusiasm and optimism, but not withstanding consistent rigors of scientific scrutiny is the AutoPulse®. This compression band loading mechanical CPR device achieved much higher ROSC rates for cardiac arrest patients when compared with traditional, manual CPR.[11]

Consequently, after the publication of several case series, a federally funded, multicenter, randomized clinical trial (RCT) was conducted.[12] This study was terminated early after interim data analysis found that mortality rates for patients receiving AutoPulse® chest compressions were higher than those receiving manual chest compressions.[13] Despite this more recent and more scientifically validated result, many EMS systems continue to utilize AutoPulse®, citing the need to await further and pending study results, while undoubtedly contemplating the considerable amounts of money expended on the device prior to the publication of the RCT study.

Perhaps one of the reasons that some EMS systems made the financial commitment to this device prior to publication of well-designed studies is the desire to be "cutting edge" and progressive. However, as the AutoPulse® studies and MAST pants studies have

shown, new and expensive technologies do not intrinsically confer better clinical outcomes. The real take home message from these studies is that EMS systems must re-focus their efforts by never forgetting the most important mantra in all of medicine: *primum non nocere* (first, do no harm).[14]

More is better

This fallacy is a common error made by many EMS systems. More paramedics, more ambulances, more personnel on scene, more medical devices, more medications, etc. equal better outcomes. Nothing could be further from the truth.

Only in the past few years have researchers and the media challenged this concept that more is better. Once again, common sense might dictate that if you put more paramedics on the streets, more patients will survive. However, closer inspection seems to indicate that there is a law of diminishing returns. After exceeding a critical mass of paramedics, the addition of more paramedics may not increase survival rates. In fact, more paramedics may actually worsen outcomes. How is this possible?

Recent medical outcomes studies have shown that experience matters. Physicians need to perform a certain number of procedures to maintain proficiency and maximize optimal results. When more paramedics are added to a system, the number of critical procedures and critical patients per paramedic declines unless population and patient requests increase in respective manner. This is rarely the result. Instead, a multitude of paramedics now arrive on scene, and the result can be dilution of skills. While the literature to support this is not compelling in current volume, it does lend support to this concept.[15-17]

The provision of additional paramedics involves higher initial training costs, continuing education costs, supervision costs, with the return of potentially increased liability. Perhaps even more compelling is the fact that the majority of EMS calls only require BLS assessment and care, not ALS treatment. Dispatching multiple resources, including EMTs and two or more paramedics, for a patient that only requires a basic evaluation (typically a set of vital signs) and transport to an emergency department is not only extremely inefficient and costly, but it serves to burn out the providers, especially the paramedics.

If the majority of EMS calls only require basic life support, why have so many systems increased the number of paramedics and the number of ALS resources? Isn't there a purported paramedic shortage?

The short answer to these questions is that adding paramedics to an EMS system, though attractive to politicians answering an increasing public expectation and advocated by labor unions, is rarely based upon medical need. Most systems simply measure their response times to EMS calls, with a goal of getting a BLS resource on scene within 5 minutes and an ALS resource on scene within 8 minutes. These timelines are based upon early cardiac arrest research, as well discussed by Blackwell in this analysis. Since the

publication of this data almost twenty years ago, many EMS systems have been redesigned or have deployed their resources with these response time goals in mind. In fact, the National Fire Protection Association (NFPA) EMS standards also reflect these response times.[18] Having the ability of an ALS unit to respond in less than 8 minutes 90% of the time creates the need for many ALS units in a community, which thus necessitates many paramedics, along with the associated costs.

Unfortunately, few EMS systems have re-evaluated the data that has been published since these time intervals became the so-called "industry standards". The landmark OPALS study, which generated numerous publications, is the best study to date which has examined the impact of adding ALS care for a number of common EMS incidents.[19]

OPALS was a large, multicenter Canadian study that evaluated survival prior to and after the addition of paramedics to a previously all-BLS system. They found no difference in survival to hospital discharge after the addition of paramedics, but they emphasized the importance of first maximizing the effectiveness of their BLS system with bystander CPR instruction and ready availability of AEDs.[20]

What about increasing paramedic effectiveness in major trauma? Intuition would seem to indicate that ALS intervention would improve survival rates for major trauma patients, given the ability of paramedics to administer intravenous fluids. However, the literature does not support this. In fact, several studies suggest that ALS intervention, including intravenous medication administration and endotracheal intubation performed in urban settings, does not improve survival from major trauma, and, in fact, may actually be harmful.[21-23] These conclusions may be due to ALS interventions prolonging EMS on-scene times, which may delay definitive care, as well as rapid initiation of intravenous fluids designed to increase blood pressures, but may connote opposite effect, actually decreasing the eventual circulating pressure.[24]

These studies would lead one to ask what, if any, conditions may benefit from ALS. It seems that those conditions which are most likely to benefit from prehospital ALS intervention are non-traumatic chest pain, shortness of breath, altered mental status, seizures, and allergic reactions. Paramedics are able to provide medications that may mitigate or completely treat these conditions. One of the OPALS-related studies confirmed this to be true for patients complaining of shortness of breath. The authors of this study concluded that ALS did increase survival rates for patients with these chief complaints, particularly through the administration of sublingual nitroglycerin for chest pain as well as shortness of breath due to suspected congestive heart failure. Similar benefit was seen when nebulized albuterol was administered for shortness of breath due to suspected bronchospasm.[25]

More recent studies have found that prehospital treatment with Continuous Positive Airway Pressure (CPAP) is effective in reducing morbidity and mortality for patients with moderate to severe shortness of breath due to a variety of causes.[26,27] Other studies have demonstrated the benefit of prehospital acquisition of 12-lead ECGs to identify acute ST-elevation myocardial infarction(STEMI), enabling paramedics to divert these

patients to specialized STEMI receiving centers while simultaneously activating the cardiac intervention lab and its personnel prior to patient arrival.[28,29]

Defining ALS skills

Can we, therefore, conclude that ALS does make a clinically meaningful difference for several subsets of patients? That depends upon *how we define ALS!* Note that *none* of the interventions described above are intravenous medications. Nitroglycerin is administered sublingually via a spray or a tablet. Albuterol is given via an oxygen-powered nebulizer. Aspirin is given orally. Epinephrine (for severe allergic reactions) is given as an intramuscular (IM) injection. A benzodiazepine (such as midazolam) can be given as an IM injection or given intranasally. Similarly, naloxone (which is a reversal agent for opiate overdose) can be given IM or intranasally. Glucagon (which is used to treat hypoglycemia) is given IM. A 12-lead ECG can be obtained and transmitted by EMT-Basics for physician interpretation. CPAP is already a BLS skill in some jurisdictions.[30]

Some systems already allow their BLS providers to provide these treatments, while in others they are restricted to paramedics. In Oklahoma City and Tulsa, most of the just discussed treatments are clearly within the specified BLS scope of practice. So the definition of ALS vs. BLS really depends upon whom you ask. The truth is that interventions (i.e. therapeutics) are only one aspect of the discussion of ALS vs. BLS.

How many paramedics are enough?

The other significant issue is not just ALS vs. BLS, but just how many paramedics are needed in a system? Many systems require ALS ambulances to be staffed by two paramedics, while others have one paramedic partnered with an EMT. Other systems are only staffed by paramedics. Unfortunately, there is a paucity of systems-based EMS literature that really answers these questions. However, it is difficult to justify an all-ALS system when the majority of EMS calls only require BLS service, i.e. basic first aid and hospital transport.

Certainly a tiered EMS system is the most efficient and cost-effective. This is predicated upon having an effective, tiered dispatch system, whereby the call-takers ascertain the type of problem and the computer-aided dispatch (CAD) then sends the appropriate resources, described by Clawson in this publication. Since good ALS is predicated upon good BLS, if a patient sounds unstable, then the closest BLS resource and the closest ALS resource should be dispatched simultaneously. If the caller's description is unclear of the nature and severity of the problem, the a BLS resource should be sent alone, and if the patient is critical, that BLS resource can provide initial care to secure the patient's "ABC's" and paramedics can be requested.

This tiered dispatch response allows for fewer paramedics, and also affords those ALS resources to treat and transport a majority of patients who actually require ALS assessment, treatment, and transport.[31] Having exclusively ALS resources respond to and

transport patients who usually only require BLS treatment is inefficient, costly and will likely lead to worse outcomes due to dilution of critical skills and burnout.

Conclusions

So what is the ideal system? It is likely a mix of ALS and BLS providers, utilizing a tiered dispatch system. There needs to be an ample number of BLS ambulances so that when paramedics are on scene with a BLS patient, there is a BLS ambulance available to be dispatched within a reasonable time frame to respond and provide transport. Fire companies, which are typically positioned strategically throughout communities, serve as ideal first responders.

Paramedics who are well-trained, closely supervised, and have close medical oversight, are apt to provide the best care and provide the "best bang for the buck". The "M" in EMS stands for "medical", regardless of how that EMS care is delivered. High quality EMS requires a commitment of expert EMS physicians who can actively help design, monitor, and oversee the system of care and help make any requisite changes. As the US healthcare system changes, EMS systems must change. We can no longer accept an inefficient model of having multiple EMS providers at both BLS and ALS levels respond to each incident in multiple resources, all responding to the incident via lights and sirens.

We must be cost efficient and continue to evaluate and examine the impact of our systems and our interventions, and eliminate or change those that are not of value to our patients. The current costs of EMS to the overall healthcare system have not been justified by the results. As the nation's cost of healthcare approaches one fifth of the Gross Domestic Product, the tired and worn EMS concept of "more is better" can no longer be accepted. The definitions of ALS and BLS are moving targets, especially as technology and telemedicine continue to advance.

Staffing every ambulance with paramedics in an EMS system where it is known that the majority of patients only require BLS transport is about as efficient as staffing an urgent care center with cardiothoracic surgeons. We must match the need with the response. While there can never be a universal "perfect" model, an honest appraisal of one's current EMS system, and a willingness to change, is the first step. Simply measuring the "success" of an EMS system by measuring response times will only serve to create an expensive, inefficient system that is not focused on the patients whom entrust it to their service.

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Scheduling Deployment Models

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Introduction

Staffing paradigms can be a truly difficult design dilemma when analyzing EMS system architecture. Many factors can affect strategies to build operationally efficient and, most importantly, clinically effective models for staffing. While a few types of models prevail throughout the country, there remains tremendous variation in how EMS agencies navigate and prioritize these influences.

To understand how best to develop and implement competent designs, one must first appreciate the range of variables and pressure affecting EMS staffing designs. Generally speaking, every system and agency is subject to the same types of pressures, yet the "uniqueness" of a system is often manifested in its particular balancing of and responding to these pressures. Both internal and external forces lead to the genesis of variables influencing staffing design.

Internal variables important to consider often start with the costs directly related to salaries, full-time equivalent (FTE) positions offered, workforce desired overtime in both frequency and duration. Additional types of internal variables include the basic system and/or agency type (municipal third service, fire-based with EMS cross-trained firefighters, fire-based with civilian EMS professionals, volunteer, hospital, private, public utility model), operational objectives, deployment design, quality of patient care, and safety. Each of these variables can be addressed and incorporated at the discretion of the designers. All of the identified internal characteristics can be well-defined, quantitatively measured, and subjected to manipulations designed to produce desired operational and/or clinical outcomes.

External variables influence the design in a myriad of sometimes unpredictable and uncontrollable manners, and may include, but are not limited to, jurisdictional political regulations, labor union expectations, financial restrictions, unforeseen operational costs, staffing/personnel limitations, competition, local traditions, employees' perceptions of job satisfaction and lifestyle, and community-based demands or expectations of performance. These factors may sometimes prove benign, but should never be underestimated as they can be invasive and malignant, frankly derailing the best of intended outcomes sought by thoughtful initial designs. While carrying high potentials for frustration, these externally-generated issues require sincere reflection, deliberation, conversation, and ultimately, the persistence to work cooperatively in serving the best interests of the EMS system's patients. Without the recognition of external variables and subsequent productive answers to such effects on staffing, even the most cost-efficient and clinically-effective staffing paradigms are doomed to fail.

A final introductory factor for consideration is the Fair Labor Standards Act, or FLSA, which impacts nearly every kind of public safety and healthcare provider. FLSA rules

and guidelines play heavily into staffing paradigms, and as former fire chief, Robert Zickler relays, “FSLA is a major variable that normally requires a series of spreadsheets to compute "best option" -- once past federal work rules and laws then you can move into the social and operational factors.”

After a detailed review of the more common staffing paradigms utilized in high performance, high volume EMS systems, this analysis will then discern the results of a survey focusing upon provider staffing paradigms in most of the largest EMS systems in the United States. Survey findings are taken from the responses submitted by the physician medical directors from these systems.

Staffing Paradigms

The most common strategies for EMS professional staffing employ unique or mixed use of 8, 10, 12, or 24-hour shift type. Each type of shift has its own combination of "pros and "cons", and within each type there exist several models of rotating shifts through a workweek. While there are a tremendous variety of staffing paradigms and rotation schedules from which to choose, nearly every large, urban EMS system medical director that responded to the survey noted similar influencing factors in the design and selection of the staffing paradigm for their particular system.

The 8-Hour Model

The 8-hour model uses three shifts through each 24-hour period, and can be used for ambulances that operate 24 hours continuously, or for ambulances that operate during peak staffing periods. In our survey, only Honolulu, Hennepin County Medical Center EMS in Minneapolis, and Fire Department New York employ this paradigm. Each affiliated medical director cited an optimal mix of employee lifestyle satisfaction and consistent high-volume run loads throughout their system.

This model offers many advantages to urban geographies with a largely consistent distribution of patients across the service area. In theory, this paradigm provides the ideal environment to optimize patient care and safety as well as employee safety in an extremely busy, high-performance system. Providers are exposed to a large number of patient care encounters in a short amount of time, with minimal compromise to quality of care and safety due to provider fatigue. This model is most effective in environments with relatively rapid ambulance back-in-service (also known as "turnaround") time at hospitals. Extended delays at hospitals would theoretically compromise the advantage of such a paradigm by restricting patient encounters per shift.

The EMS professional's work schedule is predictable with 5 days on, lending itself to a satisfying lifestyle for most providers depending on commuting time and distance and family life. Overtime hours can be minimized as well, since they are not built in to the scheduling. Furthermore, in many systems, fire department scheduling coordination is paramount and the 8-hour paradigm can achieve consistent integration of civilian personnel with the 24-hour fire schedule blocks.

The 8-hour model is not without operational compromise, requiring more staffed positions than either the 12 or 24-hour shift paradigms. Integral with greater FTE positions comes the costs of additional salaries, benefits, occupational healthcare, human resources support, and continuing education. Part-time employees can offer some reprieve, but introduce a host of other operational challenges. Additionally, if transitioning from staffing strategies that include mandatory overtime, employees and labor groups may object to reductions in pay and work hour potentials for FTE employees.

The 8-hour paradigm is incredibly flexible in its ability to meet the demands of high volume systems, being equally compatible in fixed or dynamic deployment strategies. Peak demand staffed as well as round the clock staffed ambulances are supported in a format that continuously places "rested minds and fresh legs" back on the street in a cost effective manner, potentially leading to significant improvements in both patient care outcomes and employee safety.

The 10-Hour Model

Of the 31 services that are reflected in the survey replies from the members of the United States Metropolitan Municipalities EMS Medical Directors Consortium, only Denver currently utilizes a 10-hour model. Louisville Metro EMS had attempted a 10-hour staffing model in prior times that utilized a 3-day work week with a flex day. In that locale, the model failed to meet the lifestyle expectations of employees.

The 10-hour model offers several operational advantages for services that utilize dynamic deployment strategies. Similar to the 8-hour template, providers can work effectively and safely in high volume, stressful, urban environments. There is no built-in overtime, and scheduling can be rather flexible using either 4-day tours or 3-day tours with an added "flex" day. This facilitates staffing for surge events such as conventions, special events, weather, etc. The built in flex day also allows for time during the workweek for training and continuing education without costing additional overtime. Furthermore, in addition to its significant cost savings over any other traditional shift solution, this model provides two 3-day weekends every month for caregivers.

The challenges inherent to the 10-hour model require a dynamic deployment strategy and willing personnel. The 10-hour shifts create 4-hour "holes" in ambulance coverage for unique ambulances and depending upon deployment schedules, for service areas. These holes can compromise capability for even the most efficiently deployed EMS agencies. The model therefore demands sophisticated rotation and scheduling solutions to provide consistent coverage over a given service area. This choice in staffing may serve as an ideal solution for systems utilizing widespread system status management, such as in Denver. Additional anecdotal challenges accompanying the 10-hour model are increased abuse of sick leave and human inertia in transitioning from traditional 12 and 24-hour work schedules.

The 12-Hour Model

The 12-hour shift is most frequently chosen among non-fire based EMS agencies serving America's largest cities. While the survey reveals several different ways this solution is implemented across the country, the 12-hour model is incredibly adaptable to the broad range of internal and external variables identified earlier.[1] Yet, it is not without its own set of challenges.

12-hour shifts offer a variety of solutions that balance many of the factors impacting staffing strategies for nearly all types of EMS agencies. As with the 8 and 10-hour solutions, the 12-hour model accommodates high-volume, mentally and physically demanding prehospital care environments with allowable fatigue and burn-out retardation for providers. Therefore, systems may find increased efficiencies by reducing the number of 24-hour shift ambulance positions with low unit hour utilization (UHU) to fewer 12-hour shift positions operating at higher UHU. It also facilitates organizational integration with other public safety agencies for those services that are either fire-based EMS, utilizing civilian personnel, or third service EMS agencies deploying ambulances out of fire department facilities.

Through a variety of rotation schedules, crews can more easily integrate personal life with work. Additionally, in systems that have tremendous variance in ambulance UHU or volume, the 8 or 12-hour models can easily work alongside a 24-hour shift model. Unlike the 10-hour model, 12-hour shifts provide for more consistent distribution of ambulance coverage, and therefore work well in less dynamic systems or systems that simply cannot rotate assets over a given service area. Lastly, this shift model requires a total of 8 providers per 24-hour ambulance and may require fewer staff overall for any particular system, including fewer part time reserve staff when compared to 8 and 10-hour strategies.

As with each of the other shift length options, the 12-hour shift model is not without its challenges. The paradigm requires built in overtime averaging 4 hours each workweek or 8 hours per most pay periods. Additional costs may be incurred due to limited time for required training, orientation, and education while on shift. Many services have reduced these costs by deploying dedicated mobile training assets to the field. In this paradigm, 1 to 2 staff positions are also required when compared to 24-hour staffing models, and it is not nearly as operationally efficient as 10-hour shifts. As with any of these models, local cultural and traditional norms may affect employee satisfaction in transitioning from one staffing paradigm to another. Furthermore, while the 12-hour paradigm may not support a service area with a relatively even distribution of heavy run volumes as well as an 8 or 10-hour model, it can provide a less complicated staffing solution to those regions with a wider variance in service demand.

The 24- Hour Model

As the model of choice for many fire-based and rural EMS agencies, the 24-hour shift provides for the most straightforward fire department shift integration, lowest cost staffing, and a personal/work lifestyle favored by many public safety providers.

There are a few different versions of the 24-hour shift model. The first distinction is the rotation schedule. Systems using the 24-hour shift model either provide 48 hours (24/48) or 72 hours (24/72) off. The second distinction is the inclusion of a Kelly Day (paid time off or PTO outside of normal PTO) or a Furlough Day (unpaid time off, outside of PTO and sick leave), which usually applies to agencies using the 24/48 rotation. Here, the provider will work a given tour of 24/48 shifts, and then skip a preselected tour day. That tour day the provider takes off is not deducted from a PTO or sick leave bank. Use of the Kelly or Furlough day is a common practice in fire-based systems using either civilians or sworn firefighters as transporting EMS providers. Agencies can argue these strategies theoretically cost less because fewer personnel are required and annual salaries don't really change. It is best to calculate true hourly labor rates as may be determined by factoring in credited hours compared with a given annual salary projection.

This shift paradigm is ideal for low volume, static systems with fewer than eight to ten runs per ambulance in a 24-hour period (other mixed systems use UHU of 0.40 as a cut off). This model therefore emphasizes reliable response times over other types of efficiencies, where fewer, busier ambulances are unable to reach certain areas within an acceptable fractile response time. In addition, 24-hour shifts allow crews to train within and across disciplines, accomplish a variety of other agency related projects and tasks, and may also work to foster better EMS and fire integration, all while limiting labor costs.[2] Lastly, it provides a more traditional lifestyle associated with public safety and EMS that attracts many providers.

However, the 24-hour shift poses several challenges to EMS agencies. Built-in overtime costs are significant in this model, and must be balanced by reduced staffing. Hourly labor rates must result in manageable annual salaries with little variance. Additionally, a given service area may require more low volume, 24-hour shift ambulances to meet acceptable response standards when compared to a more efficient model using higher volume 12-hour shift staffed ambulances. This shift type best serves lower volume, static systems, and even then, ensuring adequate patient contacts and competent skills retention can be difficult if not impossible for the involved cadre of EMS professionals. Therefore, a strong CQI, remediation, and continuing education program is required to assess and safeguard provider competencies. There is also much debate regarding patient and provider safety in the 24-hour shift model.

Several studies highlight impaired performance, judgment, and quality of care in the in the remaining early morning hours of the shift.[3-15] These concerns can be even more apparent when crews approach ten to twelve or more patients in a 24-hour period. In an internal study on health, the Austin Travis County EMS System found that 24-hour shifts significantly compromised customer service and quality of care in urban and suburban

communities.[16] Employee safety was also negatively impacted due to larger time periods of "low alertness" and falling asleep while driving home from shifts.[3,4] Perhaps the best supporting evidence can be found in studies examining resident physicians in training; resulting in limited work hours, patient caps, and call length restrictions for resident training programs throughout the country.[3,4,10,15,17-25] Conversely, several studies on fatigue reveal no change in patient or psychomotor outcomes due to fatigue, yet these studies were largely qualitative and focused on resident physicians working more than 80 hours per week.[26,27]

Perhaps the most compelling analysis of work hours duration effect in EMS is the International Association of Fire Chiefs publication on the effects of sleep deprivation on EMS providers. While the work study highlights the negative impacts on health, safety, and quality of care due to prolonged shifts, it cites a paucity of conclusive evidence that 24-hour shifts negatively impact care or safety. It then goes on to assert:

- Fire fighters have documented increases in their risks for cardiac disease and malignancies, which are also are illnesses that may be promoted by the chronic sleep deprivation associated with long work hours.

- Fire fighters and EMS responders are at risk for the decrements in mental and physical performance that have been well documented among others working long hours and during the night.

- Fatigue among fire fighters may relate to the disproportionately higher fireground injury rates observed in the early morning hours.

- Fatigue when driving may increase the risk of crashes when driving following long work hours. Long commutes following work may be a particular hazard.

This report provides the following summary conclusions:

- Those working long duration shifts can improve their well being by leading healthy lifestyles.

- Chronic sleep deprivation may not be recognized, and it is important for workers to acknowledge their need for and maximize their ability to achieve adequate restorative sleep.

- Coping with long work hours may be facilitated by identifying workers at higher risk for difficulties in adjusting to such, like those with sleep disorders.

- Fatigue is a risk for motor vehicle crashes, and commuting home following long duration shifts may be an especially vulnerable time for workers.

- Personnel, their families, management and consultants, working in collaboration, are best able to structure work hours and circumstances to meet the needs of professional excellence and employee well being that typify fire fighting and EMS work.[28]

While 24-hour shifts provide largely satisfactory lifestyles for employees, they appear to best serve more rural/suburban communities with lower demand, where the need for adequate response times and EMS assets outweigh demands on efficiencies and strain on providers. This paradigm requires fewer staff per ambulance (6-7 per ambulance), facilitates on the job training, and integrates most easily with traditional fire department staffing schedules.[2] Depending upon the EMS system and community involved, moving away from a 24–hour model may be prohibitively expensive.[2,29] However, built-in overtime, Kelly days, the use of higher paid cross-trained EMT/firefighters or paramedic/firefighters, and higher number of required ambulances to meet overall demand often result in more expensive systems. Additionally, there is significant data to show that 24-hour shifts can actually compromise clinical care, related patient outcomes, customer service satisfaction, and safety to all involved in both urban and suburban settings.

The 51 S Model

The last model to consider is a novel and innovative mix of 12 and 24-hour shifts developed by Timothy Earles over a year ago. The model seeks to provide the ideal balance of provider performance, lifestyle, and efficiency through a rotating combination of 12 and 24-hour shifts. According to Mr. Earles, the 12-hour shifts can even be replaced with 10-hour shifts in larger systems and continue to meet service goals while reducing costs in the form of overtime paid after 40 hours. In theory, the 51 S paradigm can be applied to any type of EMS agency, even fire-based, regardless of call volume.

51 S is comprised of 5 types of shift schedules to accommodate a wide variety of lifestyle needs, all utilizing set days for each schedule. Providers can select a schedule type based on needs for weekends off, college courses, childcare, etc. The model limits time to fifty-one hours overtime per week, and requires the fewest staff per ambulance (5). Depending on call volume, there is ample time for on-the-job training or other service-related projects.[30]

According to Mr. Earles, savings are measured in five areas:

- Reduced Attrition: If people can work a schedule that meets the needs of their goals and lifestyle, they will stay.

- Reduced recruiting costs: Once people discover you are offering five choices of a schedule rather than the traditional one or two, they will find you. Recruiting isn't necessary.

- Reduced Occupational Health costs: Rested, healthy people are far more productive, caring, and less prone to mistakes or injuries.

- Benefit-time buy back: Because the schedule has been designed to accommodate so many of the lifestyles and goals of the people in our field, less benefit time is used to take time off to accommodate these preferences. This means an opportunity to purchase much of that time back at a straight rate, rather than paying overtime for someone else to work the shifts involved when benefit time is used. (Summer vacation and Christmas have proved to be popular times for buy-back programs.)

- Reduced staffing costs: Imagine models predicting a growth in your service district over the next several years requiring millions in labor costs to provide timely and appropriate service. 51s may potentially give systems the ability to use existing staff more efficiently to the point that in most cases, the need for increased staffing over the next several years is accommodated using just those resources a system already has. The cost and organization of adding trucks under the current staffing model a system is using is eliminated.

To date, per Mr. Earles, the project has provided a theoretical savings of more than $52 million to the 46 systems who've asked for a comparison evaluation of 51s to their current schedules (using North Carolina standards for pay and salary).

To further understand this paradigm, Mr. Earles provides the following example:

Let's take the FTEs involved with staffing twenty-one 12 hour units around the clock (8 people to staff each, working 36/48 hrs per week) and add to that eight 24 hour units (6 people to staff each, working 56 hrs per week). That's a total of 216 FTEs and combining them, results in 33 staffed units each day at peak. Using 51 S, requiring just 5 people to staff each unit, this number climbs to 44 units at peak, slowly settling to 22 late at night until early morning when call volume usually drops to around 35% to 40% of peak demands typically experienced during the day. For many systems this is actually far more than enough of an increase and will satisfy future growth needs for the next several years as well. And you were able to do it without hiring any more staff than you already have. The schedule literally sells itself in most cases once the budget folks are told you won't need any more labor cost increase for years to come - just let you keep what you have now. This same scenario presented elsewhere has resulted in saving jobs in systems previously considering a reduction in service or man-power to keep afloat. Keep in mind that not all of staff have to be placed on this schedule, or all at once either. Surveys taken in the past by staff via on-line tools such as Survey Monkey have proved useful in determining what can be right for each system with a keen eye towards needs mixed in.

The 51 S construct can provide tremendous benefit to employees and agencies alike in terms of lifestyle and proposed savings. Without a doubt, this model is inviting in its creativity, sophistication, and elegance of implementation. The wide range of shift schedules affords tremendous flexibility for a myriad of employees, while, in comparison to the 24-hour shift model, fatigue is reduced and patient encounters are increased.

Admittedly, the model is still too novel for accumulated hard data. However, *if* the theories on reduced attrition, recruiting, and occupational health costs are correct, then the 51 S paradigm could provide meaningful cost savings to agencies year after year.

The logic behind Mr. Earles' paradigm is difficult to argue, and perhaps the only significant drawback to 51 S is its youth. Administratively speaking, many of the proposed savings are difficult to measure, quantify, and realize in real dollars. Some require sophisticated and detailed reporting measures throughout the service to assess. Furthermore, while most high performance EMS systems employ some form of peak staffing, the 51 S model imparts additional fatigue and strain on the 24-hour shift crew during the late night and early morning hours, relying on those crews to rest through the first part of their shift. Ensuring lower daytime volumes for those 24-hour crews could be difficult in many systems. However, 51 S may truly be a perfect fit for those mixed systems already using both 12 and 24-hour shift crews and experiencing a wide range of demand across their service area. One additional issue to consider is that staff may theoretically have a difficult time transitioning from 12 to 24 to 12-hour shifts, but this has not been seen anecdotally according to Mr. Earles.

The 2011 Gathering of EMS Eagles Staffing Survey: A Discussion

The annual EMS State of the Science Conference, also known as the "Gathering of Eagles", hosted by Dr. Paul Pepe and the EMS physicians from the University of Texas Southwestern Medical Center at Dallas is the annual summit of the EMS Medical Directors serving most of the 35 largest 911 EMS services in the United States, as well as the services from London (England), Vancouver (British Columbia), the FBI, and the US Secret Service. Participants represent every model of EMS service from fire-based, third service, hospital-based, private, public utility, private-public partnerships, and federal. In March of 2011, the following survey as designed by Dr. Miramonti and regarding EMT and paramedic staffing was distributed via email to the participating medical directors:

How long are your shifts?

- 12
- 24
- Mixed 12/24
- Other

Do shifts rotate through the days of the week?

- Not at all
- 24/72 with a "Kelly" day
- 24/72 without a "Kelly" day
- 2 on/2 off/3 on (long weeks and short weeks)
- 51 S
- Other

In your experience, what are the biggest influences on the staffing model your services use?

- Cost
- Operations
- Lifestyle
- Patient Care
- Safety
- Other

Twenty-four physician medical directors representing thirty-three EMS agencies participated in the survey, including the British Columbia Ambulance Service (BCAS). The services can be categorized by type as follows:

Type	**%**
Fire-Based	58%
Civilian providers	18%
Sworn firefighter providers	40%
Third Service	27%
Hospital-Based	6%
Public Utility	6%
Private	3%
Public Private Partnership	
Mixed	
Total	100%

Figure 1: EMS Services by type

Fire-based services utilizing sworn firefighters to provide EMS all employ a 24-hour staffing model. Four of 13 (31%) of these services rotate shifts every 72 hours with the remaining 69% rotating every 48 hours. Each fire-based service utilizing sworn firefighters incorporated some type of "Furlough" day or "Kelly" day.

Fire based services utilizing civilian providers as a more cost-effective staffing strategy utilize either a 12-hour (66%) or 24-hour (17%) shift paradigm. Interestingly, Fire Department New York (FDNY) EMS providers work 8-hour shifts because of the relatively even distribution of high demand throughout the system. Dr. John Freese, FDNY Chief Medical Officer, cites attempts at a 12-hour shift model failed due to cultural, labor, and lifestyle conflicts resulting in increased sick days. Furthermore, the 8-hour shift ensures mentally and physically "fresh" EMS providers.

Of the nine third-service EMS agencies participating in the survey, eight (89%) use a 12-hour shift model. Boston EMS utilizes both 8 and 10-hour shifts throughout the service. Indianapolis EMS and Wake County EMS each employ both 12 and 24-hour shifts in order to accommodate variance in demand as well as a mix of rural, suburban, and urban

settings throughout their systems. As previously mentioned, this type of model incorporates easily into closely integrated fire department cultures, and affords tremendous scheduling flexibility for crews and management alike. Dr. Mike Olinger, Clinical Medical Director for Indianapolis EMS, states that the mix of 12 and 24-hour shifts can constantly accommodate the shifting balance of efficiency vs. response for cities that have a wide variation of demand, population density, and resources.

Hospital-based Denver Health EMS is the only service to utilize the ten-hour model with tremendous success. Denver EMS Chief Scott Bookman and Medical Director Dr. Chris Colwell cite lifestyle, cost, and operational needs as the main drivers of the model, which is ideally suited to the system status managment based deployment strategy in Denver. Interestingly, in Louisville, KY, EMS leaders were unable to implement the 10-hour model in that system. Dr. Neal Richmond, Chief and Medical Director for Louisville Metro EMS, points to pre-existing traditions and an increased number of workdays per pay period as the primary obstacles. Both Drs. Richmond and Colwell agree, however, that while managing shift changes every four hours is operationally challenging, the model is very efficient; it facilitates on-the-job training, reduces overtime, and provides for two, 3-day weekends every month for most employees.

None of the participating services employed the more novel 51 S model.

Despite the wide variation in models and rotation strategies, the majority of medical directors identify cost, lifestyle, and operational needs as the most significant influences on choice of shift paradigm. Patient care and safety, labor, and tradition also served as driving factors, though were cited less often.

The results of the survey demonstrate many of the principles previously discussed in this analysis. 8 and 10-hour shifts work well in areas with consistent demand and/or system status management type deployment of ambulances. 10-hour shifts offer additional training time, but require constant shifts in coverage. 12-hour shifts are incredibly flexible across a continuum of population densities, demand volumes, and types of services. 24-hour shifts provide excellent integration into fire services, are more traditional, and serve lower volume, static systems effectively. Wake County (NC) EMS and Indianapolis EMS mix 12 and 24-hour shifts across their service areas, balancing either ambulance run volumes or UHU against response-time parameters, to determine which ambulances can be staffed by 1, 24-hour crew or two, 12-hour crews. Lastly, 51 S, while elegant and intuitively sensible, may yet be too novel to provide sufficient data to support its theoretical cost savings benefit.

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Staffing and Clinical Efficacy

Henry E. Wang, MD, MPH, MS

Introduction

A key variable in EMS system design is the number and configuration of practitioners to serve the community. This question must balance the need to deliver healthcare to the community against financial, logistical and personnel considerations.

The salient question is whether EMS systems should use a single response tier (SRT - all ALS) or multi-response tier (MRT - both BLS ambulances and ALS ambulances, with selective dispatch) strategy. These two models are the most commonly deployed strategies in the US. SRT systems are relatively simple, ensuring that a paramedic is available for every call. No special dispatching procedures are necessary as there is only one type of EMS unit dispatched for all calls. The downside of a SRT system is that paramedics are over-utilized and may often be called upon to handle calls that could be managed by an EMT. In addition, the pool of paramedics required for a SRT system is large; it may be difficult to hire, retain and train such a large cadre of personnel. In addition, there is a relatively large number of paramedics for a fixed number of patients, limiting their exposure to critical care cases and procedures. While some SRT systems pair one paramedic with one EMT, it can be difficult for a single paramedic to accomplish all resuscitation tasks on a critical case.

In contrast, a MRT system reduces the total number of paramedics, using combinations of BLS and ALS unit to provide emergency response. In this configuration there are fewer overall paramedics, allowing them to consistently care for a high volume of high acuity patients, and to garner increased clinical and procedural experience. Because BLS units may care for low acuity cases, paramedics can be more consistently available for high acuity cases. The downside of MRT is that these systems are more difficult to administer, requiring staffing and supervision of two levels of providers and two vehicle configurations. Most significantly, MRT systems requires exceptional dispatching with 911 operators capable of accurately discerning low from high acuity calls.

CONCEPTUAL MODEL OF THE PROBLEM

The Volume-Outcome Relationship in Medicine

There are many illustrations in medical science of the "volume-outcome" relationship – the concept that outcomes improve as the volume of experience increases for a practitioner, group of practitioners or institution. (Kelly and Hellinger 1987; Luft 1990; Cohen, Becker et al. 2000; Nathens, Jurkovich et al. 2001; Nathens and Maier 2001; Halm, Lee et al. 2002; Kahn, Goss et al. 2006; MacKenzie, Rivara et al. 2006; Snider and Laskey 2006; Lin, Xirasagar et al. 2008) For example, mortality is lower among patients undergoing coronary bypass surgery or cardiac catheterization in high-volume hospitals. (Cohen, Becker et al. 2000; Adams, Acker et al. 2002; Snider and Laskey 2006; Lin, Xirasagar et al. 2008) Conversely, low surgical volume hospitals have higher rates of

post-operative wound infections. (Luft 1990) Kahn, et al. found reduced mortality in centers with increased mechanical ventilation experience. (Kahn, Goss et al. 2006) Trauma centers have improved outcomes from severe injury through their rapid response, assessment and critical care protocols. (Nathens, Jurkovich et al. 2001; MacKenzie, Rivara et al. 2006) Centers that specialize in treating acute myocardial infarction and stroke have expertise in the rapid identification, mobilization and advanced care of these patients, facilitating improved care delivery and outcomes. (Adams, Acker et al. 2002; The American Heart Association's Acute Myocardial Infarction Advisory Working Group, Jacobs et al. 2006)

Conceptual Model of the Volume-Outcome Relationship in Paramedic Care

In the case of prehospital care, there are several factors that may interact in the conceptual model of the volume-outcome relationship. (Figure 1) In this model the "number of providers" refers to an increase in the number of paramedics, paramedic units or paramedic agencies. This model highlights the system-level "tension" presented by the number of paramedic personnel. As the number of providers increases, components of the system benefit from the change. However, increases in the number of providers also comes at expenses to the system.

Availability of EMS - An increase in the number of paramedic providers increases the number of paramedics per population and should result in expanded availability of paramedic providers to the population.

Response Times – The increase in the number of paramedic providers per population should result in shortened response times.

Cost – Increases in the number of paramedics clearly comes as a financial cost to the community, both as a direct result of increased manpower (salary) costs as well as other indirect costs; for example, training costs.

Training Burden – Paramedics must receive training to maintain cognitive and manual proficiency. An increase in the number of paramedics will result in increased training burden to the system and community.

Procedures and Experience Per Medic - While subject to variations, the number and acuity mix of prehospital patients is relatively static for a given community. As the number of paramedic providers increases, the number of cases available per paramedic can be expected to decrease. Similarly, the number of critical care procedures available to each paramedic can be expected to decrease.

Skill and Proficiency - As the number of patient encounters and critical care procedures per paramedic decreases, one can expect parallel decreases in skill and proficiency.

Quality of Care and Patent Outcomes – While there are multiple factors that influence quality of care and patient outcomes, these constructs have strong relationships with the

number of paramedic providers. One assumes that a system with "no" paramedic providers will have poor quality of care and patient outcomes. As the community increases the number of providers, the availability of paramedic care will increase, improving access to care, quality of care and outcomes. However, as the community saturates with paramedic providers, the system may struggle to manage the cost and training burden presented by the large number of personnel. Consequently, quality of care may start to wane. Under these conditions, one would also expect patient outcomes to similarly decrease.

THE VOLUME-OUTCOMES RELATIONSHIP IN EMS

Despite the importance of the volume-outcome relationship, there are few formal studies of this concept in EMS.

Wang HE, Balasubramani GK, Cook LJ, Lave JR, Yealy DM. Out-of-Hospital ETI Experience and Patient Outcomes. Annals of Emergency Medicine 2010;55(6)527-537

Prior studies suggest improved patient outcomes for providers that perform high volumes of complex medical procedures. In this study, we sought to determine the association between rescuer procedural experience and patient survival after out-of-hospital ETI. (Wang, Balasubramani et al. 2010) We analyzed probabilistically linked Pennsylvania statewide EMS, hospital discharge and death data of patients receiving out-of-hospital ETI. We defined ETI experience as cumulative ETI during 2000-2005; low = 1-10 ETI, medium = 11-25 ETI, high = 26-50 ETI, and very high = >50 ETI. We identified survival on hospital discharge of patients intubated during 2003-2005. Using generalized estimating equations, we evaluated the association between patient survival and out-of-hospital rescuer cumulative ETI experience, adjusted for clinical covariates.

During 2003-2005, 4,846 rescuers performed ETI. These individuals performed ETI on 33,117 patients during 2003-2005 and 62,586 patients during 2000-2005. Among 21,752 cardiac arrests, adjusted odds of survival was higher for patients intubated by very high ETI experience rescuers; adjusted OR (95% CI) vs. low ETI experience: very high 1.44 (1.15-1.89), high 1.13 (0.98-1.31) and medium 1.02 (0.91-1.15). Among 8,162 medical non-arrests, adjusted odds of survival was higher for patients intubated by high and very high ETI experience rescuers; adjusted OR (95% CI) vs. low ETI experience: very high 1.55 (1.08-2.22), high 1.29 (1.04-1.59) and medium 1.16 (0.97-1.38). (Figure 2) Among 3,202 trauma non-arrests, survival was not associated with rescuer ETI experience; adjusted OR (95% CI) vs. low ETI experience: very high 1.84 (0.89-3.81), high 1.25 (0.85-1.85) and medium 0.92 (0.67-1.26).

In conclusion, we found that rescuer procedural experience was associated with improved patient survival after out-of-hospital ETI of cardiac arrests and medical non-arrests. However, rescuer procedural experience was not associated with patient survival after out-of-hospital ETI of trauma non-arrests.

Eschmann NM, Pirrallo RG, Aufderheide TP, Lerner EB. The Association Between Emergency Medical Services Staffing Patterns and Out-of-Hospital Cardiac Arrest. Prehospital Emergency Care 2010;14:71-7.

Teamwork plays an important role in resuscitation. EMS systems usually dispatch additional units to the scene of a cardiac arrest to provide assistance. This study sought to determine if the number of paramedics at the scene of an OHCA was associated with improved return of spontaneous circulation (ROSC) or survival to hospital discharge.(Eschmann, Pirrallo et al. 2010) This study used Milwaukee County EMS data for January 1993-December 2005 (12 years). The authors included all adult (≥18 years of age) OHCA cases of presumed cardiac etiology. The authors compared return of spontaneous circulation and survival to hospital discharge for OHCA patients treated by a crew with two paramedics were compared to those patients treated by crews with three or more paramedics.

Of 10,057 cases included in the analysis, 4,229 patients were treated by two paramedics (9% survived to discharge), 4,459 patients were treated by three paramedics (9% survived to discharge), and 1,369 patients treated by four or more paramedics (8% survived to discharge). Compared with patients receiving care by only two paramedics, patients treated by crews with three paramedics (OR 0.83, 95% CI 0.70-0.97) and crews with four or more paramedics (OR 0.66, 95% CI 0.52 to 0.83) experienced reduced survival to hospital discharge. Return of spontaneous circulation was not influenced by the number of paramedics present. A potential explanation is the additional confusion presented with additional unintegrated personnel.

Sayre MR, Hallstrom A, Rea TD, Van Ottingham L, White LJ, Christenson J, Mosesso VN, Anton AR, Olsufka M, Pennington S, Yahn S, Husar J, Cobb LA. Cardiac Arrest Survival Rates Depend on Paramedic Experience. Academic Emergency Medicine 2006;13 (5): S55.

The AutoPulse Assisted Prehospital International Resuscitation (ASPIRE) trial was a multicenter trial evaluating the effectiveness of the AutoPulse compression band CPR device on OHCA survival. In a secondary analysis, the authors found strong correlation between cardiac arrest cases per paramedic per year and OCHA survival to discharge.(Sayre, Hallstrom et al. 2006) Cases per paramedic per year and their corresponding OHCA survival were: Site A 0.68 (6%); Site B 1.63 (4%); Site C 4.68 (27%); Site D 1.16 (6%); Site E 0.56 (11%).

Persse DE, Key CB, Bradley RN, Miller CC, Dhingra A. Cardiac arrest survival as a function of ambulance deployment strategy in a large urban emergency medical services system. Resuscitation. 2003 Oct;59(1):97-104.

MRT systems use both ALS and BLS units to provide EMS care, with dispatchers selectively directing ALS to higher acuity cases. In theory, there are fewer paramedics in the MRT response system, and hence each paramedic should accumulate greater experience and effect improved patient outcomes.

In this paper Persse, et al. compared OHCA outcomes between the dense urban section of Houston, which used tiered response, and outlying residential areas, which used uniform all-ALS SRT care.(Persse, Key et al. 2003) The MRT region reported a Unit-Hour-Utilization of 0.59 while the SRT areas reported a UHU of 0.28. In the study period there were 181 witnessed VF arrests in the MRT response region and 24 witnessed VF arrests in the SRT region. Successful IV and intubation rates were higher in the MRT response regions. Survival to discharge was higher in the MRT response (23.9%) than SRT system (4.2%) region.

Gold LS and Eisenberg MS. The effect of paramedic experience on survival from cardiac arrest. Prehosp Emerg Care. 2009 Jul-Sep;13(3):341-4.

This study evaluated paramedic care in the King County, Washington EMS system. (Gold and Eisenberg 2009) The authors evaluated all witnessed VF OHCAs, identifying the years of experience of all on-scene paramedics. Of the 185 paramedics in the analysis, each paramedic treated an average of 3.8 (range 0-14) witnessed VF arrests annually (all arrests 9.4 annually, range 0-34). The authors found slight increases in cardiac arrest survival associated with the years of experience of the paramedic performing resuscitation procedures. Survival was not associated with the experience of the other on-scene paramedic. There was a slight survival benefit from the combined experience of both paramedics.

USA Today Survey of Out-of-Hospital Cardiac Arrest Survival (Robert Davis. Many lives are lost across USA because emergency services fail, 5/20/2005, http://www.usatoday.com/news/nation/ems-day1-cover.htm)

Perhaps the most prominent illustration of the paramedic volume-outcome relationship appears not in scientific journals but in the news journal USA Today. Davis surveyed EMS medical directors at 50 major US cities regarding EMS system configuration and cardiac arrest survival.(Davis 2003) He found that cities with the lowest per capita number of paramedics had the highest OHCA survival rates. For example, Seattle has 13.5 paramedics per 100,000 population and a OHCA survival rate of 45%, while Omaha, Nebraska has 4.6 paramedics per 100.000 population and a OHCA survival rate of 3%.(Figure 3)

Eisenberg MS, Horwood BT, Cummins RO, Reynolds-Haertle R, Hearne TR. Cardiac arrest and resuscitation: a tale of 29 cities. Ann Emerg Med. 1990 Feb;19(2):179-86.

In 1990 Eisenberg, et al. reviewed papers published between 1967-1988 describing OHCA survival in 29 US cities.(Eisenberg, Horwood et al. 1990) The authors found that survival rates were highest in MRT systems and lowest in SRT systems, hypothesizing that CPR was started earlier in these systems.

Other Adverse Events

While explicitly linked to procedural experience and outcomes, recent studies highlight the occurrence of adverse events in the care of critically ill prehospital patients. These

events clearly may be influenced by training and clinical experience and may contribute to the volume-outcome connections.

Katz and Falk highlighted the prevalence of endotracheal tube misplacement in paramedic airway management efforts; in their series of 108 ETI arriving at an Orlando trauma center, they found 25% of the tubes misplaced, including two-thirds in the esophagus. (Katz and Falk 2001) Other studies have highlighted similar concerns in other populations.

Hyperventilation is harmful in the setting of traumatic brain injury, causing cerebral vasoconstriction and reduction of cerebral blood flow. Davis demonstrated the prevalence of inadvertent hyperventilation after prehospital ETI and its link with poor patient outcomes.(Davis, Dunford et al. 2004) Hyperventilation is also harmful in the setting of cardiopulmonary resuscitation chest compressions, raising intrathoracic pressure and reducing coronary perfusion pressure. Aufderheide highlighted the prevalence of this unwanted event in prehospital cardiac arrest resuscitation. (Aufderheide and Lurie 2004; Aufderheide, Sigurdsson et al. 2004)

Interruptions in CPR chest compressions are harmful, causing precipitous drops in coronary perfusion pressure. Using state-of-the-art CPR detection technology, we studied ETI efforts in 100 prehospital cardiac arrest patients in Pittsburgh. (Wang, Simeone et al. 2009) We found that ETI efforts resulted in a median of 2 CPR interruptions; the median first interruption was 46.5 seconds (IQR 23.5-75 seconds), and the median sum of all interruptions was 109.5 seconds (IQR 54-198 seconds).

Other aspects of rendering care can threaten patient safety and may be reduced with experience or training. In a review of the Food and Drug Administration's Manufacturer and User Facility Device Experience Database (MAUDE), we found 671 adverse events involving ambulance stretcher use; over half involved stretcher collapse. (Wang, Weaver et al. 2009) In a review of 326 insurance claims against EMS providers, we found that one-third involved emergency vehicle crashes and one-third involve patient handling mishaps. (Wang, Fairbanks et al. 2008)

FACTORS THAT MAY INFLUENCE THE CHOICE BETWEEN A SINGLE_RESPONSE TIER AND MULTI-RESPONSE TIER STRATEGY

The choice between an SRT and MRT system is not straightforward. The decision for an EMS system must be individualized and must account for a myriad of factors.

Clinical and Procedure Experience

As alluded to previously, the larger the number of paramedics, the fewer the clinical and procedural opportunities. While controlled or simulated experience may potentially substitute for clinical experience, there are many barriers.

For example, the EMS educational resources in the US are limited. The customary method for learning ETI is for students to work under anesthesiologists in the operating room practicing the procedure on anesthetized patients. However, paramedic training programs are face significant challenges obtaining controlled OR time. (Johnston, Seitz et al. 2006) Anesthesiologists are not willing to host students or accommodate the medicolegal risk. Securing OR time has been described as the single hardest part of directing a paramedic training program. Once in the OR, students face significant competition from nurse anesthetists, resident physicians and even respiratory therapy students. Although the national recommendation is for paramedic students to perform 5 intubations before graduation, many do not meet this number, and a significant fraction never perform a live ETI at all during training.

The opportunity for performing procedures is limited in clinical practice. In an analysis of Pennsylvania statewide EMS data, we found that paramedics performed a median of 1 ETI annually. (Wang, Kupas et al. 2005) As described previously, ETI experience is associated with patient outcomes. (Wang, Balasubramani et al. 2010) Paramedics cannot possibly maintain ETI skills performing only 1 procedure per year. While some propose that human simulators could substitute for clinical experience, the current technology does not accurately replicate the dynamics of human flesh nor the heterogeneity of human airways. Mannequins and simulators can help to teach situational awareness, but in many cases are not suitable substitutes for task training. (Wang and Yealy 2006; Wang and Yealy 2006)

Could we introduce simplified techniques for resuscitation? Several EMS agencies have streamlined cardiac arrest resuscitation, using King LT airways instead of endotracheal tubes and EZ-IO intraosseous access instead of traditional intravenous access. These agencies have chosen this strategy to expedite provision of an advanced airway, accelerate drug delivery, and minimize CPR chest compression interruptions. However, while reducing dexterity load is helpful, it does not address the issue of cognitive complexity faced in prehospital care. Paramedics need regular exposure to high acuity to grow accustomed to evaluating and managing these cases.

Capabilities of Dispatch Center

MRT systems requires excellent and accurate triaging by the 911 dispatch (public service answer point – PSAP) center. Without accurate triaging, the wrong level unit may be dispatched to the wrong levels of calls. PSAP operators must be capable of quickly discerning BLS from ALS conditions, and clear protocols must be developed to delineate between the two levels of calls. In addition, because two or more EMS units may be dispatched to a scene, careful control of response logistics is essential.

Geographic Distribution of Cases

MRT systems may not be appropriate for all communities. For example, in a deep rural community with a diffuse population, it may not be feasible to dispatch two units to the same incident. In remote areas it may not be possible for a ground ALS unit to meet up with a BLS unit. In select cases response by an air medical unit may prove necessary. Conversely, MRT systems may play a viable role in dense urban centers where there is a high volume of calls. In these systems it is inefficient to staff ALS units to respond to every incident. Triaging of lower acute calls to BLS units prove a more efficient and judicious use of resources.

Variation in Case Mix and Acuity

The range of patient cases caries widely for different communities. The configuration of response must account for this variation. For example, in a community with a high proportion of high acuity calls, SRT systems may prove an optimal approach, providing optimal delivery of services and assuring an adequate quantity of experience for providers. Conversely, a community with relatively few high acuity calls may be more amenable to a MRT system. Disease and acuity variation may also vary *within* a community. For example, in an analysis of EMS shock care in Pennsylvania, we found considerable regional variation in the total and per capita number of shock cases as well as the breakdown between traumatic and medical shock. (Wang, Shapiro et al. 2011) A community's cardiac arrests may see greater survival gains with improvements in public CPR training and cardiac arrest awareness rather than reconfiguring EMS. (Stiell, Wells et al. 2004)

Education and Training Resources

Continuing education and training are essential for maintaining EMS provider skill and proficiency. The training resources available to an EMS system may influence the optimal design. For example, a community that has chosen a SRT system will need to invest in supplemental training for each paramedic. Conversely, in a high volume MRT system, paramedics may acquire adequate proficiency through clinical experience. However, a MRT system with low-medium volume and acuity may require as much supplemental training as a SRT system.

Mass Casualty and Surge Capacity

The number of practitioners could influence an agency’s ability to respond to a surge or mass casualty event. A SRT system will have a large number of paramedic-trained

personnel to respond to multi-victim incidents. However, most mass casualty incidents may have a mix of low and high acuity patients. An organized tiered EMS system with many BLS providers may be capable of responding to a large scale disaster.

Administrative Constraints

A SRT system is clearly easier to administer, with only one level of provider (or two, if a hybrid paramedic/EMT crew is used), one type of vehicle, and no dispatcher triaging. A MRT system requires oversight of multiple levels of personnel, vehicles and dispatching operations. Fiscally, both types of systems have associated expenses. Although most experts believe that a SRT system is less expensive, savings in personnel costs may be offset by additional paramedics and dispatcher training costs.

Culture and Politics

Cultural and political factors are strong influences on EMS system organization and design. The beliefs and desires of the community's citizen are important additional factors. As taxpayers and "customers" of the EMS system, citizens may have perceptions and desires regarding prehospital care delivery systems. While some individuals may understand the benefits of a MRT system, others may place higher perceived value on broad access to paramedic level care offered by SRT. In communities with entrenched volunteer ambulance systems, MRT systems may appear the accepted norm. Government leaders and stakeholders may also have expectations and perceptions of the ideal EMS system.

It is extremely difficult to reconfigure an EMS system. Converting from MRT to SRT requires significant expense as personnel are retrained or hired, and as vehicles are reconfigured. If the community embraces a two-paramedic per ambulance model, then many EMTs will need to be reassigned or terminated. Likewise, the conversion from a SRT to a MRT system has many challenges, including reassigning or terminating paramedics, reconfiguring vehicles, and retraining dispatchers.

Conclusion

Communities must weight a myriad of factors when choosing between a SRT and MRT EMS system.

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FIGURE 1

Conceptual model of prehospital volume-outcome relationship.

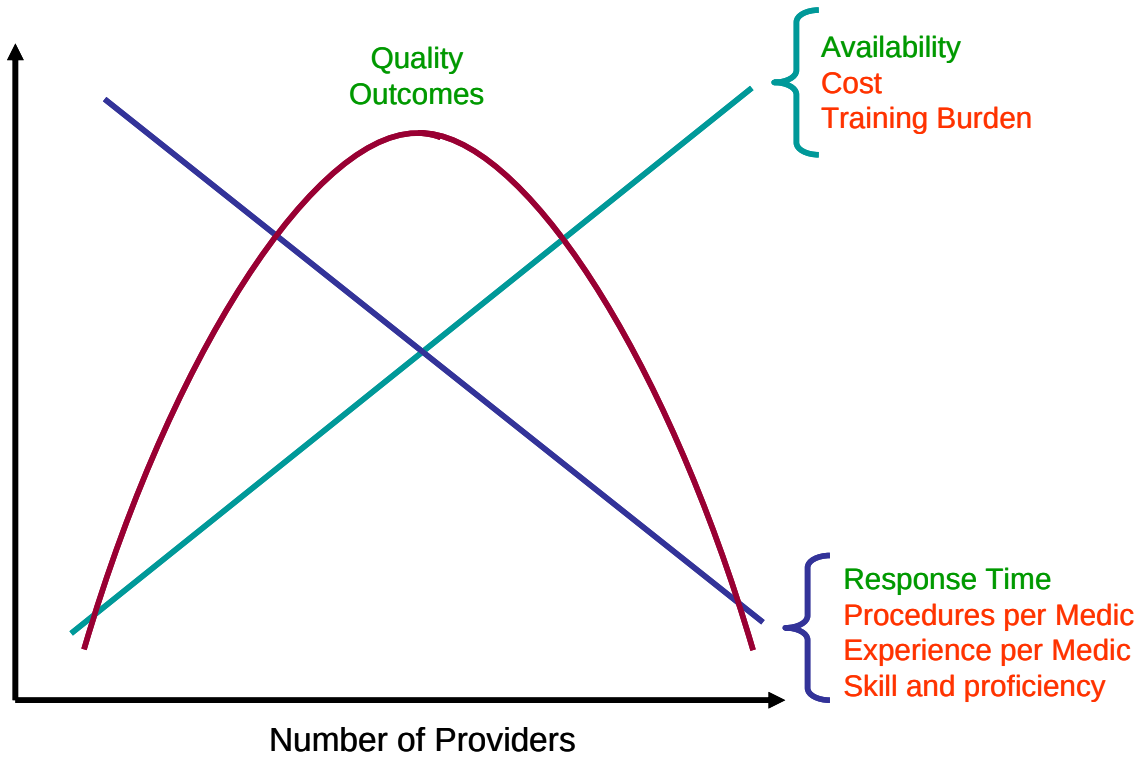


FIGURE 2

Adjusted associations between patient survival and rescuer cumulative ETI experience. Includes ETI patients January 1, 2003-December 31, 2005. (Wang, Balasubramani et al. 2010) Cardiac arrests, medical non-arrests and trauma non-arrests analyzed separately. ETI experience defined as rescuer's cumulative number of ETI since January 1, 2000.

Cardiac arrest estimates adjusted for patient age, patient sex, major injury/trauma bystander witnessed cardiac arrest, bystander CPR, EMS automated external defibrillator use, EMS response time (dispatch to arrival on scene), rescuer cumulative patient contacts, EMS agency population setting and year of encounter. Medical and trauma non-arrests adjusted for patient age, patient sex, pulse, systolic blood pressure, Glasgow Coma Scale, rescuer cumulative patient contacts, EMS agency population setting and year of encounter. ETI = endotracheal intubation.

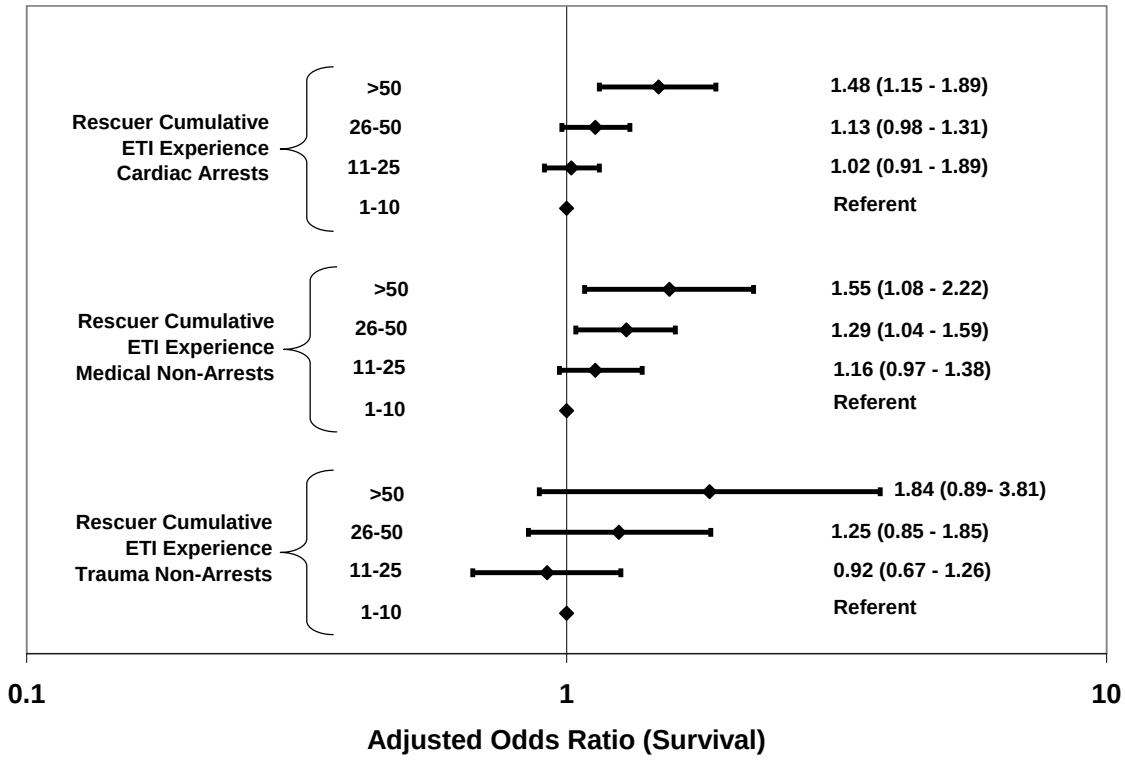
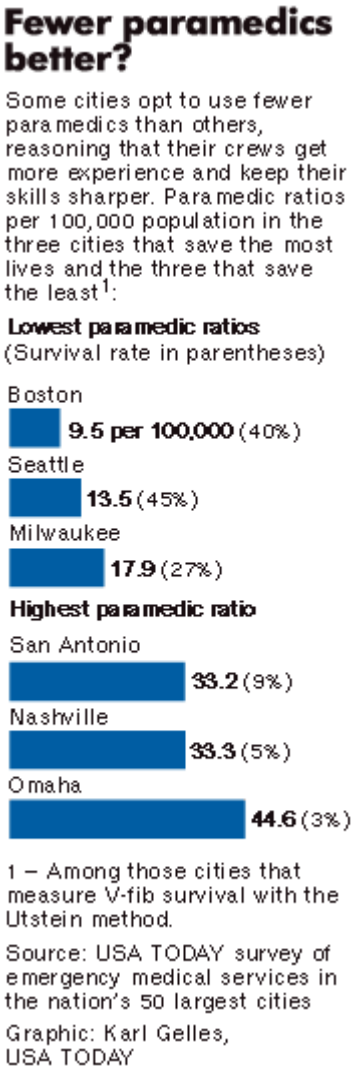


FIGURE 3

Paramedic:population ratios and out-of-hospital cardiac arrest survival. From Robert Davis, "Many lives are lost across USA because emergency services fail" USA Today 5/20/2005, http://www.usatoday.com/news/nation/ems-day1-cover.htm, Accessed April 4, 2011



Appendix A - A Strategic-Based EMS Blueprint for Tulsa

As the Tulsa Emergency Medical Services Strategic Planning Steering Committee, it is our pleasure to present the attached document, "A Strategic-Based Emergency Medical Services Blueprint for Tulsa" for your review.

Each "guiding principle" with supporting core issues and operational plans reflects our unqualified consensus support. Consensus was achieved through our consideration of evidence and operational-based findings and expert advisement utilizing our combined experience of over 240 years in the delivery of emergency medical services. As testament to the highest consideration due every patient we serve, patient beneficence remains the dominate spirit in this document. Further indicative of our system's solid foundation are our commitments to fiscal responsibility in system enhancements and our due respect shown one another in a consistent and reliably collegial atmosphere throughout the development of this document.

We believe your endorsement of this comprehensive blueprint for further optimization of emergency medical services will greatly benefit the future patients utilizing Tulsa's EMS system. This blueprint also champions appropriate support for the men and women dedicated to providing this vital medical service.

We appreciate your thoughtful review of this document and your subsequent support.

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A STRATEGIC-BASED EMERGENCY MEDICAL SERVICES BLUEPRINT FOR TULSA

Executive Summary

Tulsa's Emergency Medical Service (EMS) system is rightfully regarded as one of the finest in our nation. Every day, dedicated men and women in the Tulsa Fire Department and Emergency Medical Services Authority commit themselves to learn, practice, and provide the necessary medical care for citizens emergently summoning their help. Their ardent efforts and honed skills result in numerous lives saved and sustained despite the rigors and challenges they face in the practice of EMS medicine.

Although today's patients benefit from outstanding care provided by these medical professionals, Tulsa is wise in its support for EMS strategic planning to ensure continued EMS system excellence for years to come.

The comprehensive discussion of the necessary tenets, or "guiding principles," for high-performance EMS, associated core issues, and the operational steps promoting their successful incorporation specific to Tulsa's EMS system comprises the blueprint. While each guiding principle constitutes an essential accomplishment, it is only the synergy of their combined effects that produce the results necessary to reliably respond and appropriately benefit patients depending upon Tulsa's "911" services in times of real and perceived medical crisis.

Careful adherence to evidence-based directives in EMS system design and medical treatment protocols must be exercised. Tulsa is fortunate to have dedicated leaders throughout its EMS system and medical community that support consideration of patient outcomes, appropriate "fit" of treatment to high local standards of care, and the fiscal impact of design and treatment changes prior to effecting change. The EMS strategic planning steering committee fully supports the continuance of these practices throughout numerous operational plans.

Before emergency medical technicians and paramedics arrive to deliver patient care, a complex sequence of events must reliably transpire to achieve that care. The EMS strategic planning steering committee has outlined a plan that fully reviews current dispatch logistics to identify steps (or perhaps more accurately, delete steps) making this process even more efficient.

Today represents a critical time in the service demands upon Tulsa's EMS system. Currently, the system provides a luxury of responding rapidly to all service requests, even those of perceived lower priority need. Factoring the consistent growth in service demands over the last several years, meeting these demands cannot continue for years to come without 1) committing to significant increases in workforce, fixed resources (fire stations), and mobile resources (fire engines and ambulances), all involving considerable costs; and/or 2) employing evidence-based alternative response modalities, proven appropriate to patient needs while simultaneously containing system costs. Many EMS systems around the world have successfully incorporated models of alternative response to promote system efficiency. It is

important to monitor Federal and state regulations that address these practices and advocate for changes appropriate for Tulsa's EMS system. The EMS strategic planning steering committee fully supports careful study and application appropriate to local patient and system needs and demands.

Regardless of exact response configuration utilized in any particular response, the men and women in the Tulsa Fire Department and EMSA work side by side so that patients are served appropriately by the collective EMS system. Several guiding principles discuss the importance of further fostering this "team concept" of patient care. Combined training programs delivering common curriculum with multi-agency instructors are essential. The EMS strategic planning steering committee has identified The Oklahoma Institute for Disaster & Emergency Medicine, based at The University of Oklahoma School of Community Medicine in Tulsa, as the leading resource to foster this combined training.

Combined training further contributes to a collegial work environment throughout the EMS system. While facing significant challenges throughout the course of their work day, Tulsa's EMS professionals deserve significant support. The EMS strategic planning steering committee has made a number of recommendations building upon today's workforce camaraderie to strengthen this support.

Integral support for Tulsa's EMS system is provided by the Medical Control Board (MCB). The MCB, currently comprised of eight emergency physicians representing the busiest emergency departments in Tulsa and Oklahoma City and one neurosurgeon, contributes countless volunteer hours to the EMS system. Their oversight of the local practice of EMS medicine is absolutely essential for Tulsa's EMS system to function. These dedicated physicians also advise the system's EMS Medical Directors in their day-to-day medical oversight when needed. The EMS strategic planning steering committee fully supports the salient roles played by the MCB.

Long-term sustenance of Tulsa's EMS system depends upon fiscal accountability and a commitment to a continuous process of quality improvement. Throughout this blueprint, the EMS strategic planning steering committee has ensured appropriate operational steps addressing both aspects are included. It is important to clarify that Tulsa does not place its EMS system and patients at the mercy of a "lowest bidder" philosophy. Rather, patient beneficent decisions are simply made with due considerations for financial impacts and effect on overall system performance. This framework serves in the day-to-day operations as well as in necessary readiness for future disasters, natural and man-made.

Finally, the EMS strategic planning steering committee's work to date should be viewed as the initial phases of a dynamic process. Just as this document serves today's EMS system well, it is only through support for a continuous process of EMS strategic planning that future generations of Tulsans will continue to receive excellent EMS care.

Guiding Principles

1. EMS system design is based on scientific medical and economic evidence published in peer-reviewed literature as well as determined by the system's continuous quality improvement.

2. EMS system design recognizes the unique aspects and essential contributions of both first response and transport components. Component-distinct medical assessments and treatments are combined to form the essential medical care delivered to a "single patient" in the EMS system. Therefore, successfully treating this "single patient" depends upon coordinated and integrated response, medical treatment protocols, and continuing medical education.

3. As the "single patient" paradigm predominates throughout the EMS system's design of response, medical treatment, and continuing medical education, the EMS system's continuous quality improvement should be coordinated and integrated.

4. EMS communications optimizes the EMS system's patient care abilities when utilizing evidence-based priority dispatching. Successful priority dispatching sends necessary resource(s) to the patient, without excessive and inappropriate utilization of first response and transport components.

5. EMS communications optimizes the EMS system's patient care abilities when utilizing integrated EMS resource locater capabilities to identify and dispatch the closest appropriate responder(s).

6. Effective, coordinated continuing education (CE) enables advances in excellent patient care. Relevant, engaging CE is based upon EMS CQI findings, patient care capabilities, and treatment protocols.

7. Collegial working relationships among all personnel in this EMS system promote optimal patient care provided by mutually respected professionals.

8. Medical treatment protocols are derived utilizing prevailing EMS standards of care, evidence-based medicine, and system design considerations. Medical treatment protocols are formatted to recognize the essential contributions from communications, first response, and transport personnel and promote seamless care delivery. Clinical staffing must afford the safe implementation of these medical treatment protocols.

9. This EMS system recognizes and respects each contracted community's desire for high quality emergency medical services delivered in an affordable, cost effective design. Communications, first response, and transport components/resources are integrally linked and depend upon the effectiveness and efficiency of each other. Additional system resources are added only when they support the desired high quality of EMS in our communities and do so with reasonable costs.

10. Medical care provided by the EMS professionals in this system constitutes a delegated practice of medicine. The Medical Control Board and Office of the Medical Director physicians must be experienced and specialty board certified. These physicians commit to providing objective and independent medical oversight, without regard to self-interests and political pressures.

11. Response time standards factor the patient's perceived condition. Response time standards are appropriate for both first response and transport agencies. Strict compliance within response time standards is expected.

12. Electronic patient records must be utilized by both first response and transport to allow for integrated and seamless patient care documentation. This system is maximally effective for continuous patient care improvement activities, allowing for 100% critical care event compliance review.

13. Disaster preparedness and response constitute essential roles of this EMS system. Effective preparedness for and response to disaster-related emergency medical needs are dependent upon concise, task-oriented multiple casualty response procedures, routinely scheduled realistic multiple casualty training, funding appropriate protective and medical equipment, and achieving region-wide governmental operational support.

14. EMS strategic planning best enables optimal EMS system design and performance when conducted continuously.

GUIDING PRINCIPLES & CORE ISSUES

EMS patient beneficence, specifically addressing and meeting patient care needs within a reasonable EMS scope of practice, must provide the foundation and EMS system architecture, guiding principles, core values, and operational plans. Pointedly, the patient-centered approach is the EMS system's immunization against political and organizational self-interests. Current system design and future recommendations should anticipate served community EMS needs, factoring present and needed resources, ultimately fulfilling the commitment to provide optimal EMS care.

1. **EMS system design is based on scientific medical and economic evidence published in peer-reviewed literature as well as determined by the system's continuous quality improvement.**

   The United States spends two and a half times per capita the rate of any other nation on health care. Significant expenditure involves tests, procedures, and medications without peer-reviewed research proven benefit. In reality, patients can incur greater risk without receiving better outcomes when evidence-based medicine and commitment to systematic quality improvement does not constitute the foundations of a medical practice. An EMS system is clearly a practice of medicine, although certainly not one located in the traditional hospital or clinical office-based environments, therefore incurring many significant and unique challenges in meeting its patient's needs.

   Examples of non-evidence based clinical practices in EMS have included MAST pants (increased EMS operational costs, yet decreased patient survival from hemorrhagic shock) and high-dose epinephrine (increased EMS operational costs, increased hospital-based ICU demands and costs, yet no improvement in neurologically-intact patient survival from cardiac arrest). Examples of judiciously adopting standard of care changes in Tulsa, utilizing best-available scientific evidence at the time, include CPAP for COPD or CHF-related respiratory distress and the ResQPod for cardiac arrest. The ResQPod is an excellent example of the Tulsa EMS system's medical aggressiveness as the device was adopted early compared with other major metropolitan EMS systems. This early adoption was based upon promising patient outcomes research and the ability to evaluate the impact upon patient outcome locally utilizing the system's continuous quality improvement.

   Evidence-based medicine guides EMS systems in providing quality, cost-efficient care. Best patient outcomes are realized by utilizing appropriately trained EMS professionals, assisted by current treatment protocols, incorporating safe and effective procedures, medications and equipment. Far from "cookbook" medicine, evidence-based medicine requires careful integration of medical research findings, a medical professional's clinical expertise, and respect for a patient's autonomy and informed consent.

Core Issues

- Evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating the best available scientific and/or medical research meeting the publication standards inherent in peer-reviewed journals and an individual EMT/EMT-Intermediate/EMT-Paramedic's clinical expertise, while respecting a patient's autonomy through implied or informed consent.

- This EMS system's independent Medical Control Board has responsibility and accountability to ensure that the medical treatment protocols reflect current evidence-based medicine, incorporating this system's continuous quality improvement (CQI). A medical treatment protocol change does not necessarily constitute a standard of care change. A standard of care change ultimately results in change to medical treatment protocol(s), system operational procedure(s), or both.

- The CQI process, monitoring and improving the clinical and operational performance of the system, must use statistically valid principles and practices of evidence-based medicine. All organizations contributing key system components must be appropriately represented in the CQI process.

- Each community served in an EMS system is respected. EMS system practices must promote effective professional relationships with other components in a community's healthcare, public safety, and governmental systems.

- The Standard of Care Change Process should allow changes in the EMS system within the principles of evidence-based medicine. No EMS system or community is so unique to exclude applicability of the majority of EMS-related peer-reviewed research. While much of the peer-reviewed research forming the basis of medical treatment or operational decision is conducted outside of Tulsa, it must be uniformly recognized that the Tulsa EMS standard of care is established by this EMS system alone. All organizations and individuals participating in the Tulsa EMS system work together to establish the Tulsa EMS standard of care. This process of broad inclusion, incorporating operational and fiscal impacts, ensures that standard of care changes are clinically, operationally, and fiscally achievable.

Operational Plan

- Establish a formal, regularly scheduled process of EMS-related, evidence-based, peer-reviewed, literature review. Topics for literature review should be based upon the CQI process to assure that changes needed to meet system goals are supported by research outcomes and are made in methods capable of further impact analysis. This program for literature review can be coordinated by Oklahoma Institute for Emergency and Disaster Medicine (OIDEM) faculty.

- Establish a process for weighing conflicting scientific evidence, particularly in areas of scarce research. The process utilized by the American Heart Association for the development of its 2005 Emergency Cardiac Care Guidelines serves as a useful template. Any local process must rigorously evaluate investigational methodologies utilized in research relevant to the EMS system.

- Establish a formal, regularly scheduled process of discussing and distributing relevant EMS-related, evidence-based, peer-reviewed, and published scientific and/or medical research (discovered through the review process described in the preceding operational plan bulleted point) to individuals throughout the EMS system. Office of the Medical Director staff, in conjunction with OIDEM faculty, can serve as discussion moderators of a "journal club." This educational forum must be open to all individuals pertinent to the EMS system. OMD staff and OIDEM faculty can provide further service by facilitating the writing of research "executive summaries" for dissemination to liaisons in the EMS system's contributing organizations. Each of these key contacts should ensure further dissemination occurs organization-wide in an expeditious manner. One common format for dissemination and repository could be the OIDEM website. Relevant return commentary should likewise be shared with OMD staff and OIDEM faculty in efforts to ensure all viewpoints are valued and considered in further EMS system changes.

- Report relevant EMS-related, evidence-based, peer-reviewed literature reviewed and correlated with this EMS system's CQI findings in valued formats at meetings integral to system design and operations (current examples: Medical Control Board, First Responders, EMSA Board of Trustees, System CQI)

- Report changes in the EMS system based on relevant EMS-related, evidence-based, peer-reviewed literature reviewed and correlated with this EMS system's CQI findings in valued formats in the Office of the Medical Director's Annual Report to the Mayor and City Council of Tulsa. An executive summary for this Annual Report is recommended.

- Endorse and maintain the current Standard of Care Change process, which includes operational and fiscal impacts, ensuring that standard of care changes are clinically desirable, operationally possible, and fiscally achievable throughout all levels of system operations.

- Endorse and maintain the current independence of medical oversight through the Office of the Medical Director and the Medical Control Board.

2. **EMS system design recognizes the unique aspects and essential contributions of both first response and transport components. Component-distinct medical assessments and treatments are combined to form the essential medical care delivered to a "single patient" in the EMS system. Therefore, successfully treating this "single patient" depends upon coordinated and integrated response, medical treatment protocols, and continuing medical education.**

   Virtually all major metropolitan EMS systems utilize distinct first response and transport components in response to 911 calls for medical assistance. Each component represents a specific, essential function in providing optimal EMS patient care.

   The first response role is to rapidly reach, assess, and stabilize patients with time-sensitive, serious medical conditions as perceived via emergency medical dispatch query of the 911 caller. Rapid arrival to these patients can only be achieved when first response is provided by an organization that strategically places numerous response apparatus, each being continuously staffed by employing a large workforce trained in EMS care at either basic or advanced life support levels. Integral to the ongoing availability of first response is the ability to transfer continuing patient care and transport responsibility to an additional component in the EMS system. An agency commonly utilized for first response in the United States is the Fire Service.

   The transport role is to reach, assess, stabilize, and ensure completeness of indicated EMS care is delivered in a time appropriate manner to all patients contacting the EMS system for medical assistance. Indicated EMS patient care most commonly involves transportation in an ambulance to a hospital-based emergency department for physician-provided care. Optimal EMS patient care can only be achieved when transport is provided by an organization that utilizes ambulances sufficient in design, number, and positioning to meet EMS system demands and staffs these ambulances with a workforce trained in EMS care at either basic or advanced life support levels. Agencies commonly utilized for transport in the United States are the Ambulance Service and the Fire Service.

   A sufficient number of the professionals in the EMS system (be they first response or transport affiliated) must be trained and credentialed at the advanced life support level to ensure continuity of competent ALS care availability. A sufficient number of professionals in the EMS system (either basic or advanced life support trained and credentialed) should exist to meet anticipated peak demand and routine disaster needs.

Core Issues

- Optimal major metropolitan EMS system performance depends upon integrated first response and transport components. While each component provides an essential aspect of the "single patient's" needed care from the EMS system, this care can only be reliably achieved when these valued aspects are combined in an efficient, effective manner. The patient should be able to appreciate a coordinated response to their perceived emergent health care need(s) with a seamless transition of care.

- First responders commonly have many additional public safety responsibilities aside from EMS patient care. Integral to the ongoing availability of first response for all of its responsibilities is the ability to transfer continuing patient care and transport responsibility to an additional component in the EMS system.

- Transport professionals in the EMS system have a primary duty to ensure completeness of EMS-appropriate patient care is delivered by the EMS system. Ambulance transport of the patient to an appropriate healthcare venue is typically involved in this component's primary duty. Attendant to this duty is a longer time commitment to nearly all patients served by the EMS system.

- Sufficient EMS professionals must exist in the system to provide care during times of anticipated peak demands and routine disasters.

- All EMS professionals, first response and transport based, utilize the same medical treatment protocols and administrative standards promulgated by the Medical Control Board. Fully integrating these protocols with shared EMS Medical Direction, compatible medical equipment, combined continuing medical education, and a combined recredentialing process facilitates optimal EMS system performance and patient outcomes.

Operational Plan

- Review current EMS system dispatch operations. Develop improved methods to more rapidly identify which 911 calls to the EMS system constitute a significant role for first response to ensure clinically-relevant and timely arrival at the patient's side. Ensure proper coordination in response patterns with the transport component for these patients with perceived serious, "time-sensitive" illness or injury.

- Endorse and maintain distinct first response and transport components and their mutual utilization of independent medical oversight. EMS medical oversight is responsible for providing the system a set of integrated medical treatment protocols and administrative standards.

- Develop EMS continuing medical education that promotes equal attendance from first response and transport components. OIDEM faculty, in cooperative agreements with education providers in the current EMS system, can assist in the formation of OIDEM-sponsored EMS education system-wide.

- All endorsements of current system practices and desires for further improvements are held accountable to the primary standard of patient beneficence.

3. **As the "single patient" paradigm predominates throughout the EMS system's design of response, medical treatment, and continuing medical education, the EMS system's continuous quality improvement should be coordinated and integrated.**

   Bettering the outcome of the "single patient" is the driver of CQI activity. First response and transport component-specific patient care must be evaluated in their combined delivery. Therefore, first response and transport component data must be compatible to a minimum of enabling coordinated CQI analysis and reporting. CQI reportable criteria must be medical relevant, measurable, and approved by the EMS system's medical oversight. Data must be supplied in formats enabling easy and meaningful usage by first response and transport components.

   Evidence based medicine is based upon rigorous analysis of operational and medical treatment data to provide reliable information to all partners in the EMS system. Data must be entered, collected, analyzed, and acted upon using statistically valid methods.

   CQI analysis should be conducted in an open, cooperative, and non-threatening forum. Analysis is more reliable and useful when conjointly discussed amongst medical oversight, first response, and transport component leaders. Proper CQI analysis yields system improvements that are efficient, effective, and fiscally responsible.

   Core Issues

   - All care provided in the EMS system is subject to treatment and operational compliance review. Reporting of patient contact and care must be performed in a manner enabling efficient CQI.

   - System performance optimization and bettering individual patient outcomes are dependent upon the ability to conduct composite CQI analytic activities.

   - Operational and medical treatment data must be collected, analyzed, displayed, and acted upon using statistically valid methods. Data definitions must be clear and adopted by all system components. Qualitative and quantitative data should be displayed on statistical process control charts in ways that ease interpretation for system decision-makers.

Operational Plan

- CQI reporting should be in a combined format utilizing information from both first response and transport components. A design team should be organized with representatives from the Office of the Medical Director, first response and transport agencies, including information technology specialists. This team should refer to the EMS system's Cardiac Arrest Registry as a model of reporting. It is imperative to identify and obtain measurable data constituting "chains of survival" for expanded clinical interventions. Entities such as respiratory distress (asthma, congestive heart failure), acute coronary syndromes (ST-elevation myocardial infarctions), seizures, and major trauma represent significant portions of the patients currently served in this EMS system and desired topics of CQI reports to be developed via this process.

- CQI activities (examples: incident investigations, system performance feedback sessions) should be attended in appropriate times/numbers by TFD EMS leadership personnel (EMS Coordinator, EMS QA Officers, EMS Education Staff), EMSA leadership personnel (Field Operations Supervisors, Education Staff, QI Staff), and OMD staff to promote consistency of efforts and conclusive incident resolutions. Face-to-face meetings amongst these key stakeholders should be encouraged to further promote effective, trusting, and enjoyable professional relationships. Relevant field personnel should be invited to attend CQI sessions, especially incident investigations, to further their interest and commitment to system-wide CQI.

- Operational and/or educational meetings (examples: TFD District Chief meetings, EMSA "PULSE" (**P**erformance, **U**tilization, **L**ate Calls, **S**ystem **E**valuation) meetings, EMSA weekly operations, EMSA monthly operations, EMSA Team Meetings) should be attended in appropriate times/numbers by EMS leadership from both TFD and EMSA (example: EMSA FOS attending TFD District Chief meeting). Dual-agency leadership representation promotes sharing of real-time information regarding staffing, apparatus, equipment, or training that may impact short-term system performance. In some instances, these meetings could become completely dual-agency formatted, better addressing system-wide CQI operational-related needs and reducing required meetings for EMS leadership in both TFD and EMSA.

- Evaluation of EMS-related software should include compatibility determination with the EMS system's present and anticipated software. Wherever possible, the degree of software compatibility should be a factor in EMS-related software purchasing. Current software changes may prove difficult given expenses in initial software purchasing, hardware configuration, personnel training, and ongoing technology support. When difficulties in software change seem substantial, standardizing data definitions and formatting within current software may provide acceptable solutions to CQI needs.

- Report relevant CQI findings in valued formats at meetings integral to system design and operations (current examples: Medical Control Board, First Responders, EMSA Board of Trustees, System CQI)

- Report relevant CQI findings in valued formats in the Office of the Medical Director's Annual Report to the Mayor and City Council of Tulsa. An executive summary of this Annual Report is recommended.

4. **EMS communications optimizes the EMS system's patient care abilities when utilizing evidence-based priority dispatching. Successful priority dispatching sends necessary resource(s) to the patient, without excessive and inappropriate utilization of first response and transport components.**

   Comprehensive, evidence-based EMS dispatch is integral to an EMS system's ability to match its response with the patient's needs. EMS dispatch must be able to identify the most severe, time-sensitive medical conditions first, thereby initiating appropriate EMS response rapidly. Without a proven system for EMS resource utilization, inappropriate response occurs. Inappropriate EMS response may be reflected in several ways: 1) committing an underutilization of resources for critical patients; 2) committing an overutilization of resources for persons with needs not ideally addressed by higher levels of EMS care, perhaps not ideally addressed by EMS at all; 3) committing resources to respond in "lights and sirens" mode to non-time sensitive acute illness or injury; 4) utilization of response time standards without basis of medical and/or operational needs. Each of these examples results in inappropriate response with detriment to patients, the public, and EMS professionals.

   In addition to correct resource identification and utilization for EMS response, comprehensive, evidence-based EMS communications provides pre-arrival instructions (PAI) for bystander patient care, further improving patient healing and survival.

   Core Issues

   - EMS dispatch must rapidly and systematically ascertain what perceived emergency medical condition is being reported. The most potentially serious and time-sensitive of these medical conditions merit rapid notification of first response and transport EMS professionals. Rapid response to these true life-threatening conditions is predicated upon rapid notification. Evidence-based medical interrogation protocols constitute the foundation for rapidly identifying these conditions and rapidly dispatching appropriate responders.

   - Effective bystander-initiated patient care can be achieved via phone directives. Critical interventions such as cardiopulmonary resuscitation (CPR), choking relief via the Heimlich maneuver, and hemorrhage control via direct pressure can be instituted prior to EMS professional care. Evidence-based pre-arrival instruction protocols constitute the foundation for rapidly initiating this care.

   - Emergency response ("lights and sirens" mode) proves an inherent risk to the public and EMS professionals. While perceived critical medical conditions warrant this risk, many calls for EMS assistance do not. Evidence-based medical interrogation protocols constitute the foundation for differentiating conditions justifying emergency response, urgent response ("non lights and sirens" mode), scheduled response ("transfers"), and alternative response ("non-fire engine or ladder/non-ambulance").

- First response provides time-sensitive care in designated higher priority medical conditions. Rapid availability of first response can become compromised when first response resources are dispatched to all requests for EMS service. Evidence-based medical interrogation protocols constitute the foundation for rapidly identifying medical conditions substantially improved by first response care.

- Timely first response care depends equally upon the efficient identification of higher priority medical conditions AND efficient methods of first response notification/dispatch. In some instances, first response self-dispatch based upon direct observation or monitored radio communications proves the quickest means for first response utilization.

- EMS dispatch must be capable of discerning if medical conditions are markedly worsening while EMS professionals are responding to the initial call for help. As conditions warrant, EMS dispatch must be capable of assigning higher priorities to these incidents, notifying currently responding EMS professionals of change(s) in patient condition, and activating appropriate additional responders to these patients.

- Given significant differences in EMS system design and service area, response time standards show surprisingly little variability among United States major metropolitan areas. While these "standards" may seem well-supported, most have been derived without significant evidence-based medicine. As better EMS science emerges, response time standards must be periodically re-evaluated. Response time standards for first response and transport components should factor medical benefit, operational safety, and fiscal responsibility concerns.

- Sending a fire engine or ladder and/or ambulance to every EMS request for service constitutes an overutilization of these resources. Evidence-based programs exist for alternative response (example: EMS professional(s) in car/truck/SUV), alternative disposition (examples: medical advice line, social service referral), and/or alternative destination (examples: walk-in clinics). Evidence indicates a growing service demand in this EMS system. Solely using "traditional" response of fire engine or ladder and/or ambulance to each request for service comprises heavy use of relatively scarce resources, high cost operations, and increasing physical demands upon EMS professionals. A conservative system of response or disposition for clearly "non emergent" needs better supports traditional EMS resource availability for high priority patients, fiscal responsibility, and supports the well-being of the EMS workforce. Response time standards review and advocacy for revised response time standards becomes inherent in supporting response type changes.

- EMS dispatch constitutes an important part of the EMS system's practice of medicine. Appropriate re-evaluations of EMS dispatch should utilize evidence-based medicine. Where gaps in evidence exist, industry "best practices" - medical, operational, and financial - should serve as leading points of discussion among decision-makers. EMS CQI constitutes an integral part of the total EMS system's CQI.

Operational Plan

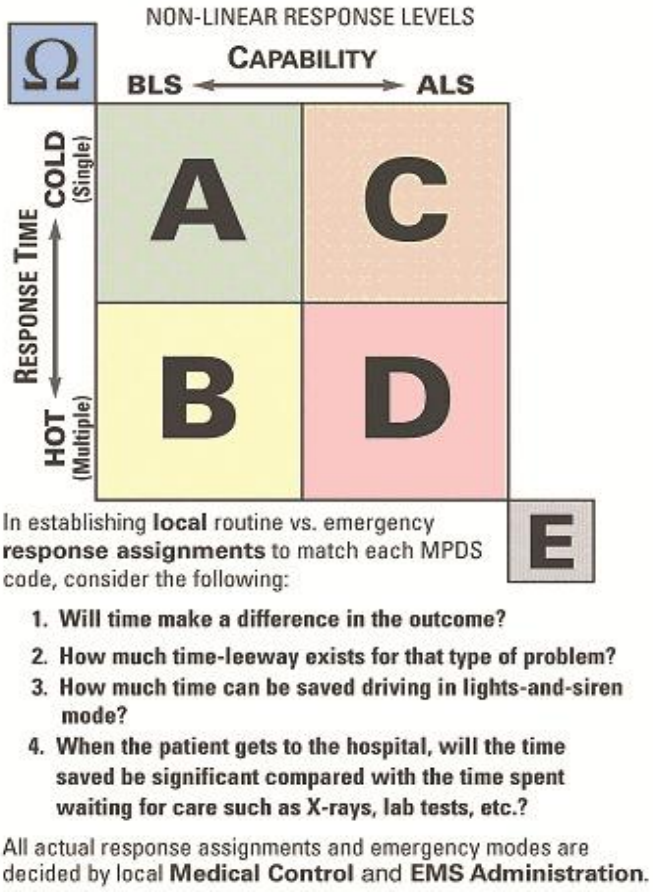
- Re-affirm EMS dispatch must utilize an evidence-based method of medical interrogation, incident prioritization, responder selection and notification, and pre-arrival instruction.

- The Medical Priority Dispatch System (MPDS) in conjunction with the National Academy of Emergency Dispatch (NAED) currently comprises the best evidence-based method of EMS dispatch and is the basis for EMS dispatch in Tulsa. MPDS is subject to continuous revision. MPDS revisions may not necessarily complement the desired Tulsa EMS standards of care. The Medical Control Board and the EMS Medical Director should carefully review suggested MPDS revisions, either approving or rejecting implementation for this EMS system.

- A taskforce with appropriate organizational and public representation should be formed with objectives to include: 1) describe current EMS dispatch operations from the time of initial 911 or non-emergency call to release of the patient from the EMS system; 2) identify areas of needed improvement in current EMS dispatch operations, with a specific focus on optimizing communication and notification between first response and transport components; 3) suggest the "best case scenario" for EMS dispatch performance and identify solutions to achieve this performance.

- In the taskforce assignment and development interim, EMS dispatch CQI should continue to promote effective operations. Multiple measures should continue to be electronically monitored, tracked, and reported in the monthly EMS dispatch CQI report, including: 1) call transfer times (911 call taker to the EMSA dispatcher and EMSA dispatcher to the Fire dispatcher); 2) calls requiring upgrade, explanation for the change, and notification times for the change; 3) identification of cardiac arrest and reasons that cardiac arrest was not identified; 4) compliance with MPDS/NAED standards.

- This diagram is the current National Academy of Emergency Medical Dispatch Response Determinants matrix utilized to prioritize emergency call responses, to select first response and/or transport response levels, and to advise response time needs (e.g. "lights and sirens") for the six prioritization levels ranging from Omega to Echo.



Appropriate representatives from Tulsa Fire Department, EMSA, and Office of the Medical Director, supported by information technology specialists and by faculty from the Oklahoma Institute for Disaster and Emergency Medicine should further investigate incorporation of MPDS determined response types and modes for this EMS system. Included in this process will be benchmarking with similar EMS communication systems already utilizing this Response Determinants matrix to formulate a safe, accurate implementation plan. This taskforce will also review relevant clinical literature to ensure that utilizing this Response Determinants matrix in conjunction with the Medical Priority Dispatch System continues to be supported by evidence-based medicine. Among multiple response configurations for consideration are: 1) first responder non-lights & sirens response without transport response, 2) first responder lights & sirens response with transport non-lights & sirens response, and 3) transport non-lights & sirens response without first responder response.

- Appropriate utilization of first responders enables rapid availability of this important care component for patients most likely to benefit from first response. Additionally, appropriate response mode minimizes response risk to both the traveling public and EMS professionals. Response time standards review and advocacy for revised response time standards becomes inherent in supporting response mode changes.

- Appropriate representatives from Tulsa Fire Department, EMSA, and Office of the Medical Director, supported by information technology specialists and by faculty from the Oklahoma Institute for Disaster and Emergency Medicine should further investigate incorporation of an MPDS determined program of alternative response (example: EMS professional(s) in car/truck/SUV responding non-lights & sirens to omega level calls; EMS professional(s) in car/truck/SUV responding lights & sirens to designated calls).

- The CQI process for any alternative response model(s) implemented will track appropriate benchmarks to ensure safe, consistent implementation of these new response protocols. Specific emphasis will be placed upon impacts related to clinical outcomes, patient satisfaction, operational readiness, personnel safety, and system costs.

5. **EMS communications optimizes the EMS system's patient care abilities when utilizing integrated EMS resource locater capabilities to identify and dispatch the closest appropriate responder(s).**

   EMS dispatch operations should encompass the ability to instantly identify and locate available responder(s). All appropriate first response and transport component apparatus should be included in this positioning identification system. Integrating first response and transport apparatus into a comprehensive apparatus deployment model yields the most accurate system for utilizing the closest appropriate EMS professionals and for positioning response apparatus to meet predictable system needs. Apparatus and personnel may be in fixed locations or in transitional staging points based upon organizational and system requirements.

   Traditionally, first response has employed a fixed location model, based upon strategically placed stations, ensuring rapid response times in a defined zone. EMS transport components have utilized models with fixed locations, transitional staging, or a combination of fixed and transitional locations. The Tulsa EMS system has historically utilized fixed location first responders (TFD personnel responding from fire stations) and EMSA ambulances transitionally staged based upon system demand predictors. These transitional staging points or "posts" are located throughout the Regulated Service Area. This ambulance deployment model is commonly referred to as "System Status Management."

   Whether fixed or mobile in deployment, all response capabilities of the EMS system should be considered to be an integral part of the "System Status Management Plan." Once the EMS dispatcher determines the call priority, he or she must be able to identify the closest, most appropriate EMS first response and transport personnel. This can only be accomplished when apparatus locator software can receive and display the exact location and status of an apparatus as well as the level of care capable of being provided by personnel on that apparatus (EMT-Basic or EMT-Paramedic). These software capabilities result in real time, effective coordination of first responder and transport response.

   Core Issues

   - EMS dispatch best supports patient care when enabled with apparatus locator hardware and software allowing the EMS dispatcher to easily and rapidly commit the closest, most appropriate EMS personnel to the patient.

   - From a system planning perspective this technology can help to identify the best location for placement of first response and transport resources in a coordinated deployment model.

   - The System Status Management Plan must include the ability to monitor individual apparatus status (example: "out-of-service") and EMS level of care being provided from that apparatus (example: "paramedic first response").

Operational Plan

- Appropriate representatives from Tulsa Fire Department, EMSA, and Office of the Medical Director, supported by information technology specialists and by faculty from the Oklahoma Institute for Disaster and Emergency Medicine should work to implement a "System Status Management Plan" fully capable of monitoring the status and location of all appropriate first response and transport apparatus as well as determining level of care provided by EMS personnel on each apparatus. Supporting hardware and software should be incorporated into the EMS dispatch operations to ensure patients are consistently assigned the closest, most appropriate EMS first response and/or transport professionals.

- Once the "System Status Management Plan" has integrated first response and transport component monitoring, future postings of EMSA paramedic ambulances should factor the location of TFD paramedic engine companies. Response time standards review and advocacy for revised EMSA response time standards becomes inherent if supporting significant changes to traditional ambulance postings in this system.

6. **Effective, coordinated continuing education (CE) enables advances in excellent patient care. Relevant, engaging CE is based upon EMS CQI findings, patient care capabilities, and treatment protocols.**

   While acknowledging unique characteristics of first response and transport components, this EMS system serves the "single patient." Continuing education reinforcing the "single patient" paradigm enables this system's EMS professionals to work effectively and efficiently together in improving patient outcomes. Though first responders, EMT-Basics, EMT-Intermediates, and EMT-Paramedics have distinct scopes of practice, every EMS professional credentialed in this system delivers medical care utilizing a common set of medical treatment protocols. The patient's treatment is optimized and made "seamless" when CE prepares every EMS professional to function as an integral part of the care team.

   Consistency in providing the highest standards of EMS care is dependent upon realistic and engaging continuing education. EMS professionals responding together deserve the benefit of training together. As CQI-derived care initiatives, new patient care capabilities, and new treatment protocols transcend any single agency in this system, educational programs addressing these improvements should likewise transcend agencies. Coordinated EMS training should be afforded to the provisional EMT-Basic, EMT-Intermediate, or EMT-Paramedic at their earliest entry into the system. While the present EMS Orientation Academy often affords joint agency training, all EMS patient care training in this system should afford joint agency involvement at both faculty and student levels.

   Joint agency training enables EMS professionals to meet outside of patient care responses and to gain better appreciation of partner agency cultures. Interagency personnel familiarity and cultural respect promote collegial environments and "one team" responses to patients.

   Core Issues

   - Effective CE drives progressive clinical ability and performance.

   - CE must effectively teach EMS professionals needed clinical improvements identified by CQI and evidence-based research, often incorporating new medical equipment and/or new medical treatment protocols.

   - EMS professionals respond most effectively and efficiently when they train together.

- Eligibility for clinical credentialing by the EMS Medical Director is dependent upon the individual attaining and maintaining appropriate certification credentials from the Oklahoma State Department of Health EMS Division. System CE must afford every system-credentialed individual the educational content necessary to fulfill the baseline requirements for Oklahoma recertification credentials at the level of system credentials.

Operational Plan

- The Office of the Medical Director, in cooperation with EMS faculty of TFD and EMSA, will ensure CQI-identified needed clinical improvements are addressed through timely, effective CE.

- A common CE curriculum utilizing joint agency instructors training joint agency personnel will be developed by OMD staff in cooperation with leaders and EMS faculty from TFD and EMSA. Key elements of this curriculum will address new patient care capabilities, medical equipment, and treatment protocols. Educational formats should incorporate ever-increasing technology, particularly those capabilities that make CE engaging and logistically efficient.

  Interim activities encouraging greater joint agency training include: 1) sharing EMS training calendars between TFD and EMSA; 2) encouraging EMS personnel to attend common required training at either TFD or EMSA locations.

- The CQI process will monitor the effectiveness of essential clinical improvements implemented through CE. A two-step process will be utilized to evaluate improvements. Step one, which examines the behavioral impact, answers the question, "Are EMS personnel implementing the care improvements taught?" Step two, which examines the clinical impact, answers the question, "Are the care improvements truly improving patient care and outcomes as intended?" Unintended consequences of each educational intervention will be measured. Lessons learned will be integrated into both CQI and CE programs.

- OMD staff in cooperation with EMS faculty from TFD and EMSA will ensure this system's CME meets or exceeds the recredentialing requirements of the Oklahoma State Department of Health EMS Division for each EMS scope of practice credential (e.g. EMT-Basic) recognized by OMD.

- The Oklahoma Institute for Disaster and Emergency Medicine offers this EMS system the educational resources of the Institute and the University of Oklahoma's College of Medicine. OIDEM is well suited to provide EMS faculty endorsement, already partnering with many educators in this system. Additionally, current OIDEM training resources include Oklahoma's most progressive emergency medical simulation center. OMD staff in cooperation with leaders and EMS faculty from TFD, EMSA, and OIDEM will develop feasibility plans for OIDEM to become this system's CE sponsoring organization.

7. Collegial working relationships among all personnel in this EMS system promote optimal patient care provided by mutually respected professionals.

EMS constitutes a challenging practice of medicine, even in routine operations. Seriously ill or traumatized patients who rapidly change in medical condition, stressed families, physically dangerous situations, and ever-present potentials for multiple casualty incidents create additional stressors upon even the most experienced EMS professional. Progressive EMS systems simultaneous promulgate advancing standards of care and realize that these standards must allow for legitimate differences of opinion about patient care. Given these dynamic situations, differences in opinion in patient assessment interpretations and medical treatment plans may result in conflict between team members. Additionally, if a lack of understanding of the different roles of first response and transport exists, this may also result in conflicts between team members. A respectful and professional conflict management plan focused upon the patient's best interests is essential in addressing these differences. Further, EMS system leadership must reliably model this respectful and professional tone in all discussions, particularly those involving significant disagreements.

Core Issues

- Creating collegial working relationships requires that individual members in this EMS system treat one another with mutual respect, recognizing that diversity of knowledge, skills, perspectives, missions, roles, and responsibilities creates a synergy in meeting patient needs and establishing a fulfilling work environment.

- Optimal synergy requires freely sharing information and ideas including shared CQI processes, shared medical treatment protocols, shared continuing education, and solid conflict management practices.

Operational Plan

- The current conflict management plan for first response and transport personnel is to be reviewed with possible revision by a workgroup representing TFD, EMSA, and the Office of the Medical Director. The plan must ensure systematic practices that allow conflicts to be addressed quickly and effectively, preferably at frontline personnel levels, with continuous commitment to meeting the patient's needs.

- The "team concept" of patient care response must be emphasized in orientation, continuing education, operational deliberation, and ongoing strategic planning. Widespread recognition and respect for the important roles of first response and transport allows all EMS professionals to understand how individual decisions on behalf of the patient impact each component of the EMS system.

- Transfer of patient care responsibility from TFD personnel to EMSA personnel shall be in a consistent, organized manner. If responding personnel are not already acquainted with one another, introduction by name and EMS certification is indicated. Patients and responding personnel alike should be able to identify recognition and appreciation amongst responding personnel throughout the care being provided by the EMS "team".

- As TFD and EMSA work toward common objectives, personnel should gain greater awareness and respect for each organization's culture and values. A synergism develops, creating a common culture and shared values. To further encourage synergism in this EMS system, the TFD Chief and EMSA-Eastern Division Manager will explore a program allowing EMSA personnel to be assigned medical care duty alongside TFD personnel in stations and responding with the crew on engines. Likewise, TFD personnel would be assigned medical care duty alongside EMSA personnel responding with the crew on ambulances. This concept has already been approved by the Oklahoma City Fire Chief and Chief Operating Officer of EMSA for implementation in Oklahoma City. If promulgated in Tulsa, system leadership will promote the high value of this program throughout respective organizations. A process would also be developed to monitor feedback from involved personnel to further improve the program's impact.

- EMS professionals should be easily recognizable by their organizational and scope of practice credentials. A common scope of practice identification device should be explored for implementation by TFD and EMSA leaders (example: color-coded picture identification).

- Appropriate representatives from Tulsa Fire Department, EMSA, and Office of the Medical Director will develop a collegiality-focused evaluation tool for implementation to both recognize successful on-scene practices (e.g. transfer of patient care responsibility from TFD personnel to EMSA personnel) and remediate undesirable patient care management conflicts.

- Significant patient care successes should be celebrated with recognition for all involved EMS personnel from TFD and EMSA in regularly scheduled ceremonies and/or communications (example: annual awards banquet, joint newsletters).

8. Medical treatment protocols are derived utilizing prevailing EMS standards of care, evidence-based medicine, and system design considerations. Medical treatment protocols are formatted to recognize the essential contributions from communications, first response, and transport personnel and promote seamless care delivery. Clinical staffing must afford the safe implementation of these medical treatment protocols.

The unique and essential contributions to patient care supplied by communications, first response, and transport personnel must be integrated into clearly defined medical treatment protocols. These protocols must additionally indicate the critical interventions required to stabilize and improve time-sensitive patient illness or injury. EMS component and provider scopes of practice must be defined and continuously updated based on Continuous Quality Improvement process outcomes, evidence-based medical practices, accepted EMS standards of care, and operational utilization review to ensure proper clinical acumen and delivery. Clear medical treatment protocols, effective education, experiential-considered clinical staffing, and ongoing clinical knowledge and skills examinations form the foundation necessary to meet patient care demands while preventing worrisome degradation in provider critical thinking and psychomotor skills.

Mental and physical fatigue among EMS professionals commonly occurs without careful system staffing design. Patients and these professionals alike deserve care delivery with clarity of thought and mechanisms to avoid physical injury. There are distinct provider fatigue tendencies between first response and transport. First response by system definition is limited in patient contact time to promote reliable availability within short response zones. Transport by system design involves prolonged patient contact throughout delivery to appropriate healthcare venues and subsequent oral and written reports of care delivered by the EMS system. Additionally, ambulances have higher unit hour utilizations, thereby conferring faster fatigue onset. While first response duties will most likely continue to be provided by 24-hour shift personnel, transport duties are safely provided when shifts are limited to a maximum of 12 hours, preferably less.

Core Issues

- Medical treatment protocols are developed utilizing evidence-based medicine, acceptable EMS standards of care, and CQI outcomes, factoring system-specific characteristics. These protocols are patient-centric, incorporating the essential contributions from communications, first response, and transport personnel in seamless treatment plans.

- Medical treatment protocols highlight critical interventions for time-sensitive conditions and reflect desirable timeliness of care. Contributions from communications, first response, and transport personnel reflect their respective patient contact spans of time.

- Medical treatment protocols are developed focusing upon meeting patient care needs, with complimentary support in continuing education, equipment and medication specification, and professional development.

- EMS personnel shift scheduling must promote continuous patient safety, optimal clinical care, and appreciable workforce beneficence. Shift lengths must closely correlate with clinical duty expectations and system demands to minimize provider fatigue.

Operational Plan

- Medical treatment protocols will be continuously reviewed for appropriate revision based upon ongoing release of evidence-based medical literature and CQI findings as well as changes in prevailing EMS standards of care. The Medical Control Board encourages the Office of the Medical Director staff to involve stakeholders from TFD and EMSA in the protocol research and development process to ensure that patients receive the appropriate care at the appropriate time by the appropriate EMS professional, using the appropriate medical equipment and medications.

- Medical treatment protocols and related continuing education will promote seamless patient care provided by "one team" responding to the patient's call for medical help. Each EMS professional will be encouraged to focus upon the critical interventions he or she is tasked with providing while recognizing how his or her interventions contribute toward the patient's overall care supplied by this EMS system. CQI programs will include evaluating communications, first response, and transport personnel protocol compliance.

- Medical treatment protocols will prioritize critical interventions for time-sensitive conditions identified in evidence-based medical literature. Current protocol revisions are focused upon formatting protocols utilizing the Office of the Medical Director's "Expanded Chains of Survival" document, initially developed in early 2007, and the U.S. Major Metropolitan EMS Medical Directors (The "Eagles") document regarding EMS clinical benchmarks, published in the April-June 2008 issue of *Prehospital Emergency Care*.

- Maintain present shift scheduling in the interim. OIDEM faculty will prepare a report on provider experience and provider fatigue impacts upon critical thinking and skills performance in patient care as well as provider well-being and safety utilizing evidence-based medicine and consensus reports from critical function organizations. In applying these findings to shift length specifications for this system, the distinctive missions of first response and transport components must be factored. Differentials in shift lengths may occur based upon patient volumes, durations of patient care, provider experiences, and provider roles/expectations.

9. This EMS system recognizes and respects each contracted community's desire for high quality emergency medical services delivered in an affordable, cost effective design. Communications, first response, and transport components/resources are integrally linked and depend upon the effectiveness and efficiency of each other. Additional system resources are added only when they support the desired high quality of EMS in our communities and do so with reasonable costs.

EMS system performance outcomes demonstrate the importance of utilizing an evidence-based medicine approach and analyzing clinical and operational data to foster high quality, cost-effective patient care. While the ultimate goal of our EMS system is to provide clinically effective and efficient care, this goal can only be realized long term in a financially sustainable infrastructure.

To be clear, leaders in this EMS system do not place clinical care subservient to a "lowest bid" mentality. Rather, knowing the value contracted communities place upon quality EMS care and recognizing today's economic realities, leaders in this EMS system promote cost-efficiency by orienting EMS personnel to value present resources, using these resources carefully and efficiently. In sum, this EMS system's leadership values fiduciary responsibility just as they value excellent patient care, effective operations, and personnel beneficence.

In 2005, the Medical Control Board requested a pilot program to use EMT-Intermediates for Advanced Life Support First Response in selected communities of the EMSA Regulated Service Area. The impetus behind this program is an ongoing evidence-based analysis of cost effective, medically appropriate EMS care. The Sands Springs Fire Department is successfully integrating an expanded scope of practice for EMT-Intermediate first responders, evidenced by accurate patient assessments and successful psychomotor skills performance. This model may serve other communities well in an era of declining health care reimbursement.

Core Issues

- An EMS system has a moral and ethical responsibility to ensure that all citizens in its service area have access to high quality EMS medical care at a reasonable cost.

- Operational fiscal accountability is important within the system, particularly when impacting multiple agencies.

- EMS system design, clinical care, and operational decisions should be driven by patient need and evidence-based medicine and operations. This system's leaders are responsible for making decisions in these regards that are ethically defensible, scientifically sound, clinically appropriate, and fiscally responsible.

- Incorporating the "one team" philosophy not only leads to better patient care and a more enjoyable work environment, it also fosters economies of scale. As first response and transport components identify common initial orientation, continuing education, CQI programs, and equipment inventory/maintenance operations, opportunities exist to make these programs more cost effective by reducing duplication of service and/or expanding service without attendant cost.

- EMS readiness costs must be appreciated, supported, and funded by the entire beneficiary population. This is an era of ever-present complex terrorism threats. Unfortunately, nearby Oklahoma City has already been the site of terrorism casualties in the tragic bombing of the Alfred P. Murrah Federal Building that occurred on April 19, 1995. Accidental and natural disaster preparation is equally important, particularly in Tulsa's severe weather-prone location. Meeting high public expectations in times of both unpredictable and preplanned disasters involves considerable staffing, training, and equipment costs.

Operational Plans

- Office of the Medical Director staff, in cooperation with TFD and EMSA EMS educational staff and OIDEM faculty, will continually evaluate the medical treatment protocols for evidence-based critical patient interventions with a focus upon designating the appropriate scope of practice (example: EMT-Basic) for each of these interventions. System staffing must enable appropriate, timely delivery of these critical interventions.

- Evaluate expanded EMT-Intermediate first response scope of practice for further implementation in Tulsa metropolitan first response agencies. Successful practices in progress in Sand Springs should serve as a model implementation guide.

- Establish a taskforce composed of leaders from Tulsa Government, TFD, EMSA, and OMD to identify feasible mechanisms for funding readiness costs. Attention should be placed upon cost sharing amongst the entire beneficiary population.

- Study present EMS system duplication of services, identifying either cost elimination methods or expanded service abilities without attendant increase in cost. Identify reasonable EMS system service area expansions that may prove service, cost, and revenue attractive for all involved communities.

- Paramedic staffing in TFD and EMSA and its impact upon this EMS system's clinical performance, CQI outcomes, educational needs, and operational costs will be analyzed and reported at least annually to the EMSA Board of Trustees, TFD Fire Chief, the Medical Control Board, and Tulsa's City Council.

- A cost analysis taskforce will be formed with appropriate representation from EMSA, TFD, OMD, and the City of Tulsa to establish a format for cost impact accounting, particularly for those operations impacting multiple agencies.

10. Medical care provided by the EMS professionals in this system constitutes a delegated practice of medicine. The Medical Control Board and Office of the Medical Director physicians must be experienced and specialty board certified. These physicians commit to providing objective and independent medical oversight, without regard to self-interests and political pressures.

The Medical Control Board (MCB) provides invaluable insight, counsel, and direction in establishing this EMS system's Standards of Care. The Standards of Care are utilized by first response and transport personnel, as well as the Office of the Medical Director staff, and ensured through educational, operational, and evaluative responsibilities of the OMD.

The MCB's active participation in the EMS system enables the emergency physicians providing care at the Regulated Service Area's busiest emergency departments to be appropriately represented in determining the EMS care received by patients destined for these emergency departments.

The MCB physicians contribute hundreds of volunteer hours to this EMS system. The MCB as a body is given its responsibility and authority through Trust Indentures and Interlocal Agreements by the beneficiary cities it serves and the Oklahoma State Department of Health Rules and Regulations.

The June 2006 Institute of Medicine's "EMS at the Crossroads" report clearly identifies how EMS systems benefit from qualified physician oversight. Active, committed medical oversight physicians directly ensure quality care and patient safety. The IOM report specifically empowered EMS medical oversight physicians by the following:

"Medical directors should have authority over all clinical and patient care aspects of the EMS system or service, with the specific job description dictated by local needs. EMS leaders and policy makers should use evidence-based decision-making based on a strong scientific methodology."

The MCB physicians believe this EMS system must build on the success of the current system configuration of uniquely identifiable first response and transport components. TFD and EMSA personnel have compiled nationwide enviable success. Continued commitment, supported by the MCB physicians, will be essential in meeting Tulsa's future EMS needs.

Core Issues

- EMS medical care delivered by EMTs and paramedics constitutes a delegated practice of medicine in the out-of-hospital arena.

- System EMTs and paramedics function as extenders under the EMS Medical Director(s) license(s).

- MCB physicians provide counsel, advice, and direction to the EMS Medical Director(s) through approval of medical administrative and treatment protocols as well as through evaluation of patient care CQI reports. These functions are vital to each patient receiving care in accordance with prevailing professional standards.

- The Office of the Medical Director provides skilled personnel with clinical experience and expertise to medically administrate the system on a daily basis under the auspices of the MCB.

Operational Plan

- Maintain independent and objective medical oversight utilizing the MCB.

- Create formal relationships enabling the Oklahoma Institute for Disaster and Emergency Medicine to employ the system EMS Medical Director(s) approved by the Medical Control Board.

- The MCB and Office of the Medical Director will continue to oversee analysis of clinical data from the electronic patient record for purposes of continuous care improvement, research, and publication.

- Proposed clinical changes affecting patient care and outcomes and/or system design will be reviewed and receive input from the MCB. MCB recommendations will be made to the EMSA Board of Trustees, the Mayor of Tulsa, and the Tulsa City Council for their consideration.

11. Response time standards factor the patient's perceived condition. Response time standards are appropriate for both first response and transport agencies. Strict compliance within response time standards is expected.

Evidence-based medicine has identified a number of time-sensitive patient conditions dependent upon timely EMS system response and care. Examples of such life-threatening conditions include cardiopulmonary arrest (sudden death), acute myocardial infarction (heart attack), acute cerebrovascular accident (stroke), and multi-systems trauma. This EMS system has long-established response time standards applicable to the transport component. Recognizing the importance of first response component care, response time standards should be promulgated and measured in these organizations as well.

Core Issues

- The provision of patient-centered care in critical clinical conditions requires a rapid response from both first response and transport personnel.

- Accountability for response time performance must exist in both first response and transport components of this EMS system.

- Though a number of response time measurement models exist, the patient-centric view is valued above others in this EMS system. This means that the system's true response time starts at the "911" call and ends at patient contact. First response and transport organizations must agree on response data definitions to ensure accurate measurement of system response times.

- Response times should be reported in fractiles rather than averages to represent the truest picture of the system's response time performance. Additionally, response times for specified area(s) in the Regulated Service Area should be reported to ensure appropriate response time performance throughout the Regulated Service Area.

Operational Plan

- A response time data and standards workgroup, representing EMSA, TFD, and OMD, will establish shared response data definitions and work to measure the response interval from "911" call to patient contact. Response time standards will be reviewed, utilizing evidence-based medicine and operations.

- This workgroup will also review current EMSA response time performance and accountability standards, with a goal of applying a similar model for TFD. Response time performance for all organizations will be reported in monthly CQI reports using an agreed standardized fractile format.

- This workgroup will additionally study impacts (clinical, operational, and financial) of increasing response times allowable for perceived lesser acuity patients.

12. Electronic patient records must be utilized by both first response and transport to allow for integrated and seamless patient care documentation. This system is maximally effective for continuous patient care improvement activities, allowing for 100% critical care event compliance review.

An electronic patient record allows for a legible medical record which can be rapidly downloaded upon arrival for contemporaneous use with emergency department care of the patient. Additionally, the record currently utilized by EMSA encourages complete documentation as the software is formatted with this system's medical treatment protocols.

The Institute for Healthcare Improvement has identified one-time data entry to a shared electronic patient record as one of the keys to improving patient safety in the health care system. It is essential that first response and transport components in this EMS system contribute to a common electronic patient record to minimize discrepancies, allow for 100% case review for protocol compliance, allow for procedural success rate analysis, and allow for clinical research.

Minimizing discrepancies in the patient care record is a proven risk management practice. Accurate documentation of EMT and paramedic patient assessment, patient care, and the patient's response to this care is a powerful defense basis to frivolous claims of mistreatment. More importantly, however, is the key role this accurate documentation plays in the patient's emergency department care. Unconscious patients obviously cannot convey details of their care prior to hospital arrival. Likewise, many patients with acute illness or injury and many of those with extensive chronic medical illness are unable to fully inform the emergency department care team of all the important details in their EMS care. If the emergency nurses and physicians fail to recognize the important details in their patient's EMS care, omissions in needed further care may result.

100% case review for protocol compliance is crucial for early identification and intervention of knowledge deficit(s). 100% case review for procedural success/failure rates is essential for early identification and intervention of skill degradation. The Office of the Medical Director has already developed focused, relevant questions for each chief complaint. These questions stimulate EMTs and paramedics to gather and record this important information, allowing tracking of protocol and procedure compliance on systemic and individual levels.

Clinical research findings are common stimuli for enhancements in patient care capabilities. All patient care data captured by the electronic records system is available in a database for clinical research. The collaboration of this EMS system with the Oklahoma Institute for Disaster and Emergency Medicine enriches the spectrum of conceivable EMS-based clinical research in the coming years.

Core Issues

- Electronic patient records enables 100% case review allowing rapid and comprehensive evaluation of clinical patterns. This capability improves medical treatment protocol compliance and design.

- Electronic patient records allow the EMS system to compile a patient care database for needed clinical research.

- The seamless integration of dispatch, first response, and transport data on each patient into a shared computer platform ensures that the care provided throughout system response to each patient conforms to system requirements, thereby provided at the highest level.

Operational Plan

- A workgroup with representatives from EMSA, TFD, and information technology from both organizations will work to establish an effective interface so that TFD's electronic patient record and EMSA's electronic patient record can transmit information to create a single "EMS system patient record". Any interface must allow for 100% case review and enable a database conducive to clinical research and compliant with appropriate regulatory oversight.

13. Disaster preparedness and response constitute essential roles of this EMS system. Effective preparedness for and response to disaster-related emergency medical needs are dependent upon concise, task-oriented multiple casualty response procedures, routinely scheduled realistic multiple casualty training, funding appropriate protective and medical equipment, and achieving region-wide governmental operational support.

Worldwide, a major disaster occurs almost daily. Oklahoma has unfortunately been the site for a number of these disasters, both intentional and natural. From the 1995 Alfred P. Murrah Federal Building bombing in Oklahoma City, claiming 168 lives and injuring over 800 persons, to the 1999 Moore area tornado, redefining the Fujita scale and becoming the world's deadliest F5 tornado since 1971, Oklahoma is a frequent reference in the study of medical needs arising from disaster. Fortunately, it has also shown the world how progressive EMS systems can help to minimize medical devastation from these destructive forces.

This present-day EMS system's ability to maintain and advance its multiple casualty response capabilities is directly dependent upon several achievements: 1) refining and promoting medical response plans addressing the evolving challenges presented by natural disasters, both near (e.g. tornadoes) and far (e.g. regional response to hurricanes), as well as increasing threats of terrorism, both explosive and via weapons of mass destruction; 2) conducting realistic training exercises to prepare individual EMS professionals for mass casualty care as well as to assess EMS system readiness; 3) funding personal protective equipment to ensure the safety of EMS professionals responding to and resolving disaster-initiated casualties; 4) funding medical equipment needs specific to efficiently treating mass numbers of injury and/or illness; 5) forming regional response plans fully supported by all participating governmental entities; 6) utilizing the resources of instrumental supporting organizations such as the Metropolitan Medical Response System (MMRS), Medical Emergency Response Center (MERC), Oklahoma Medical Reserve Corps (MRC), local and/or state health departments; and 7) integrating EMS response to disaster with hospital-based disaster preparedness and response

Core Issues

- Multiple casualty incidents (MCI) often require EMS professionals to operate differently than day-to-day responses to medical illness and/or injury. Simple, clear MCI response plans help the EMS professional to efficiently and effectively contribute to the EMS system's response to unpredictable disaster events.

- EMS professionals can best respond to any given disaster when specifically trained in that type of disaster. Realistic drills and focused didactic sessions delivered on a routine basis best prepare an EMS professional to care for disaster victims while ensuring personal safety.

- The well-being of EMS professionals responding to disasters, both man-made and intentional, is dependent upon ready access to and proper utilization of personal protective equipment. Given the possibilities of intentional chemical, biological, radiological, nuclear, and explosive events, this EMS system must protectively train, outfit, and equip its most valuable assets – its EMS professionals.

- This EMS system's Standards of Care may change when facing extreme environmental conditions, excessive numbers of casualties in relation to available resources, or medical dangers posed to patients or providers. The EMS Medical Director(s) must work closely with other system leaders in these instances to clearly define acceptable interim Standards of Care, enabling the greatest possible good to be safely delivered to as many casualties as possible.

- No single EMS system can adequately respond alone to all disasters. Regional planning and operational support is the minimum level of response essential to effective disaster readiness. Clearly, state and federal planning and operational support is also appropriate in many circumstances. An integral part of disaster pre-planning is attaining regional government political, financial, and operational support. The MMRS is one example of an effective multiple agency/multiple government disaster readiness initiative.

- Effective EMS response to disaster is dependent upon effective hospital response to disaster. This EMS system's leaders and its disaster preparedness experts will work with appropriate hospital-based personnel to promote an effective emergency medical response to disaster, specifically including efficient EMS-emergency department transitions of patient care.

Operational Plan

- Appropriate representatives from EMSA, MERC, MMRS, Region 7 Regional Medical Response System (RMRS), OIDEM, OMD, Tulsa Area Emergency Management Agency (TAEMA), and TFD will review current multiple casualty incident and other disaster- related standard operating guidelines/protocols with the following goals: 1) assuring National Incident Management System (NIMS) and National Response Framework (NRF) compliance; 2) assuring compatible, and preferably common, operational plans and objectives; 3) assisting front-line personnel to carry out key operations through easy to utilize tools (e.g. personal protective indexes, task cards, patient tracking methods); 4) ability to incorporate supporting organizations into this system's response plans (e.g. Oklahoma MRC volunteers); and 5) assuring compatibility and integration with county, state, and federal multiple casualty/disaster response plans

- Educational professionals from EMSA, MERC, MMRS, Region 7 RMRS, OIDEM, OMD, TAEMA, and TFD will review current multiple casualty incident and other disaster-related training curricula with a goal for developing multi-agency MCI/disaster drills and supportive classroom training (e.g. National Disaster Life Support courses). The combined curriculum should afford any EMS professional in the system routine opportunities to train using MCI/disaster-specific operations.

- This EMS system's disaster and safety experts will work together in acquiring necessary personal protective equipment for all at-risk system EMS professionals.

- Appropriate representatives from EMSA, MERC, MMRS, Region 7 RMRS, OIDEM, OMD, TAEMA, and TFD will work together to identify appropriate home/self care planning, alternative transport destination options, and other massive casualty (e.g. pandemic) pre-planning needs able to be utilized in times of disaster operations.

- Appropriate system leaders from EMSA, TFD, and the City of Tulsa will review current mutual aid agreements with a goal to promote appropriate assistance from EMS and other public safety related agencies outside the Regulated Service Area in times of disaster medical needs. In reciprocal agreements, EMSA, TFD, and the City of Tulsa must ensure its primary capabilities remain dedicated to the Regulated Service Area in times of regional disaster medical needs.

14. EMS strategic planning best enables optimal EMS system design and performance when conducted continuously.

The dynamic nature of the EMS practice of medicine and in fulfilling its myriad roles in promoting a community's standard of health translates to the need for continuous patient outcome-oriented strategic planning. Static advancements in patient beneficence may quickly fade if this EMS system's leaders do not continue their cooperative planning. This Strategic Based EMS Blueprint for Tulsa has already proven the success potential realized with dedicated efforts from key leaders from the City of Tulsa, EMSA, TFD, OIDEM, and OMD.

Core Issues

- EMS is a practice of medicine and therefore subject to ever-changing standards of medical care. The impact of necessary medical care changes upon this EMS system is part of a larger process of planning system design and function. While medical care specifications are the purview of the EMS Medical Director(s) and the Medical Control Board, the operational delivery of this medical care depends upon appropriate system design and productive professional relationships, both of which are fostered through continuous strategic planning.

- The complex roles tasked to this EMS system and how it interfaces with the healthcare system at large continues to multiply. Effectively meeting these needs, especially given an ever growing aging population with greater emergency medical needs, requires multi-agency participation, creative solutions, and increased efficiencies to operate with fiscal restraint. Continuous strategic planning identifies areas of common objectives and the methods to best address them utilizing the talents from EMSA, TFD, and OMD personnel, supported by institutions such as OIDEM and local hospitals, to achieve best outcomes at reasonable expense.

- Current system design and future recommendations should anticipate served community EMS needs, factoring present and needed resources, ultimately fulfilling the commitment to provide optimal EMS care.

Operational Plan

- Current Tulsa EMS Strategic Planning Steering Committee members (or their designees), representing EMSA, TFD, OMD, OIDEM, and the City of Tulsa will continue to meet routinely to maintain effective continuous strategic planning for this EMS system as well as oversee and approve taskforces assignments and recommendations stemming from this version of the "Strategic-Based Emergency Medical Services Blueprint for Tulsa." These strategic planning meetings will occur at least quarterly.

Appendix A to "A Strategic-Based EMS Blueprint for Tulsa"

Standard of Care Change Process

Step 1. Submit a "Standard of Care Suggestion." A "Standard of Care Suggestion" shall first be submitted to the Medical Director. The form employed for this purpose shall include, at a minimum, the following information:

a) name(s) and position(s) of person(s) initiating the suggestion;
b) a description of the current standard or practice, and the change being suggested;
c) potential advantages of the change;
d) type of change (e.g., change to "input standards," "performance standards," or both);
e) origin of suggestion (e.g., recently published research, personal experience, local medical audit, experience of other system, etc.);
f) listing of other EMS systems currently using the suggested standard (with contact names, if available);
g) objections likely to be raised in regard to this suggestion.

Step 2. Medical Director's Preliminary Review. Once a suggestion has been received by the Medical Director, and expanded or clarified by its originator if requested, the Medical Director shall decide whether the concept has sufficient merit to warrant further consideration. If further consideration is justified, in the sole opinion of the Medical Director, the process shall continue to Step 3. Otherwise, the suggestion and the reason for its rejection shall be documented and filed for reference, and copies sent to the person(s) initiating the suggestion and to all members of the Medical Control Board.

Step 3. Comments Obtained. Unless this process is terminated by the Medical Director pursuant to Step 2, above, preliminary comments and suggestions regarding the suggestion shall then be solicited in writing by the Medical Director as follows: Copies of the "Standard of Care Suggestion" form, along with the preliminary comments of the Medical Director shall be sent for posting to all first responder agencies, ambulance service providers, emergency communications centers, on-line medical control physicians working within the EMS System, and to the individual members of each Chapter of the EPF. Thirty days shall be allowed for submission of written comments by interested persons.

Step 4. Review and Comment by the Standards Committee. After the comments obtained during Step 3 of the process have been received and compiled, the matter shall be presented to the "Standards Committee", for review and comment. The "Standards Committee" shall consist of persons particularly interested in clinical issues, appointed by and serving at the pleasure of the Medical Director--e.g., paramedics, managers, persons involved in the quality control and in-service training programs, physicians and nurses. All related

documentation shall be provided to Standards Committee members at least 30 days in advance of its scheduled review meeting, and the originator(s) of the suggestion shall be invited to present the suggestion to the Standards Committee in person. Before rendering a recommendation, the Standards Committee may determine that additional information is needed before a recommendation can be responsibly made. If the Medical Director agrees, additional information shall be obtained, such as: a more extensive review of the literature; inquiries regarding the use of the proposed standard in other EMS systems (by telephone, in writing, or by site-visit observation); demonstration by a product manufacturer; or direct examination of a purchased sample product. Taking into consideration the Standards Committee's findings, the Medical Director shall then decide whether the process shall be terminated or continued to Step 5, below.

Step 5. Financial Impact Statement. If the Medical Director finds that the suggestion merits further consideration, the suggestion shall be submitted to the Executive Director of EMSA, who shall compile a "Financial Impact Statement" estimating the marginal costs (both initial and on-going) of implementing the proposed policy change. Every provider organization whose financial obligations would be affected by the proposed policy change shall be contacted by EMSA and asked to supply a financial impact estimate (with supporting documentation and rationale). In addition to cost estimates, the "Financial Impact Statement" shall also include a summary of the short-term and long-term impact of the proposed policy change upon ambulance rates and/or subsidy requirements, and the Executive Director's official comments regarding economic aspects of the proposed change.

Step 6. Presentation to the Medical Control Board. When the previous five steps have been completed, and the exact language of the proposed amendment to the System Standard of Care has been developed, the suggestion shall be presented to the Medical Control Board. Following the Medical Director's presentation of the suggested changes, EMSA's Executive Director shall present the Financial Impact Statement", and all related documentation, to all provider organizations described above in Step 5, and to the Medical Control Board members at least 30 days in advance of the scheduled meeting at which any decision may be made. Unless additional information is required by the Medical Control Board before voting on the matter, the Medical Control Board shall then vote to determine whether the proposed policy change shall be adopted or rejected. The policy change may be adopted for general implementation (i.e., systemwide), or on a pilot-project basis (i.e, a short-term test limited to selected personnel). If the policy change is adopted on a pilot-project basis, upon completion of the pilot project, the results shall be reviewed by the Standards Committee and by the Medical Control Board prior to deciding upon general implementation.

Step 7. Joint Approval by Medical Control Board and EMSA. In cases where implementation of such a change would, in the opinion of EMSA's Executive Director, necessitate substantial unplanned expenditures by ambulance service providers, or an increase in local tax subsidies to first responder agencies, such change shall be subject to joint approval by the Medical Control Board and the EMSA Board of Trustees prior to implementation.

Step 8. Amendment. The amendment to the System Standard of Care shall be submitted for final determination to the governing bodies of EMSA's Beneficiary Jurisdictions (i.e., Tulsa and Oklahoma City), and the proposed amendment shall be rejected unless approved by resolution of both such governing bodies.

Step 9. Filing with Non-Beneficiary Member Jurisdictions. Approved changes to the System Standard f Care shall be submitted for receipt and filing with the clerk of each Non-Beneficiary Member Jurisdiction of this Agreement.

D. Waiver of System Standard of Care Change Process Due to an Emergency.

1. "Emergency" as used in this section shall be limited to conditions resulting from a sudden unexpected happening or unforeseen occurrence or condition and situation wherein the public health, safety, or welfare is endangered.

2. The provisions of this section with reference to changes in the System Standard of Care (C, above) shall not apply whenever the Medical Director recommends to the EMSA Board of Trustees and the EMSA Board of Trustees declares by a two-thirds (2/3) vote of all of its members that an emergency exists. The Medical Director shall then proceed to investigate and prepare a recommendation for the EMSA Board of Trustees to supplement and amend the changes in the System Standard of Care due to the emergency.

3. This emergency amendment to the System Standard of Care shall be subject to ratification by the governing bodies of the Beneficiary Member Jurisdictions and shall be filed as provided in Step 9

Appendix B - EMSA RFP for 2008 Contract

Official Announcement of Invitation to Submit Proposals

(Contract Modification to the Response Time Exceptions and Exception Requests – 4/28/2010)

The Emergency Medical Services Authority, hereinafter referred to as "***EMSA***," announces an invitation to qualified proposers to submit proposals for the provision of emergency and non-emergency ambulance services as specified herein. The successful proposer will serve as a contractor to ***EMSA*** for a period of five (5) years, starting November 1, 2008. The contract under which these services are to be procured will be a term agreement, with payment to be calculated from the successful proposer's charge per transport for each type of service.

A. Overview

An integrated emergency medical service (EMS) / medical transportation system for the provision of both emergency and non-emergency services has been in operation in both Oklahoma City, Oklahoma (Western Division) and Tulsa, Oklahoma (Eastern Division) since 1990. The system has been designed to ensure high quality clinical care, provide efficient and reliable EMS services at a reasonable cost to consumers, and provide both divisions with an operationally and financially stable patient transportation system.

EMSA intends to award a single contract for the provision of emergency and non-emergency ambulance services. Under this procurement both ***EMSA*** and the contractor desire clinical excellence. Both desire cost containment, a professional and courteous image and a contractor who is successful and earns a reasonable profit. Under the contract, the relationship between ***EMSA*** and the contractor should generally be one of cooperation, not conflict, achieving the best possible marriage of the public interest with the contractor's expertise.

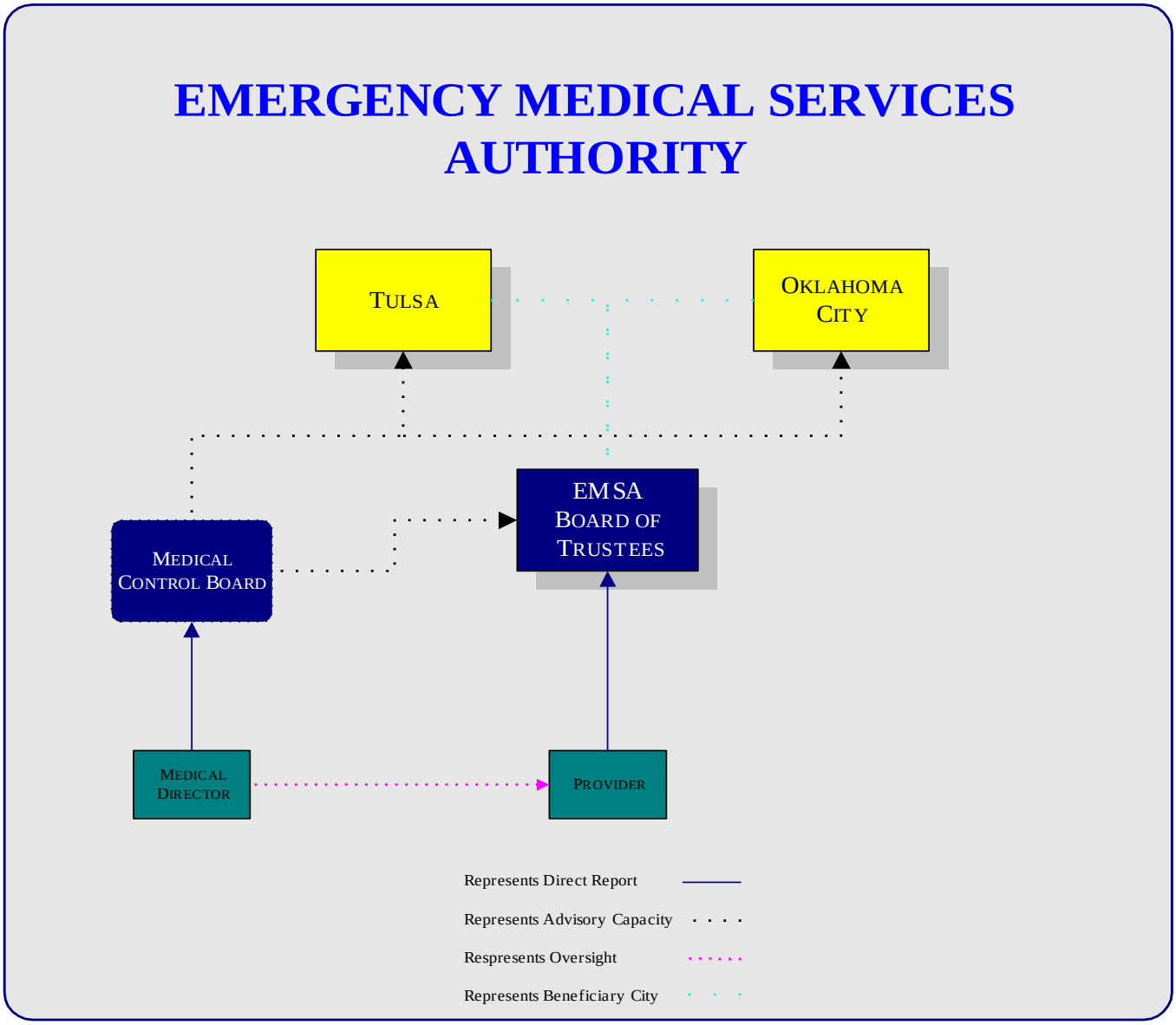
B. *EMSA*'s Functional Responsibilities

In this performance-based approach to contracting it is ***EMSA***'s responsibility to:

- Conduct periodic competition to select and contract with an ambulance service provider;
- Monitor compliance with contractual terms;
- Supply the infrastructure necessary for the operation of an ambulance service system in accordance with the standards called for by the Uniform Code for Emergency Medical Services ("Uniform Code") and other regulations;
- Handle all patient billings and collections;
- Pay the contractor monthly for services performed;
- Facilitate provision of qualified twenty-four (24) hour physician radio coverage at no charge to the contractor.

EMSA, in procuring its ambulance contractor, represents the interests of the general public as consumers of emergency and non-emergency ambulance service.

C. Graphic Depiction of the *EMSA* System



D. Contractor's Functional Responsibilities

The contractor shall furnish and manage ambulance dispatch services and field operations including but not limited to: employment of dispatch and field personnel; equipment maintenance; in-service training; quality improvement monitoring; purchasing and inventory control; and, support services. Other responsibilities include:

- Utilizing ***EMSA***-required forms and data systems;
- Maintaining all vehicles and on-board equipment, except for communications equipment;
- Rendering services in accordance with clinical and response time standards called for in the Uniform Code and other regulations (Attachments A, Uniform Code for Emergency Medical Services; B, Interlocal Agreement; K, System Standard of Care Protocols;
- Participating in medical audit proceedings as required;
- Submitting a single invoice to ***EMSA*** for all services rendered.

Many of the major uncertainties affecting the delivery of emergency services in most communities are eliminated from the proposer's consideration in preparing for this procurement. For example, there need be no uncertainty concerning collection rates. ***EMSA*** will pay for every unit of service delivered, and will do so within 30 days of receipt of invoice after the end of the calendar month during which such services were rendered.

Further, since ***EMSA*** is supplying all of the equipment to be utilized in the performance of this contract, there is no requirement for large-scale investment in capital equipment, another substantial reduction in risk for the proposer.

In short, it is ***EMSA***'s intention to eliminate or reduce risk from uncertainties beyond the control of the contractor to such an extent that the principal uncertainties and risks remaining are largely within the control of the contractor, namely, the ability to recruit and manage personnel efficiently and effectively.

In summary, the proposer is provided with a clear description of the job to be done, in terms of response time standards and clinical standards, and is provided with most, if not all, of the equipment necessary to do the job. Furthermore, ***EMSA*** promises to pay for services delivered by the contractor in accordance with those standards.

Therefore, ***EMSA,*** the contractor, and the patients all benefit from the contractor's ability to produce reliable, high quality services in accordance with standards and regulations at the lowest possible cost.

E. Schedule of Events

Task	Beginning Date	Ending Date
Develop RFP	2/01/07	9/30/07
Advertise & Issue RFP	10/01/07	10/14/07
Conduct pre-bid conference	2/01/08	2/15/08
Credentials due	2/22/08	2/22/08
Send results in Board packet	3/21/08	3/21/08
Board vote on Credential Committee Recommendation	3/26/08	3/26/08
Selection Committee report due	6/25/08	7/25/08
Send Results in Board Packet	7/18/08	7/18/08
Board vote on Selection Committee Recommendation	7/23/08	7/23/08
Final EMSA Board approval of the Contract	7/24/08	9/24/08
Contract negotiations	7/24/08	9/12/08
Send Contract in Board Packet	9/19/08	9/19/08
Board vote on Final Contractor	9/24/08	9/24/08
System start-up	11/01/08	11/01/08

Minimum Qualifications & Documentation of Credentials

A. Overview

This section delineates the minimum qualifications that a potential proposer must possess so that ***EMSA*** may ascertain whether the proposer is qualified to provide the sophisticated and complex service to be awarded through this procurement process.

Proposers' credentials will be evaluated and scored based upon objective criteria designed to evaluate each proposer's ability to perform if awarded a contract. Each proposer will receive a review of its credentials in accordance with the schedule established in Attachment E. Any deficiencies noted must be addressed prior to submitting the proposal.

There are three key areas in which minimum qualifications must be established: previous experience in managing emergency services; financial depth and capability; and, regulatory compliance.

A proposer will be determined to be qualified or not qualified to submit a bid. Only qualified proposers may submit a bid. The scoring of bids will include no credit for having qualified to bid.

To provide proposers the maximum flexibility in submitting their qualifications, two alternative methods for credentialing are available: the simplified method for accredited organizations, or the standard method.

B. Simplified Method for Accredited Organizations

A simplified qualification process is available to accredited organizations. This process is available if the proposer's local operational unit which will directly provide service in response to this Request for Proposal (RFP) holds current accreditation status by the Commission on the Accreditation of Ambulance Service (CAAS) and currently or has previously managed a "high performance" (as defined in the AAA Community Guide to Ensure High Performance Ambulance Service.)If a parent organization or related entity is the accredited agency, or if an organization is not accredited, then the proposer must provide the information outlined in the standard method for qualification. If the entity has applied for accreditation and has been denied or deferred, that must also be disclosed.

For accredited organizations to utilize the simplified qualification process under this procurement, the organization must provide ***EMSA*** with a copy of the accreditation certificate and a letter indicating responses to the following for the most recent two year period:

- Names and contact persons for entities for which high performance EMS service has been provided;
- Fractile response time requirements and compliance percentages for other high-performance ground ambulance transport operations;
- Qualifications of key management personnel;

- Customer service and litigation history;
- Documentation of current financial stability and the availability and sources of funds required to support start-up operations;
- Documentation of capability to be insured and provide performance security as outlined in the RFP.

C. Standard Method for Qualification

In the event the agency has not yet become accredited, submission of more detailed supporting materials to enable ***EMSA*** to fully evaluate the proposer's qualifications is necessary. Entities qualifying under this section which have multiple operational sites may use information from any site to establish qualifications. However, information presented which does not reflect the experience of the operational site responsible for this proposal shall be so noted.

Should any group of entities submit a proposal as a joint venture, or should any proposer intend to utilize a sub-contractor to fulfill specified aspects of its obligations, any information presented which does not reflect the experience of the operational unit which is responsible for this proposal shall be so noted.

1. Analogous Experience

   Proposer shall provide one of the following:

   a. Documentary evidence that clearly demonstrates that the proposer has experience managing an emergency ALS ambulance service in a community with a population of at least 1,000,000. Information provided should include a list of communities in which the service is operated, names of the Medical Director and contract officer or designated governmental contact person, the number of responses provided in each of the past two years, and a brief description of the community and service provided.

      Information regarding medical and governmental contacts should include names, titles, addresses, and telephone and fax numbers.

   Or,

   b. Documentation of existing sophisticated internal emergency services management systems and personnel that can facilitate its transition to managing such a service. This information should include descriptions of operational programs including but not limited to:
      - Medical training and quality assurance processes;
      - Driver training;
      - Risk management procedures; and
      - Current deficiencies/planned solutions.

      Proposer shall provide information and documentation of existing management and supervisory strength (including senior management's involvement in ground ambulance operations) in order to demonstrate the organization's ability to manage such a program. The information provided should be in the form of names and

resumes of existing management and supervisory personnel who will be directly responsible for providing services under this RFP.

Proposer shall demonstrate its ability to comply with response times by one of the following methods:

i. Experience in managing and operating a service which is required to comply with specified emergency ground ambulance response times based upon fractile compliance (e.g. 90% of all life threatening emergency requests must be responded to within 8 minutes and 59 seconds). Documentation shall include a copy of the contract language, regulation, or ordinance which requires compliance and the service's response time performance for the past full year for which information is available.

Format—
For the year beginning _____, 200__
and ending _____, 200__

___% life-threatening emergencies responded to within
___ minutes.

Or, if the proposer does not have experience managing and operating a service which is required to comply with specified response times;

ii. The proposer shall provide information that demonstrates a clear and convincing capability to implement and manage such a system. The proposer should include information about what steps, policies, procedures, training, equipment and management techniques would be utilized on award of the contract.

2. Demonstration of Financial Depth and Stability

Proposers shall provide evidence that clearly documents the financial history of the organization and demonstrates that the proposer has each of the following:

a. Financial capability to handle the expansion (including implementation and start-up costs) necessitated by the award of the contract.

Proposer shall include copies of its financial statements for the most recent two-year period. If consolidated financial statements are utilized, the individual program unit's financial statements must be separately shown. Audited financial statements are preferable. If audited financial statements are unavailable, the proposer must provide unaudited financial statements supported by tax returns.

b. Expertise in billing Medicare and other third party payers of ambulance services.

Although ***EMSA*** is responsible for managing all patient billing functions, patient care forms, which are the basis for ***EMSA***'s bill, are prepared by field personnel. The extent to which patient care forms are accurately and completely filled out has a direct result on ***EMSA***'s ability to be reimbursed by Medicare and other third party payers. Accordingly, the proposer must be knowledgeable about billing procedures in order to assist in obtaining the information needed to maximize ***EMSA***'s collections.

For the entity submitting its credentials:

- Describe documentation required of field personnel for billing purposes;

- Describe how improvements needed in this area are identified, as well as actions taken to implement procedures needed to address those improvements.

c. Proposer shall demonstrate the ability to secure insurance coverage required under this procurement. Any existing self-insurance plan used for the purposes of qualification must substantially meet the requirements set forth in this RFP. Proposer shall detail any and all notifications of pending insurance (separate listing for auto and professional liability) claims, investigations and settlements, including both status and resolution.

3. Documentation of Regulatory Compliance and Other Litigation
   a. The proposer shall detail any and all regulatory agency investigations, findings, actions, complaints and their respective resolutions.
   b. The proposal shall detail any other litigation in which the proposer is involved or which is pending.

Service Area Summary and Background

A. Service Area Summary

EMSA is providing ambulance services utilizing a regional approach. The region served has approximately 1,200,000 citizens in 16 cities covering 1,000 square miles. The service area (region) is separated into an Eastern Division with Tulsa as the largest city and a Western Division with Oklahoma City as the largest city. Tulsa and Oklahoma City are the Beneficiary Jurisdictions, which means that they are the beneficiaries of the ***EMSA*** trust. The other cities within each Division are the Non-beneficiary Jurisdictions. Currently, the Non-beneficiary Jurisdictions include Jenks, Bixby and Sand Springs in the Eastern Division and Edmond, Lake Aluma, Arcadia, Valley Brook, Yukon, Bethany, the Village, Nichols Hills, Mustang, Warr Acres and Piedmont in the Western Division.

B. Background

EMSA is a public trust created in Tulsa in 1977. It was the first Public Utility Model system developed. In 1990, Oklahoma City was added to the trust and the two divisions were created. Regionalization allows each of the cities in the system to share in the savings derived from a consolidated approach to purchasing, billing, collections, and contract management oversight.

Historic Service Volumes

Patient transport volumes have increased steadily for the last three years. Information about response time performance, numbers of transports and other routine reports prepared by ***EMSA*** are provided in Attachments F, EMSA Response Time Performance for Last Three Years; and G, EMSA Numbers of Transports for Last Three Years. .

Operations Management Provisions

Scope of Service

The contractor shall furnish all emergency and non-emergency ambulance service for the entire population of the Regulated Service Area. While other services may transport patients to facilities in the Eastern or Western Divisions of the Regulated Service Area, no other service shall be allowed to pick up patients within a division for transport to locations in that division. All ambulance services shall be provided at the advanced life support (ALS) level. Additionally, the contractor shall furnish stand-by special events coverage, inter-facility transfers, limited long-distance transfer service, reasonable mutual aid services, special contract services and communication and medical dispatch services, as specified in this proposal. While ***EMSA*** intends to pay the contractor for each unit of service (transport) delivered, ***EMSA*** also expects the contractor to cooperate and assist in identifying and reducing transports that are not medically necessary.

Any units of production defined herein that contractor intends to use to generate revenue outside the scope of this RFP must first be approved by the EMSA Board of Trustees. A Business Plan must be submitted which describes the services that will be provided and how revenue sharing with the Authority will take place. Under no circumstances shall outside obligations interfere with meeting the requirements presented in this RFP.

Response Time Performance, Reliability & Measurement Methods

Response times are a combination of dispatch operations and field operations. In a performance-based contract, ***EMSA*** does not limit the contractor's flexibility in the methods of providing EMS service. Performance that meets or exceeds the response time requirements of the RFP is the result of a coordinated effort of the contractor's total operation and therefore, is solely the contractor's responsibility. An error on the contractor's part in one phase of its operation (e.g. dispatch, system deployment plan, ambulance maintenance, etc.) shall not be the basis for an exception to the contractor's performance in another phase of its operation (e.g. clinical performance).

Superior response time performance early in a month is not a reason or justification to allow inferior response time performance late in the month. Therefore, contractor shall use its best efforts to minimize variations or fluctuations in response time performance according to day of week, or week of month.

1. Response Time Requirements—Beneficiary Jurisdiction of the Eastern Division and Beneficiary and Non-beneficiary Jurisdictions of the Western Division (Combined)

   Description of call classification-
   EMSA has designated four priorities with which the contractor must comply by meeting specified response times. The designation of an assignment as Priority 1 through 4 is accomplished by presumptive prioritization by the contractor's System Status Controller (SSC) in accordance with the then current Medical Priority Dispatch System (MPDS) protocols approved by the Medical Director. Currently ***EMSA*** is using Version 11 of the MPDS.

Emergency Assignments

a. Life threatening emergency (Priority 1)
   The contractor shall place an ALS ambulance on the scene of each life threatening emergency assignment, as presumptively determined in accordance with the MPDS, within 8 minutes 59 seconds on not less than 90% of all life threatening emergency transports.

   For every presumptively defined life threatening emergency transport exceeding the response time standard defined herein, contractor shall submit monthly to ***EMSA***, in writing, the cause of the extended response time and the contractor's efforts to eliminate recurrence.

b. Non-life threatening emergency (Priority 2)
   The contractor shall place an ALS ambulance on the scene of each non-life threatening emergency assignment, as presumptively determined in accordance with the MPDS, within 12 minutes 59 seconds on not less than 90% of all non-life threatening emergency transports.

   For every presumptively defined non-life threatening emergency transport exceeding the response time standard defined herein, contractor shall submit monthly to ***EMSA***, in writing, the cause of the extended response time and the contractor's efforts to prevent recurrence.

   Non-emergency Assignments
   EMSA recognizes that the contractor's primary responsibility is to meet emergency service demands. As a result, ***EMSA*** understands that the contractor's response to non-emergency requests may be occasionally and temporarily delayed until sufficient reserves of emergency production capacity can be restored to the system.

   Even so, the contractor shall furnish sufficient production capacity, and shall manage its available resources, so as to normally provide reasonably prompt non-emergency transfer service and especially in the case of previously scheduled non-emergency transfer requests, the contractor shall furnish service on schedule.

   Where the contractor is unable to provide reasonably prompt non-emergency service, or is temporarily unable to provide the previously scheduled service as planned, the contractor shall inform the individual or agency requesting such service, explaining the reasons for the temporary delay, and shall furnish an honest, reasonable estimate of the time service will be available. For unscheduled non-emergency (Priority 3) requests for service, this estimate and/or conversation with the patient or agency shall take place every fifteen (15) minutes after the original request for transport was received. For scheduled non-emergency (Priority 4) requests for service, this estimate and/or conversation with the patient or agency shall take place every fifteen (15) minutes after the scheduled time of pick-up.

   a. Unscheduled non-emergency transfer (not scheduled 24 hours in advance) (Priority 3)
      The contractor shall place an ALS ambulance on the scene of each unscheduled non-emergency assignment, as presumptively determined in accordance with

the MPDS, within 1 hour (60 minutes) on not less than 90% of all unscheduled non-emergency transports.

b. Scheduled non-emergency transfer (scheduled at least 24 hours in advance) (Priority 4)
The contractor shall place an ALS ambulance on the scene of each scheduled non-emergency assignment, as presumptively determined in accordance with the MPDS, within twenty (20) minutes of the time requested for transport, if one is designated by the caller, on not less than 90% of all scheduled non-emergency transports.

Non-discrimination Necessary Throughout the Beneficiary Jurisdictions
In developing high response time standards, the Beneficiary Jurisdictions have established sub-areas (three in each Division) for compliance measurement for Priority 1 transports. Contractor shall use best efforts to maintain response times for Priority 1 transports in each sub-area within 15% of the compliance required citywide. Maps demonstrating the sub-areas and map pages with more specific sub-area information are included as Attachment H (Map and Response Time Sub-areas).

Variations of more than 15% from the response time standards for the Beneficiary Jurisdictions within the same sub-area for more than three consecutive months, or more than six (6) months during any twelve (12) month period, shall be considered chronic response time discrimination. Provided, however, that in the event the volume of Priority 1 transports in any sub-area during any month is less than 100, sufficient additional Priority 1 transports shall be added from that sub-area, in sequential order from one or more months immediately preceding, to that month's sub-area statistics so that the total volume of Priority 1 transports included in the calculation is 100.

2. Response Time Requirements—Non-beneficiary Jurisdictions of the Eastern and Western Divisions
EMSA understands the difficulty in serving areas where call volume is extremely low and spread over a moderate geographic area. Therefore in the Eastern and Western Divisions, the response time requirements for Non-beneficiary Jurisdictions shall be as follows:

All of the Non-beneficiary Jurisdictions when considered together shall have a fractile response time for Priority 1 and Priority 2 transports combined of at least 90% when measured each month. Additionally, each of the Non-beneficiary Jurisdictions shall have its individual response time for Priority 1 and Priority 2 transports combined reported each month. The monthly response time for Priority 1 and Priority 2 transports combined for each Non-beneficiary Jurisdiction shall have a fractile response time equal to or above the 75^{th} percentile.

Response times for Priority 1 shall be measured by placing an ALS ambulance on the scene of each Priority 1 assignment as presumptively determined in accordance with the MPDS, within 11 minutes 59 seconds. Priority 2 response times shall be measured by placing an ALS ambulance on the scene of each Priority 2 assignment as presumptively determined in accordance with MPDS, within 12 minutes and 59 seconds.

Priority 3 and 4 assignments shall be measured in the same manner as those of the Beneficiary Jurisdictions.

If the total transports for Priority 1 and 2 assignments for the combined Non-beneficiary Jurisdictions drops below 65 transports in each of three consecutive months, the issue of response time performance may be opened for negotiation between ***EMSA*** and the contractor.

3. Response Time Measurement Methodology

   The response time measurement methodology employed can significantly influence operational requirements of the EMS system. The following are applicable:

   a. Time Intervals

      For the purposes of this contract, response times shall be measured from the time the call is received at ***EMSA's*** communication center until arrival at incident location by the first arriving ALS ambulance. For scheduled non-emergency (Priority 4) requests, "scheduled time of pick up" shall be substituted for the "time call received" in the response time calculation.

      Arrival at incident location means the moment an ambulance crew notifies the ***EMSA*** communication center that it is fully stopped at the location where the ambulance shall be parked while the crew exits to approach the patient. In situations where the ambulance has responded to a location other than the scene (e.g. staging areas for hazardous material, violent crime incidents or non-secured scenes), arrival "at scene" shall be the time the ambulance arrives at the designated staging location. The Medical Director may require the contractor to log time "at patient" for medical research purposes. However, during the term of the contract, "at patient" time intervals shall not be considered part of the contractually stipulated response time.

      In instances when the ambulance fails to report "at scene", the time of the next communication with that ambulance shall be used as the "at scene" time (e.g. time "at patient"). However, the contractor may appeal such instances when it can document the actual arrival time through another means (e.g. first responder, communications tapes/logs, arrival times captured by GPS, etc.).

   b. Upgrades, Downgrades and Turn A rounds

      From time to time, special circumstances may cause changes in call priority classification. Response time calculations for determination of compliance with contract standards and penalties for non-compliance will be as follows:

      i. Upgrades

         If an assignment is upgraded, prior to the arrival on scene of the ALS ambulance (e.g. from Priority 2 to Priority 1), the contractor's compliance and penalties will be calculated based on the shorter of:

         - Time elapsed from call receipt to time of upgrade plus the higher priority response time standard, or
         - The lower priority response time standard.

      ii. Downgrades

         Downgrades are not allowed.

      iii. Reassignment enroute

         If an ambulance is reassigned enroute or turned around, prior to arrival on the scene (e.g. to respond to a higher priority request), the contractor's compliance and penalties will be calculated based on the response time standard applicable to the assigned priority of the initial response. The response time clock will not stop until the arrival of an ALS ambulance on the scene from which the ambulance was diverted.

c. Response times outside the Eastern and Western Divisions
The contractor shall not be held accountable for emergency or non-emergency response time compliance for any assignment originating outside the defined service area of the Eastern and Western Division. Responses to requests for service outside the defined service area of a division will not be counted in the total number of calls used to determine compliance.

d. Each incident a single response
Each incident will be counted as a single response regardless of the number of units that respond. The response time of the first arriving ALS ambulance capable of transport will be used to compute the response time for the incident.

e. Response time exceptions and exception requests

The contractor shall maintain mechanisms for reserve production capacity to increase production should a temporary system overload persist. However, it is understood that from time to time unusual factors beyond the contractor's reasonable control affect the achievement of specified response time standards. These unusual factors are limited to unusually severe weather conditions, declared disasters, or periods of unusually high demand for emergency services. High demand is defined as those periods when there are a greater quantity of simultaneous emergency and unmodifiable non-emergency ambulance requests, than the 90th percentile of demand for the same hour of the day and day of the week during the previous fiscal year. The contractor and EMSA will set demand projections and high demand capacity constraints annually in conjunction with review of past period performance. An 'unmodifiable non-emergency ambulance request" is a call where the ambulance has arrived on scene and therefore is engaged in patient care, thus eliminating the ability to divert that unit to a higher priority case, and therefore included as simultaneous demand for the purpose of calculating high demand. Equipment failure, traffic congestion, ambulance failure, dispatch error, or other causes shall not be grounds for granting an exception to compliance with the response time standard.
Approved by the EMSA Board of Trustees 4/28/2010

If the contractor feels that any response or group of responses should be excluded from the calculation of the response time standards due to "unusual factors beyond the contractor's ability to reasonably control", the contractor may provide detailed documentation to the President of ***EMSA*** and request that ***EMSA*** exclude these runs from response time calculations and late penalties. Any such request must be in writing and be received by the President of ***EMSA*** within five business days after the end of each month. Should the contractor dispute the determination made by the President of ***EMSA***, the contractor may make a written appeal to the Medical Director for a definitive ruling within five (5) days of receipt of the response time calculations summary. The Medical Director's ruling shall be final and binding on both parties.

4. Deviations from Response Time Standards
EMSA understands that isolated instances may occur in which the contractor does not meet the stated performance specifications. Minor violations of these requirements will result in the imposition of deductions from the contractor's payment by ***EMSA***. However, a chronic failure to comply with the response time standards may constitute default of the contract.

Response time deductions for late patient responses are as follows:

a. Emergency
   For each presumptively defined life threatening emergency (Priority 1) transport and for each presumptively defined non-life threatening emergency (Priority 2) transport which originates within the division, and for which the contractor's response time is two (2) minutes or more in excess of the response time standard as described herein ***EMSA*** shall deduct from the contractor's payment $10.00 per minute for each minute the response time exceeds the two (2) minute grace period up to a maximum of $250.00 per incident.

b. Non-emergency
   For each presumptively defined unscheduled non-emergency transfer (Priority 3) or scheduled non-emergency transfer (Priority 4) which originates within the division, and for which the contractor's response time exceeds the required response time standard as described herein, ***EMSA*** shall deduct from the contractor's payment $10.00 per minute for each minute in excess of the required response time up to a maximum of $130.00 per incident.

   For purposes of calculating response time deductions, a fraction of a minute is to be rounded up to the next minute. For example, a Priority 1 transport arriving one (1) minute and twenty (20) seconds after the two (2) minute grace period would result in a deduction of $20 (2 minutes [rounded] at $10 per minute).

   Upon either retrospective audits of calls or exemption requests, if ***EMSA*** finds that a call was assigned a lower priority than would have been assigned had the communications personnel properly followed Medical Priority Dispatch Standards (MPDS) as approved by the Medical Director, ***EMSA*** shall measure the response time against the higher priority and the transport will be subject to late patient response deductions when applicable.

5. Non-performance Deductions
   Deductions from the contractor's payment will be made for non-performance. The following deductions will be applied (in addition to the per run deductions for late patient responses) when response time compliance for Priority 1 transports in the Eastern Division Beneficiary Jurisdiction or the Western Division Beneficiary Jurisdiction combined with the Western Division Non-beneficiary Jurisdiction falls below 90% for any calendar quarter:

   85% or below…… $100,000
   86%……80,000
   87%……50,000
   88%……30,000
   89%……20,000

   The above deductions are assessed each calendar quarter for each Beneficiary Jurisdiction and Non-beneficiary Jurisdiction.

6. Incentive for Superior Response Time Performance
   For every contract quarter that contractor's response time compliance level for Priority 1 transports is at 92% or better, ***EMSA*** shall forgive all response time deductions for late

patient responses for the next contract quarter. (Non-performance deductions will not be forgiven.)

7. Reporting Requirements
   The contractor shall provide, by the seventh day of each calendar month, reports detailing its performance during the preceding month as it relates to each of the performance requirements stipulated herein. For each day in which the contractor fails to provide the reports, ***EMSA*** will deduct from the contractor's payment $100.00.

C. Equipment Furnished and Provisions for Maintenance

For services rendered in the Eastern and Western Divisions, ***EMSA*** shall furnish for use by the contractor a VHF and UHF communications system, with a central dispatch center in both divisions. The VHF and UHF communications system shall be in general conformance with the system described in Attachments I, VHF Communications System Description; and J, UHF Communications System Description This VHF and UHF communication system shall be maintained by ***EMSA*** at ***EMSA***'s expense, except for damage to the system resulting from abuse or neglect by the contractor's personnel.

In addition to the communications system, ***EMSA*** shall also furnish the contractor with ambulances and on-board equipment in conformance with the equipment requirements set forth in the System Standard of Care Protocols (Attachment K) and other regulations, and as more specifically described in Attachment L, Vehicle Specifications; and in adequate quantity to provide reserve equipment and vehicles to facilitate preventative maintenance and repairs. A ratio of 130% of peak load staffing of vehicles and equipment shall serve as a standard for vehicle and equipment safety inventory levels. When delivered to the contractor, vehicles shall be fully equipped but not stocked with either basic or advanced life support expendables. The contractor shall only utilize these vehicles for emergency and non-emergency services rendered under ***EMSA*** auspices, and shall diligently maintain this equipment in accordance with factory recommended maintenance schedules and procedures, and shall supply, at the contractor's own cost, all fuel, oil, and routine maintenance. The contractor shall diligently adhere to factory "preventive maintenance schedules" and procedures at the contractor's own expense, and shall be responsible for costs of all repairs to such equipment during the term of the contract. Likewise, contractor shall be responsible for providing the preventive maintenance recommended by the manufacturer for all on-board equipment supplied by ***EMSA***. At the end of the contract period, the contractor shall bring all equipment into good working order, except for normal wear and tear.

It is ***EMSA's*** intent to continue to replace or remount all units on a five year schedule. Also, ***EMSA*** will provide extended warranties on all new units and equipment for as long as they are available and beneficial.

At the end of the contract period, ***EMSA*** shall cause all vehicle and on-board equipment to be inspected, and shall inform the contractor of any deficiencies discovered. Contractor shall have ten (10) days to correct such deficiencies at contractor's expense. If, at the end of the ten-day period, the contractor has not corrected such deficiencies, ***EMSA*** shall cause such deficiencies to be corrected, and shall deduct the amount of expenditures necessary to correct the deficiencies from the contractor's final payment.

In the event that the contractor finds that the number of vehicles furnished by ***EMSA*** are, in the contractor's opinion, insufficient to cover each of the Eastern and Western Divisions in accordance with the response time requirements, the contractor may, at the contractor's own expense, furnish additional ambulances as set forth in the System Standard of Care Protocols and other controlling documents. However, ***EMSA*** is of the opinion that, with a well-managed operation, the number of units supplied to the contractor for each division is sufficient to handle the task at hand.

D. Supplies for Basic and Advanced Life Support Services

It will be the total responsibility of the contractor to supply all supplies necessary and/or required to perform basic and advanced life support services. Attachment M, Basic and Advanced Life Support Supplies, is a detailed list with the number, type and in some cases brand, of each item that shall be carried on every ambulance.

E. Performance vs. Level of Effort

This RFP assumes a performance contract rather than a level of effort contract. In accepting a proposer's offer, ***EMSA*** neither accepts nor rejects the proposer's level of effort estimates; rather ***EMSA*** accepts the proposer's financially guaranteed commitment to employ whatever level of effort is necessary to achieve the clinical response time and other performance results required by the terms of the contract.

The proposals must include descriptions of initial ambulance coverage plans and deployment models estimated by the proposer to be sufficient or even in excess of what may be necessary to meet the performance standards required herein. Acceptance by ***EMSA*** of the proposer's offer shall not be construed as acceptance of the proposer's proposed level of effort.

F. Integration of First Responders

Currently, first responder service (basic and advanced life support) is available throughout the service area. While the fire department always maintains responsibility for controlling an incident scene, the primary responsibility for patient care transfers to the contractor's senior paramedic upon his/her arrival. Fire personnel will support the care provided by the contractor on-scene, and in those situations when required, will assist providing care enroute to the hospital.

During the term of this procurement, ***EMSA***, the Oklahoma City and Tulsa Fire Departments, the Office of the Medical Director and representatives of the Cities of Tulsa and Oklahoma City will pursue a strategic plan for the future developed by the Office of the Medical Director, with input from ***EMSA*** and the fire departments. Implementing the strategic plan could modify operational aspects of this RFP. If conditions do change, the winning contractor understands and agrees to negotiate and/or modify financial and non-financial aspects of its response. Guiding principles of the strategic plan are as follows:

10. EMS system design is based on scientific medical and economic evidence published in peer-reviewed literature as well as determined by the system's continuous quality improvement.

11. EMS system design recognizes the unique aspects and essential contributions of both first response and transport components. Component-distinct medical assessments and treatments are combined to form the essential medical care delivered to a "single patient" in the EMS system. Therefore, successfully treating this "single patient" depends upon coordinated and integrated response, medical treatment protocols, and continuing medical education.

12. As the "single patient" paradigm predominates throughout the EMS system's design of response, medical treatment, and continuing medical education, the EMS system's continuous quality improvement should be coordinated and integrated .

13. EMS communications optimizes the EMS system's patient care abilities when utilizing evidence-based priority dispatching. Successful priority dispatching sends necessary resource(s) to the patient, without excessive and inappropriate utilization of first response and transport components.

14. EMS communications optimizes the EMS system's patient care abilities when utilizing integrated EMS resource locater capabilities to identify and dispatch the closest appropriate responder(s).

15. Effective, coordinated continuing education (CE) enables advances in excellent patient care. Relevant, engaging CE is based upon EMS CQI findings, patient care capabilities, and treatment protocols.

16. Collegial working relationships among all personnel in this EMS system promote optimal patient care provided by mutually respected professionals.

17. Medical treatment protocols are derived utilizing prevailing EMS standards of care, evidence-based medicine, and system design considerations. Medical treatment protocols are formatted to recognize the essential contributions from communications, first response, and transport personnel and promote seamless care delivery. Clinical staffing must afford the safe implementation of these medical treatment protocols.

18. This EMS system recognizes and respects each contracted community's desire for high quality emergency medical services delivered in an affordable, cost effective design. Additional system resources are added only when they support the desired high quality of EMS in our communities and do so with reasonable costs.

10. Medical care provided by the EMS professionals in this system constitutes a delegated practice of medicine. The Medical Control Board and Office of the Medical Director physicians must be experienced and specialty board certified. These physicians commit to providing objective and independent medical oversight, without regard to self-interests and political pressures.

11. Response time standards factor the patient's perceived condition. Response time standards are appropriate for both first response and transport agencies. Strict compliance within response time standards is expected.

15. Electronic patient records must be utilized by both first response and transport to allow for integrated and seamless patient care documentation. This system is maximally effective for continuous patient care improvement activities, allowing for 100% critical care event compliance review.
16. Disaster preparedness and response constitute essential roles of this EMS system. Effective preparedness for and response to disaster-related emergency medical needs is dependent upon concise, task-oriented multiple casualty response procedures, routinely-scheduled realistic multiple

casualty training, funding appropriate protective and medical equipment, and achieving region-wide governmental operational support.

17. EMS strategic planning best enables optimal EMS system design and performance when conducted continuously.

The plan, "Strategic-Based Emergency Medical Service Blueprint for Oklahoma City and Tulsa" is included in its entirety as Attachment N.

Contractor's support of the first responder program shall include:

1. First Responder Equipment and Supply Replenishment
   The contractor shall develop mechanisms to exchange re-usable orthopedic appliances, and re-stock disposable and ALS medical supplies used by first responders when treatment has been provided by first responder personnel and patient care is assumed by the contractor's personnel. If the contractor is canceled enroute or at the scene and no patient contact is made by the contractor's personnel, the contractor shall not be obligated to re-stock the first responder agency supplies.

2. Return to Station
   In any situation in which fire department personnel assist the contractor during transport to the hospital, the contractor shall provide or arrange return transportation to the fire station for those personnel.

G. Communications System Management

The contractor shall furnish and manage ambulance dispatch and communication services within the Eastern and Western Divisions. Such service shall include, but is not limited to, dispatch personnel, in-service training, quality improvement monitoring, and related support services.

1. Staffing
   Staffing levels shall be such that emergency lines should be answered on the first ring. Also, as medically appropriate, callers with life threatening emergency requests shall receive pre-arrival instructions.

2. Hardware
   All dispatch communications equipment, radios, telephone equipment, Computer Assisted Dispatch (CAD) system equipment, computer tablets, and mobile data terminals including hardware and software employed by the contractor in the delivery of these services shall be furnished by ***EMSA*** meeting the general requirements set forth in this RFP.

   Each Beneficiary Jurisdiction maintains the primary answering point for 9-1-1 and has the capability of transferring both telephone and computer data to ***EMSA***'s communication center in the respective division. The Beneficiary Jurisdictions shall use best efforts to ensure the transfer of 9-1-1 callers seeking medical attention to ***EMSA***'s communication center within 10 seconds of the initial receipt of the call.

3. Computer Aided Dispatch System

EMSA shall provide a computer aided dispatch system to be utilized to record dispatch information for all ambulance requests. The CAD time recording system shall include the date, hour, minutes and seconds. All radio and telephone communication including pre-arrival instructions and time track shall be digitally recorded and kept for a minimum of 365 days. The computer-aided dispatch system shall meet the reporting requirements as specified herein.

4. Communications Center Personnel Qualifications
   Medical communications workers shall at a minimum be certified as emergency medical technicians (EMT), and have and maintain emergency medical dispatch certification (EMD).

   The contractor shall provide comprehensive internal orientation and testing, encompassing EMD certification, CAD system use, system status management, geography, medical priority dispatch protocols, first responder notification protocols and procedures, air medical notification procedures, disaster management policies and procedures, voice radio system operation (including medical and field communications equipment), paging system conventions and uses, data radio system operations, CAD, radio telephone, electrical, and emergency operations center procedures.

5. Priority Dispatch Protocols and Pre-Arrival Instructions
   EMSA utilizes medical priority dispatch protocols and pre-arrival instructions approved by the Fellows of the National Academy of EMS Dispatch. ***EMSA***'s communications centers in both Oklahoma City and Tulsa have been designated as accredited centers of excellence by the National Academies of Emergency Dispatch. The dispatch priorities are subject to change by the Medical Director. While "priority dispatching" as defined by the Fellows of the National Academy of EMS Dispatch is acceptable, ***EMSA*** does not allow the concept of "call screening". It shall be a major breach of this contract for the contractor to fail to respond to a call or to transport or to render emergency medical patient assessment and treatment, as appropriate, or to otherwise refuse or fail to provide any ambulance services originating within the regulated service area because of the patient's perceived, demonstrated or stated inability to pay for such services, or because of the location of the patient within the regulated service area or because of an unavailability status or the location of any ambulance unit at the time of the request.

   Adherence to medical dispatch protocols is required. Thus, except where a deviation is clearly justified by special circumstances not contemplated within a dispatch protocol, such medical dispatch protocol shall be strictly followed. Compliance with dispatch questions and pre-arrival instructions shall be a routine part of the contractor's quality improvement processes and shall be reported on a monthly basis with response statistics.

H. Data and Reporting Requirements

The long-term success of any EMS system is predicated upon its ability to both measure and manage its affairs. Therefore, ***EMSA*** will require its contractor to provide detailed operations, clinical and administrative data in a manner that facilitates its retrospective analysis.

1. Dispatch Computer
   The dispatch computer supplied by ***EMSA*** shall be capable of the following:
   a. Electronic data entry of every response on a real time basis.

b. Color coded prioritization of deployment planning, displaying calls received for runs pending, runs in progress, transfers scheduled up to 24 hours advanced, and status of ambulance resources available for service.
c. Continuous display of unit time in each response status. Automatic display of units exceeding pre-determined "time in status" criteria for deployment and crew safety.
d. Immediate recall on any current, previous, or pre-scheduled run for inquiry by date, incident number, location or patient name.
e. On-line, real time visual display showing a deployment plan and prioritization of citywide coverage for that time of day, and day of week. Visual displays of deployment plans are available for both actual and hypothetical ambulance availability levels.
f. Automated integration with digital paging, mobile status messages and 9-1-1 ANI/ALI displays.
g. Security features preventing unauthorized access or retrospective adjustment and full audit trail documentation.
h. GPS monitoring of the entire ambulance fleet.

2. Communication Center Data Capabilities
EMSA's electronic data system is capable of producing the following reports to be utilized in measuring response time compliance:
a. Emergency life threatening and non-life threatening response times by jurisdiction and by user definition.
b. Unscheduled non-emergency and scheduled non-emergency response times by jurisdiction and by user definition.
c. Out of chute response times by crew members.
d. On-scene times.
e. Hospital drop times by crew members.
f. Emergency and non-emergency responses by hour and day.
g. Dispatch personnel response time reports.
h. Canceled run report.
i. Demand analysis report.
j. Problem hour assessment.
k. Call mode by hour and day.
l. Ambulance alert exception report.

In addition, the contractor shall fully complete a manual "dispatch card" supplied by ***EMSA*** for each dispatch of an ambulance when the computer is inoperable. The contractor's personnel, following the resumption of normal service of the CAD system, shall enter manual dispatch cards into the CAD system.

3. Quality Improvement and Medical Control
EMSA's electronic data system is capturing and reporting all common data elements as required under the standard established by the National Association of EMS Directors. In addition, it is anticipated that the data system will be capable of reporting adherence to medical dispatch protocols, adherence to primary and secondary medical priority dispatch questioning, and provision of pre-arrival instruction.

4. Records
The contractor shall operate and manage the ***EMSA*** data collection system in accordance with ***EMSA*** standards. It is understood that the data system shall include,

but not be limited to, the following generally described sources. It is also understood the contractor shall make these records available upon request of ***EMSA***.

a. A uniform dispatch report form to ***EMSA*** specifications.
b. A uniform electronic patient care form [ePCR] provided by ***EMSA.***
c. An interhospital patient care form to ***EMSA*** specifications.
d. Equipment maintenance and inventory control schedules as required by ***EMSA.***
e. Deployment planning reports.
f. Continuing education and certification records documenting training compliance.

A patient care form is required for all patients for whom care is rendered at the scene, regardless of whether the patient is transported. Patient care records should clearly identify those instances when two or more patients are transported in the same ambulance so that proper billing can be done. Further, a round trip transport occurs when a single ambulance takes a patient to a destination and then provides transport back to the point of origin. Round trip transports are to be counted as one transport rather than two.

In order to ensure that ***EMSA*** is able to bill its patients in a timely manner, the contractor is required to provide ***EMSA*** with accurately completed patient care forms. The minimum information required on a patient care form in order for it to be accepted by EMSA includes either (1) a correct name or (2) a correct social security number with a correct date of birth. Additionally, every ePCR must have a correct patient address or a correct patient telephone number; and, the signature of the patient or responsible party or a clearly stated reason why the patient is unable to sign. CMS is considering rule changes regarding patient signatures. It is expected that the contractor will comply with all such rule changes which are within the reasonable control of the contractor ePCR's are to be forwarded to ***EMSA*** electronically as soon as the contractor deems the e-PCR to be complete (i.e., meets ***EMSA***'s billing requirements).

EMSA will deduct from the contractor's payment $250.00 for every ePCR that is not accurately completed (as described above) and electronically submitted to EMSA within fifteen (15) days of the date of service. It is generally expected that ePCRs will be submitted to ***EMSA*** at the earliest possible time so as not to delay ***EMSA***'s billing operations. If ***EMSA*** should have to return an ePCR to the contractor because the information provided is insufficient for billing, the contractor will have four business days to return the ticket to ***EMSA*** or fifteen (15) days after the date of service, whichever is later.

5. Monthly Reports Required
   Contractor shall provide, by the seventh day of each calendar month, reports dealing with its performance during the preceding month as it relates to the clinical, operational and financial performance stipulated herein. The format of such reports shall be subject to ***EMSA*** approval.

6. Financial Statements
   Quarterly income statements for the contractor's operations under the ***EMSA*** contract shall be provided to ***EMSA*** within 90 days of the end of each calendar quarter. The income statements shall be in the format specified in Attachment O and shall be certified by a certified public accountant that has direct responsibility for financial aspects of the contractor's operations under the ***EMSA*** contract. It is understood that

EMSA may make these financial statements available to other parties as deemed appropriate.

Contractor shall also comply with such other miscellaneous reporting requirements as may be specified by ***EMSA***, provided that these additional reporting requirements shall not be unreasonable or excessively cumbersome to the contractor.

I. Internal Risk Management/Loss Control Program Required

EMSA believes that education and aggressive prevention of conditions in which accidents occur is the best mechanism to avoid injuries to patients and the contractor's staff. Therefore, ***EMSA*** requires the contractor to develop and implement an aggressive loss control program including, at a minimum, physical pre-screening of potential employees (including drug testing), initial and on-going driver training, lifting technique training, hazard reduction training, as well as involvement of employees in planning and executing its safety program.

J. Stand-By and Special Events Coverage

Upon request by law enforcement and fire department dispatchers, the contractor shall furnish courtesy stand-by coverage at emergency incidents involving a potential danger to the personnel of the requesting agency or the general public. ***EMSA*** also provides paramedic(s) to the Tulsa County Sheriff's Office when its SWAT team is activated.

Other community service-oriented entities may request stand-by coverage from ***EMSA***. The contractor is encouraged to provide such non-dedicated stand-by coverage to events whenever possible. If ***EMSA*** is requested to provide such services with a dedicated ambulance, then ***EMSA*** will pay the contractor on a per-hour basis for such stand-by services. Each dedicated event shall have a two-hour minimum, plus an hour for set-up and an hour for clean up. The contractor will also make a paramedic available for pre-scheduled stand-by and special events coverage at an hourly rate. No minimums or additional time for set-up and clean up will be allowed for paramedic-only events.

K. Community Education Requirements

EMSA desires that its contractor take significant steps to improve access to the 9-1-1 system and participate in community education programs emphasizing preventative health care. These programs are to be made available to schools and community groups. It is ***EMSA's*** expectation that the contractor will plan such programs working collaboratively with ***EMSA*** and/or the American Heart Association, the American Red Cross, other public-safety and EMS-related groups. The contractor also currently provides a dedicated public information officer for ***EMSA***'s western division.

The contractor's minimum performance shall include: developing a minimum of 10 local print and electronic media public service announcements, participation in EMS Week activities, and providing at least 200 hours of public relations service events per division per year (in addition and separate from dedicated or non-dedicated special event coverage and any other hours stipulated in the RFP). PR hours may, at the contractor's option, be provided

by in-service units/personnel. All community education programs shall be approved by ***EMSA's*** Vice President of Marketing, and ***EMSA*** shall be the name associated with these events.

L. Mutual Aid

The contractor shall provide mutual aid as required by the Emergency Medical Services Rules and Regulations promulgated by the Oklahoma State Department of Health.

M. Disaster Assistance and Response

The contractor shall be actively involved in planning for and responding to any declared disaster in any of the cities ***EMSA*** serves. Both a mass casualty incident plan and an emergency disaster plan following incident command system guidelines have been developed.

1. In the event a disaster within a Beneficiary Jurisdiction or a neighboring city is declared by the Beneficiary Jurisdiction, normal operations shall be suspended and the contractor shall respond in accordance with the Beneficiary Jurisdiction's disaster plan. The contractor shall use best efforts to maintain primary emergency services and may suspend non-emergency services as required. During the period of the declared disaster, ***EMSA*** will not impose performance requirements and penalties for response times.

2. The direct marginal costs resulting from the performance of disaster services that are non-recoverable from third parties may be submitted to ***EMSA*** for payment. Such marginal costs shall not include cost for maintaining normal levels of service during the disaster, but shall be limited to the reasonable and verifiable direct marginal cost of these additional services.

3. ***EMSA*** holds grants and reimburses the direct costs of the contractor to coordinate various disaster and trauma response systems throughout the state of Oklahoma. The Metropolitan Medical Response System [MMRS] works as a unifying tool to link hospitals, EMS services, fire departments, police departments and the sheriff's office in the Tulsa and Oklahoma City areas and also holds a contract with the Oklahoma State Department of Health to develop similar systems in other parts of the state. The heart of the MMRS is the Medical Emergency Response Center [MERC] which operates as the medical emergency operations center for the county.

   Additionally ***EMSA*** is funded by the state health department to operate Trauma Referral Center(s) [TReC]…..currently one in Tulsa and one in Oklahoma City, however the program may consolidate to a single location for both regions of the state. These center(s) are operated by ***EMSA***'s communications centers.. All trauma transports into Oklahoma City and Tulsa are to be coordinated through the appropriate TReC, which insures that the metropolitan hospitals are available and can handle additional patients and that patients get to hospitals with needed specialist. The TRcC also collects trauma data for the health department.

4. ***EMSA*** is funded by the Department of Public Safety to provide car seats to low income families at no cost. ***EMSA*** medics provide installation and inspection of car seats no more often than monthly in both Oklahoma City and Tulsa.

5. ***EMSA***'s contractor provides the employees that work in grant programs. However, grant funds pay the salaries and benefits of these employees. The contractor is also responsible for working to secure continuing grant funds to support the programs already described in addition to any new projects.

N. Deployment Planning and Initial Plan

During the first quarter of operations, the contractor shall adhere to or exceed the initial coverage plan submitted in its proposal. It is anticipated that the contractor's initial coverage plan may require more or less unit hours than may be necessary after the contractor has gained additional experience.

Subsequent coverage plan modifications, including any changes in post locations, priorities, and around-the-clock coverage levels, may be made at the contractor's sole discretion by notifying ***EMSA*** in writing prior to the implementation of the change.

Clinical and Employee Provisions

A. Medical Oversight

EMSA shall furnish medical control services at its expense, including the services of a Medical Director for all system participants (i.e., first responder agency and transport agency) in accordance with the Uniform Code and the EMS Interlocal Cooperation Agreement. The Medical Director is approved, appointed and reports to the Medical Control Board. Although the Medical Director is appointed by the Medical Control Board; after the termination of the employment contract between the Medical Control Board and the current Medical Director, the Medical Director will be provided pursuant to an agreement between ***EMSA*** and The Oklahoma Institute for Disaster and Emergency Medicine through the University of Oklahoma College of Medicine, Tulsa, if allowed by the then-current Uniform Code, the EMS Interlocal Cooperation Agreement and ***EMSA***'s Trust Indenture. To avoid potential conflicts of interest, the Medical Director shall receive no compensation or remuneration, directly or indirectly, from the contractor without ***EMSA's*** prior approval.

1. Medical Protocols
   Contractor shall comply with medical protocols and other requirements of the system standard of care as established by the Medical Director. Current medical protocols including trauma transport protocols are found in the System Standard of Care Protocols.

2. Direct Interaction with Medical Control
   Field and communications personnel have the right and responsibility to interact directly with the system's medical leadership on all issues related to patient care. This personal professional responsibility is essential. Particular attention has been given to including safeguards against the contractor's organization preventing or discouraging this interaction from occurring. The Medical Director recognizes the complexity of these interactions, and will not otherwise involve himself/herself in employers' labor matters. The contractor currently provides the equivalent of two FTE's to support the Office of the Medical Director quality improvement activities.

3. Medical Review/Audits
   The goal of the medical audit process is to improve patient care by providing feedback on the system and individual performance. If the audit process is to be positive, it routinely must produce improvement in procedures, on-board equipment, and medical practices. It is the contractor's responsibility to operationalize this corrective feedback.

   To the greatest extent possible, medical audits are to be scheduled in advance for the convenience of the field personnel. The contractor shall arrange schedule changes, if possible, to make medical audit attendance more convenient.

   The Medical Director may review and categorize medical audit requests, separating those with important clinical implications or which potentially involve disciplinary action from those that involve less important issues. In many cases the Medical Director may contact the parties involved by telephone, and may resolve the matter directly without further involvement, or unnecessary inconvenience of field personnel.

The Medical Director may require that any of the contractor's employees attend a medical audit when necessary. Employees may attend any audit with respect to any incident in which they were involved that is being formally reviewed but must maintain the confidentiality of the medical audit process. Every employee involved in a case being reviewed is not required to attend unless mandated by the Medical Director.

The Medical Director shall at all times work with the contractor's Medical Director to insure that procedures and processes, which are already in place in the contractor's organization, are not altered unnecessarily.

4. Duties of the Medical Director
   The duties of the Medical Director are outlined in the EMS Interlocal Cooperation Agreement. [Attachment B]

B. Transport Requirement Limitations

Should the contractor determine that specific individuals have abused the required transport provision of the EMS service, they shall report the names of those individuals to the Medical Director. The Medical Director shall establish, within the standard of care, reasonable procedures to enable the contractor to decline to transport such abusers after contact with on-line medical control.

C. Minimum Clinical Levels and Staffing Requirements

All ambulances rendering services shall be staffed and equipped to render paramedic level care. The paramedic shall be the primary caregiver for all patients (e.g. emergency and non-emergency) and shall accompany all patients in the back of the ambulance during any patient transportation. The minimum requirement for the second staff member shall be Basic EMT.

D. Demonstrable Progressive Clinical Quality Improvement Required

EMSA desires that its contractor develop and implement a comprehensive quality improvement process for the EMS system. That process shall include, at a minimum, medical dispatch personnel and transport personnel. Quality improvement processes shall be utilized to improve outcome oriented patient care and facilitate continuing education.

The contractor shall provide in-house or sub-contracted in-service training programs designed to meet employee certification requirements that will be offered at no cost to employees.

The contractor shall budget a certain dollar figure each year to be used for non-mandatory clinical upgrades. It is ***EMSA's*** intent to encourage and require its contractor to anticipate increasing internal standards and the funding needs of these enhancements in addition to those that may be externally mandated.

E. Treatment of Incumbent Work Force

A number of dedicated, highly trained personnel are currently working in the ***EMSA*** system. To ensure that all employees have a reasonable expectation of employment in the contractor's operation, the proposers are strongly encouraged to recruit employees currently working in the system to assure a smooth transition and to encourage personnel longevity within the system.

F. Character Competence and Professionalism of Personnel

EMSA expects and requires professional and courteous conduct and appearance at all times from the contractor's field personnel, medical communications personnel, middle managers and top executives. The contractor shall address and correct any occasional deviations from these standards.

All persons employed by the contractor in the performance of work shall be competent and holders of appropriate licenses and permits in their respective professions and shall be required to pass a criminal record check as well as screening to insure that no employee has been excluded from the Medicare program and meets federal citizenship requirements. The contractor shall provide documentation to ***EMSA*** of compliance with these provisions.

G. Key Personnel

EMSA will, in part, base the award of the contract upon the qualification of the organization, and upon the qualifications of key personnel presented in the proposers' proposal. The contractor will be expected to furnish the personnel identified in the proposal throughout the term of the contract. The contractor is expected to furnish the same personnel or replacement personnel with equal or superior qualifications. It is the specific intent of this provision to prevent "bait and switch" bidding practices whether intentional or not.

H. OSHA and Other Regulatory Requirements

It is anticipated during the term of this contract that certain OSHA, state or federal regulatory requirements may be increased. It is ***EMSA***'s expectation that the contractor will adopt procedures that meet or exceed all requirements for dealing with these matters.

The costs for any OSHA, state or federal requirement added to the system after the first year of the contract will be shared. ***EMSA*** will pay 80% of the costs of new requirements after the first year, and the contractor will pay 20%. During the first year of the contract, the contractor will be responsible for paying for any new OSHA, state and federal requirements.

I. Discrimination Not Allowed

During the performance of this contract, the proposer agrees that it will comply with all applicable provisions of federal, state and local laws and regulations that prohibit discrimination. Specifically, the proposer warrants that it shall:

1. Not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, national origin, citizenship or disability. The contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. This shall include, but not be limited to the following: employment; upgrading; demotion; transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship;

2. in all solicitations or advertisement for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin;

3. comply with Executive Order 11246, as amended, if applicable, and the rules, regulations and orders of the Secretary of Labor;

4. be responsible for determining the applicability of and compliance with any federal or state regulation enacted pursuant to: Executive Orders; federal legislation or amendments to legislation; and state legislation or amendments to legislation.

J. Work Schedules and Employee Affairs – An Employer Matter

Although this is a performance-based RFP and proposers are encouraged to be creative in delivering service, the proposers are expected to employ reasonable work schedules and conditions. Patient care must not be hampered by impaired motor skills of personnel working extended shifts, part-time jobs, voluntary overtime, and mandatory overtime without adequate rest. Specifically, no shift shall exceed 12 hours in length with no less than 8 hours of rest between shifts. The contractor must take steps to ensure that part-time staff has had a rest period of at least 8 hours prior to beginning an EMSA shift. Exceptions to this rule can be granted by the medical director for jurisdictions of very low volume.

EMSA realizes that the success of the contractor depends on its ability to motivate and maintain its workforce through compensation, including benefits and retirement programs. The contractor is not to use sub-standard compensation levels in order to deliver the economic efficiencies necessary to profitably manage this contract. Average salary levels, which may be proposed, at a minimum, shall be equal to or exceed current salary levels. ***EMSA*** in no way intends to restrict the ingenuity of the contractor and its employees from working out new and creative compensation (salary and benefits) programs.

EMSA's goal is to ensure that the contractor initially, and throughout the term of the contract, provides a financial benefit to encourage employee retention and recruitment for the ***EMSA*** system.

EMSA emphasizes that the contractor is responsible for conducting the affairs with its employees, including managing personnel and resources fairly and effectively in a manner that ensures compliance with the contract which will be ultimately executed by the contractor. ***EMSA*** will not otherwise involve itself in contractor/management/ employee relationships.

Financial and Administrative Provisions

A. Term and Renewal Provisions

The term of the contract ultimately executed by the proposer shall be for a period of five (5) years beginning November 1, 2008. ***EMSA*** may grant up to two five-year extensions to this procurement. Extensions will be considered only when cost savings and medical excellence can be verified by the Authority and its Board of Trustees, and by the Medical Control Board, respectively.

B. Insurance Indemnity Provisions

Throughout the term of the contract, contractor shall meet or exceed the following requirements:

1. Prior to the time the contractor is entitled to commence any part of the project, work or services under the contract, the contractor shall procure, pay for and maintain the minimum insurance coverages and limits as provided for in this RFP. This insurance shall be evidenced by delivery to ***EMSA*** of: (a) certificates of insurance executed by financially stable insurance carrier(s) acceptable to ***EMSA*** and licensed or permitted to write insurance by the Oklahoma Insurance Commission. These insurance certificates shall list coverage and limits, expiration dates and terms of policies, and the names of all carriers issuing or reinsuring these policies. And, (b) a certified copy of each policy, including all endorsements. Insurance requirements shall remain in effect throughout the term of the contract.
    a. Commercial general liability insurance, including but not limited to, commercial owner and contractor protection, operational products, completed operations, property and personal injury, with limits of not less than $1,000,000.00 per occurrence; and, $2,000,000.00 annual aggregate. Coverage shall be on "an occurrence basis,", unless otherwise stated by exception herein.
    b. Professional medical liability insurance including errors and omissions with minimum limits of $1,000,000.00 per occurrence and $2,000,000.00 annual aggregate.
    c. Worker's compensation coverage to statutory limits as required by law; employer's liability insurance of not less than $1,000,000.00 bodily injury by incident; and $1,000,000.00 bodily injury by disease for each employee.
    d. Comprehensive automobile liability covering all vehicles used under the contract for owned, hired, and non-owned vehicles with minimum limits of $1,000,000.00 combined single limit for bodily injury (including death), per occurrence, and property damage of not less than $1,000,000.00 per occurrence. Coverage shall include coverage for loading and unloading hazardous waste unless covered under the general liability or professional liability insurance above.
    e. Automobile physical damage insurance for comprehensive and collision covering all vehicles provided by ***EMSA*** and used under this contract. The contractor shall provide the primary insurance coverage for all vehicles used under this contract regardless of actual vehicle ownership.
    f. Medical payment coverage on general liability and auto coverage at a per person limit of not less than $100,000.00.

g. Uninsured and underinsured motorist coverage of at least $250,000.00 shall be provided.
h. "Umbrella" coverage in the amount of at least $5,000,000.00 shall be provided as additional coverage to all underlying liability policies as specified in 1.a, 1.b, 1.c and 1.d. This policy may be written as a "Form Following Excess" policy.

2. Endorsements Required
Each insurance policy shall include the following conditions by endorsement to the policy:
a. Sixty (60) days prior to the expiration, cancellation, non-renewal or any material change in coverage or limits on any policy, a notice thereof shall be sent to ***EMSA*** at its address of record by the insurer. The contractor shall also notify ***EMSA*** in a like manner within twenty-four (24) hours after receipt of any notices of expiration, cancellation, non-renewal or material change in coverage received by the contractor from its insurer. Nothing shall absolve the contractor of this requirement to provide notice.
b. Companies issuing the insurance shall have no claims against ***EMSA*** for payment of premiums or assessments of deductibles, which are the sole responsibility and risk of the contractor.
c. All such policies shall name ***EMSA***, its Board, officers, The Office of the Medical Director, the Medical Control Board and employees of the forgoing and all Beneficiary and Non-beneficiary Jurisdictions as additionally named insureds.
d. All policies shall contain a waiver of subrogation to all parties named in 2.c. above.

3. All insurance shall be maintained with companies:
a. Holding a "general policy holders rating" of "A";" X" or better, as set forth in the most current issue of "Best Insurance Guide" or a comparable rating from other reputable rating organizations;
b. Licensed or permitted to operate in the State of Oklahoma; and
c. In good standing with the Oklahoma Insurance Commission.

4. Self Insured Risk
Any program of self-insurance risk employed by the contractor shall be subject to prior approval and on-going monitoring by ***EMSA*** and its legal counsel. In addition to any assurances required by ***EMSA*** under this provision, as initially agreed prior to final award of the contract, the following items shall be met to ***EMSA's*** satisfaction:
a. Potential fiscal liability associated with the risk to be assumed by the contractor must be reasonable and limited to an amount which would, if realized, not impair the contractor's ability to perform under the contract. The coverage contemplated shall at a minimum be equivalent to the coverage required under paragraph 1 above.
b. Throughout the term of the contract, ***EMSA*** shall be immediately notified of any major claims, the amount reserved against potential claims, and other program changes that may adversely affect the contractor's ability to provide insurance against potential risks as required in the contract. ***EMSA*** shall receive a monthly status report of all open claims.
c. The self-insured program meets and complies with all applicable laws and regulations.
d. The same requirements and conditions outlined in paragraphs B.2 and B.3 above shall apply to all excess insurance coverage carried.

5. Indemnification

The contractor (as indemnitor) will be required to indemnify, defend, save and hold ***EMSA***, Beneficiary and Non-beneficiary Jurisdictions, agents, successors and assigns (as indemnitee) harmless from and against and in respect of any act, judgment, claim, domain, suit, proceeding, expenses, orders, action, loss, damage, cost, charge, interest, fine, penalty, liability, reasonable attorney and expert fees, and related obligations (collectively, the "claims") arising from or related to acts and omissions of the contractor in its performance or non-performance under the contract, whether direct or indirect including but not limited to, liabilities, obligations, responsibilities, remedial actions, losses, damages, punitive damages, consequential damages to third parties, treble damages, costs and expenses, fines, penalties, sanctions, interest levied and other charges levied by other federal, state and local government agencies on ***EMSA*** by reasons of the direct or indirect actions of the contractor. These obligations will survive and remain in force after the expiration or termination of the contract and are unlimited; provided, however that these obligations are not intended to cover claims against ***EMSA*** arising solely from ***EMSA's*** own negligence or intentional misconduct. For purposes of this section, the term ***EMSA*** shall include ***EMSA,*** its officers, Board of Trustees, the Office of the Medical Director, the Medical Control Board and employees of the forgoing entities.

The following provisions shall control the indemnity and defense obligations set forth above:

a. Defense- The contractor, at its cost and expense, shall fully and diligently defend ***EMSA*** against any claims brought, investigations undertaken or actions filed which relate to claims for which ***EMSA*** is indemnified. The contractor shall employ qualified attorneys, selected by ***EMSA***, to appear and defend the claim or action on behalf of ***EMSA***. The contractor, acting in good faith and in the best interest of ***EMSA***, shall have the sole authority for the direction of the defense, and shall be the sole judge of the acceptability of any compromise or settlement of any claims or actions against ***EMSA*** so long as such compromise or settlement does not impose a liability on ***EMSA*** not fully covered and satisfied by the indemnity provided by this section or, in ***EMSA's*** judgment, subject ***EMSA*** to any material adverse order, judgment or decree which impairs its image or ability to operate its business as previously conducted. Otherwise, ***EMSA*** reserves the exclusive right to reject any such compromise or settlement and prosecute the claim, compromise or settlement. The contractor shall inform ***EMSA***, on a quarterly or more frequent basis, on the progress and proposed resolution of any claim and shall cooperate in responding to inquiries of ***EMSA***.

b. Reimbursement for expenses- The contractor shall reimburse ***EMSA*** for any and all necessary expenses, attorney's fees, interest, penalties, expert fees, or costs incurred in the enforcement of any part of the contract within thirty (30) days after receiving notice that ***EMSA*** has incurred them.

c. Cooperation of parties and notice of claim- The contractor and ***EMSA*** shall each provide the other prompt written notice of any audit or review of any actual or threatened claim, or any statement of fact coming to the attention of one of the parties which is likely to lead to a claim covered by the indemnity. Each party agrees to cooperate in good faith with the other and respond to any such audit or review in defense of any such claim.

C. Performance Security

Due to the importance of our work in emergency medical services, ***EMSA*** must do everything possible to eliminate the potential for system failure. Ambulance service is too essential, whether provided by a public or private agency, to be left to chance. Accordingly, a well–designed system incorporates a variety of performance security measures to minimize the potential for failure and to sustain uninterrupted service in the event of failure.

EMSA will use a combination of performance security provisions to safe guard the public whom we serve. In this procurement, ***EMSA*** will implement a Pre-Qualification of Proposers. ***EMSA*** will maintain control of the accounts receivable and will own all equipment used in the performance of EMS duties. Also, ***EMSA*** shall maintain financial incentives to reward the contractor for maintaining the high standards of this procurement. In addition, ***EMSA*** has the right to terminate the contract for non-performance.

1. Continuous Service Delivery
   Contractor expressly agrees that, in the event of contract default by the contractor the contractor will work with ***EMSA*** to ensure continuous delivery of services, regardless of the underlying causes of default. The contractor agrees that there is a public health and safety obligation to assure that ***EMSA*** is able to provide uninterrupted service delivery in the event of default even if the contractor disagrees with the determination of the default.

2. Performance Letter of Credit or Cash Escrow Account
   Contractor will deposit with ***EMSA***'s Chief Financial Officer an annually renewable performance letter of credit or cash escrow account in a form satisfactory to ***EMSA***'s Chief Financial Officer and ***EMSA***'s attorney. The amount of the performance letter of credit or cash escrow account shall be $3,000,000.00 (three million dollars). (Due to the impracticality and extreme difficulty in determining actual damages, the parties shall agree in the contract that said sum is a reasonable amount for total liquidated damages.) The federally insured banking institution or other financial institution, on which the performance letter of credit is drawn, shall be acceptable to ***EMSA***'s Chief Financial Officer.

   The performance letter of credit or cash escrow account shall be used to ensure the operation of the ambulance service, including but not limited to, any necessary rebidding, negotiation or related administrative expenses, should ***EMSA*** terminate the contract because of a default.

3. Notice of Change is Required for Performance Letter of Credit
   Any performance letter of credit shall contain the following endorsement: "at least 60 (sixty) days prior to cancellation, replacement, failure to renew, or material alteration of this performance letter of credit, written notice of such intent shall be given to ***EMSA*** by the financial institution. Such notice shall be given by certified mail to ***EMSA***'s Chief Financial Officer."

4. Cooperation Required
   In the event ***EMSA*** terminates the contract in accordance with its terms, the contractor shall forfeit the full amount of its performance security as liquidated damages.

D. Contractor Default and Provision for Termination of the Contract

Conditions and circumstances that constitute default of the contract shall include the following:

1. Failure of the contractor to operate the system in a manner which enables ***EMSA*** and the contractor to remain in compliance with federal or state laws, rules, or regulations, and with the requirements of its ambulance ordinance and/or related rules and regulations adopted pursuant thereto;

2. Falsification of information supplied by the contractor during or subsequent to this procurement process, including by way of example, but not by way of exclusion, altering presumptive run code designations to enhance the contractor's apparent performance or falsification of any other data required under the contract;

3. Creating patient transports so as to artificially inflate run volumes and contractor's revenues;

4. Failure of the contractor to provide data generated in the course of operations, including by way of example, but not by way of exclusion, dispatch data, patient report data, response time data or financial data;

5. Excessive and unauthorized scaling down of operations to the detriment of performance during a "lame duck" period;

6. Failure of the contractor's employees to conduct themselves in a professional and courteous manner and to present a professional appearance;

7. Failure of the contractor to maintain equipment in accordance with manufacturer recommended maintenance practices;

8. Making an assignment for the benefit of creditors; filing a petition for bankruptcy; being adjudicated insolvent or bankrupt; petitioning by a custodian, receiver or trustee for a substantial part of its property; or, commencing any proceeding relating to it under bankruptcy, reorganization arrangement, readjustment of debt, dissolution or liquidation law or statute;

9. Failure of the contractor to cooperate with and assist ***EMSA*** after default has been declared as provided for herein, even if it is later determined that such breach never occurred or that the cause of such breach was beyond the contractor's reasonable control;

10. Acceptance by the contractor or any of the contractor's employees of any bribe, kickback or consideration of any kind in exchange for any consideration whatsoever, when such consideration or action on the part of the contractor or contractor's employees could reasonably be construed as a violation of federal, state or local law;

11. Payment by the contractor or any of the contractor's employees of any bribe, kickback or consideration of any kind to any federal, state, or local public official or consultant in

exchange for any consideration whatsoever, when such consideration could reasonably be construed to be a violation of any federal, state or local law;

12. Failure of the contractor to meet the system standard of care as established by the Medical Director;

13. Failure of the contractor to maintain insurance in accordance with the contract;

14. Failure of the contractor to meet response time requirements as set forth in the contract;

15. Response time discrimination within the sub-areas of the Beneficiary Jurisdictions as set forth in the contract;

16. Failure to maintain a performance letter of credit or escrow account upon the terms and in the amount specified in the contract;

17. Failure to submit reports and information under the terms and conditions outlined in this RFP;

18. Any other failure of performance, clinical or other required in the contract and which is determined by the President of ***EMSA*** and confirmed by the Board of Trustees of ***EMSA*** to constitute a default or endangerment to public health and safety.

E. *EMSA's* Remedies

If conditions or circumstances constituting default as set forth in Section D exist, ***EMSA*** shall have all rights and remedies available at law or in equity under the contract, specifically including the right to terminate the contract. ***EMSA***'s remedies shall be cumulative and shall be in addition to any other remedy available to ***EMSA***.

F. Provisions for Termination of Contract

In the event of default, ***EMSA*** shall give the contractor written notice, return receipt requested, setting forth with reasonable specificity the nature of the breach and the reason such breach endangers the public's health and safety. Within five (5) calendar days of receipt of such notice, the contractor shall deliver to ***EMSA***, in writing, a plan of action to cure such default. The plan of action shall be updated, in writing, every five (5) calendar days until such breach is cured. The contractor shall have the right to cure such breach within thirty (30) calendar days of receipt of notice of breach. If the contractor fails to cure such default within the period allowed for cure (with such failure to be determined by the sole and absolute discretion of ***EMSA***), or the contractor fails to timely deliver the cure plan to ***EMSA***), ***EMSA*** may terminate the contract. The contractor shall cooperate completely and immediately with ***EMSA*** to affect a prompt and orderly transfer of all responsibilities to ***EMSA***.

The contractor shall not be prohibited from disputing any findings of default through litigation, provided, however, that such litigation shall not have the effect of delaying, in any way, the immediate transfer of operations to ***EMSA***. Such dispute by the contractor shall not delay ***EMSA***'s access to the funds made available by the performance letter of credit. These

provisions shall be specifically stipulated and agreed to by both parties as being reasonable and necessary for the protection of public health and safety. Any legal dispute concerning the finding that default has occurred shall be initiated and shall take place only after the transfer of operations to ***EMSA*** has been completed, and shall not under any circumstances delay the process of transferring operations to ***EMSA*** or delay ***EMSA***'s access to performance security funds as needed by ***EMSA*** to finance such transfer of operations.

The contractor's cooperation with and full support of ***EMSA's*** termination of the contract, as well as the contractor's immediate release of performance security funds to ***EMSA,*** shall not be construed as acceptance by the contractor of the finding of default, and shall not in any way jeopardize the contractor's right of recovery should a court later find that the declaration of default was made in error. However, failure on the part of the contractor to cooperate fully with ***EMSA*** to affect a smooth and safe transition shall itself constitute a breach of the contract, even if it was later determined that the original declaration of default by ***EMSA*** was made in error.

G. "Lame Duck" Provisions

Should the contractor fail to prevail in a future procurement cycle, the contractor shall agree to continue to provide all services required in and under the contract until the new contractor assumes service responsibilities. Under these circumstances the contractor will, for a period of several months, serve as a lame duck contractor. To ensure continued performance fully consistent with the requirements of the contract through any such period, the following provisions shall apply:

1. The contractor shall continue all operations and support services at the same level of effort and performances as were in effect prior to the award of the subsequent contract to a competing organization, including but not limited to compliance with provisions hereof related to qualifications of key personnel;

2. The contractor shall make no changes in methods of operation which could reasonably be considered to be aimed at cutting contractor services and operating cost to maximum profits during the final stages of the contract;

3. ***EMSA*** recognizes that if a competing organization should prevail in a future procurement cycle, the contractor may reasonably begin to prepare for transition of service to the new contractor. ***EMSA*** shall not unreasonably withhold its approval of the contractor's request to begin an orderly transition process, including reasonable plans to relocate staff, scale down certain inventory items, etc., as long as such transition activity does not impair the contractor's performance during this period.

4. During the process of a subsequent competition conducted by ***EMSA***, the contractor shall permit its non-management personnel reasonable opportunities to discuss with competing organizations issues related to employment with such organizations in the event the contractor is not the successful proposer. The contractor may, however, require that its non-management personnel refrain from providing information to a competing organization regarding the contractor's current operations, and the contractor may also prohibit its management level personnel from communicating with representatives of competing organizations during the competition. However, once ***EMSA*** has made its decision regarding award, and in the event the contractor is not the

winner, the contractor shall permit free discussion between any ***EMSA***-based contractor employee and the winning proposer without restriction, and without adverse consequence to any ***EMSA***-based employee.

H. General Provisions

1. Assignment
   The contractor shall not assign any portion of the contract for services to be rendered without first obtaining written consent from ***EMSA.*** Any assignment made contrary to the provisions of this section shall terminate the contract and, at the option of ***EMSA,*** shall not convey any rights to the assignee. Any change in contractor's ownership shall, for purposes of the contract, be considered a form of assignment. ***EMSA*** shall not unreasonably withhold its approval of requested change in ownership, so long as the transferee is of known financial and business integrity.

2. Permits and Licenses
   The contractor shall be responsible for and shall hold any and all required federal, state or local permits or licenses required to perform its duties under the contract (except for the state EMS license which is maintained by ***EMSA***). In addition, the contractor shall make all necessary payments for licenses and permits for service and for issuance of city permits for all ambulance vehicles used. It shall be entirely the responsibility of the contractor to schedule and coordinate all such applications and application renewals to ensure that the contractor is in complete compliance with federal, state and local requirements for permits and licenses. The contractor shall be responsible for ensuring that the state and local certifications of its employees are valid and current at all times.

3. Compliance with Laws and Regulations
   All services furnished by the contractor under the contract shall be rendered in full compliance with all applicable federal, state and local laws, ordinances, rules and regulations. It shall be the contractor's sole responsibility to be fully familiar with all laws, rules, and regulations that apply to the services provided by the contractor (including the Uniform Code and the EMS Interlocal Cooperation Agreement), and to comply there under at all times. Furthermore, the contractor agrees to perform in accordance with the provisions of any regulations or written guidelines established by the Medical Director pursuant to the Uniform Code and the EMS Interlocal Cooperation Agreement.

4. Product Endorsement/Advertising
   The contractor shall not use the name or equipment of ***EMSA*** for the endorsement of any commercial product or service without the expressed written permission of ***EMSA***.

5. Audit and Inspections
   EMSA representatives may, at any time, and without notification, directly observe the contractor's operation of the communication center, maintenance facility, and any ambulance post location. An ***EMSA*** representative may ride, as "third person" on any of the ***EMSA*** ambulances at any time, provided, that in exercising this right to inspection and observation, ***EMSA*** representatives shall conduct themselves in a professional and courteous manner, shall not interfere with the duties of contractor's employees, and shall at all times be respectful of contractor's employer/employee relationships. ***EMSA*** representatives shall have the right to audit the reports and data

that the contractor is required to provide under the contract. Such audits will be conducted during normal business hours with a minimum of 48 hours advance notice to the contractor.

6. Return of ***EMSA*** Equipment
   The contractor agrees to return any ***EMSA***-issued equipment in good working order, normal wear and tear excepted, at the termination of the contract. For any ***EMSA*** equipment not returned at the conclusion of the term or for any equipment returned damaged or otherwise unusable, ***EMSA*** shall repair or replace said equipment at the contractor's expense and deduct an equivalent amount from the contractor's performance security.

7. Relationship of the Parties
   Nothing in the contract resulting from this RFP shall be construed to create a relationship of employer and employee or principal and agent, partnership, joint venture, or any other relationship other than that of independent parties contracting with each other solely for the purpose of carrying out the provisions of the contract. Nothing in the contract shall create any right or remedies in any third party, it being solely for the benefit of ***EMSA*** and the contractor.

8. Rights and Remedies Not Waived
   The contractor will be required to covenant that the provision of services to be performed by the contractor under the contract shall be completed without further compensation than that provided for in the contract. The acceptance of work under the contract and the payment therefore shall not be held to prevent maintenance of an action for failure to perform work in accordance with the contract. In no event shall payment of consideration by ***EMSA*** constitute or be construed to be a waiver by ***EMSA*** of any default or covenant or default by the contractor. ***EMSA***'s payment shall in no way impair or prejudice any right or remedy available to ***EMSA*** with respect to such default.

9. Consent to Jurisdiction
   The contractor and its ultimate parent corporation shall consent to the exclusive jurisdiction of the courts of the State of Oklahoma or a federal court in Oklahoma in any and all actions and proceedings between the parties hereto arising under or growing out of the contract. Venue shall lie in Tulsa County, Oklahoma.

10. End-term Provisions
    The contractor shall have ninety (90) days after termination of the contract in which to supply the required audited financial statements and other such documentation necessary to facilitate the close out of the contract at the end of the term.

11. Notice of Litigation
    The contractor shall agree to notify ***EMSA*** within twenty-four (24) hours of any litigation or significant potential for litigation of which the contractor becomes aware. Further, the contractor will be required to warrant that it will disclose in writing to ***EMSA*** all litigation involving the contractor, the contractor's related organizations, owners, and key personnel.

12. Cost of Enforcement
    If either ***EMSA*** or the contractor institutes litigation against the other party to enforce its rights pursuant to the contract, the actual and reasonable cost of litigation incurred by

the prevailing party, including but not limited to attorney's fees, consultant and expert fees, or other such costs shall be reimbursed within ninety (90) days after receiving notice of the party which prevails.

Submission and Scoring of the RFP

A. General Submission Information

1. Procurement Time Frames
   The schedule for the ***EMSA*** procurement is outlined in Attachment C, Procurement Schedule. Failure to comply with any time frames outlined in the procurement schedule may result in automatic disqualification of the proposer.

2. Cost of Participation
   All costs of participation in this procurement process shall be borne by the proposer. ***EMSA*** reserves the right to reject all proposals.

3. Authority to Verify Credentials and Proposal Submissions
   The proposer shall submit executed notarized "investigative authorization forms" for the company(s) whose credentials are submitted for review and for owners, officers, and key personnel. If the company is a publicly held corporation, only the company release form and personal release forms of managers and key personnel who would be involved in the fulfillment of the contract or in the preparation of the proposal need be submitted. A blank copy of each type of required release form, which may be duplicated, is provided herein as Attachment D, Investigative Releases.

4. Own Expertise and Judgment Required
   Each proposer is specifically advised to use its own best expert and professional judgment in deciding upon the methods to be employed to achieve and maintain the performance required under the contract. By "methods" ***EMSA*** means compensation programs, shift schedules, personnel policies, supervisory structures, ambulance deployment techniques, and other internal matters which taken together, comprise each proposer's strategies and tactics for accomplishing the task. ***EMSA*** recognizes that different proposers may employ different production methods, perhaps with equal success. By allowing each proposer to select, employ, and change its production methods, ***EMSA*** hopes to promote innovation, efficiency and superior levels of performance.

5. Estimated Business Volumes
   EMSA specifically makes no representations or warranties regarding the number of requests for ambulance service, ambulance transports, quantities or length of long distance transfer services, or frequency of special event coverage that may be associated with this procurement. Any and all historical data on past volumes of business within the ***EMSA*** service area are provided mainly to illustrate the historical level of performance and not as a guarantee of future business volume.

6. Exceptions
   Proposers taking material exception to ***EMSA***'s specifications shall be disqualified. The purpose of the pre-bid conference is to provide clarification of the RFP and its specifications before submission of proposals. If an organization has questions regarding the RFP and its specifications, a request for clarification should be submitted at or before the pre-bid conference to obtain a ruling on the manner before submitting the proposal.

7. Official Contacts Only/Requirement to Disqualify
   Proposers are advised that all correspondence regarding this procurement should be made in writing to H. Stephen Williamson, President/CEO, ***EMSA***, 1417 North Lansing Avenue, Tulsa, Oklahoma 74106-5906 (fax 918-596-3177).

   Answers to substantive questions raised by any proposer shall be sent in written form to every proposer. Proposers are advised against contacting any member of the selection committee, any member of the ***EMSA*** Board of Trustees, or any member of the city councils of Oklahoma City or Tulsa. Any information obtained by proposers from any source other than written communication from the President of ***EMSA*** should be considered unofficial and quite possibly in error.

8. Confidentiality of Submitted Material
   All material submitted in response to the RFP, including requests for credentials, shall be considered confidential and not available for release to the public or other proposers. This provision is designed to protect the information and a proposer's submissions. Further, it ensures no other proposer has access to competitors' materials prior to, or after proposal submission and/or oral presentations. Allowing access could give a competitor an unfair advantage and jeopardize the competitive effectiveness of this procurement process.

   All proposers hereby agree that ***EMSA*** shall retain one complete set of all submitted materials for its files as well as two sets of the winning proposal. If a proposer desires other copies be returned, it shall advise ***EMSA*** in writing of such request, and all material, except as defined above, shall be returned.

   Following the date of the award of the contract, public access to submitted material shall be allowed in compliance with the Oklahoma Open Records Act. However, if any proposer believes their proposal contains confidential or proprietary information, then those specific sections may be so designated. ***EMSA*** shall not be liable for any release of information pursuant to a court order, even if designated confidential/proprietary.

9. Proposal Deposit Required
   All proposals shall be accompanied by a proposal deposit (not a bid bond) in the amount of $200,000.00 in the form of a certified or cashier's check made payable to ***EMSA***. This proposal deposit will be returned to any unsuccessful proposers by ***EMSA*** within ten (10) business days after the award of the contract unless, upon investigation of credentials and proposals it is determined that the proposer has misrepresented itself or provided false or inaccurate information in the qualification or request for proposal response. The successful proposer's deposit will be returned upon the signing of the contract. No interest shall be paid on these proposal deposits.

10. Sealed Submission
    Each proposer should submit an original, so marked, and ten (10) copies of its proposal, signed by the proposer's contractually binding authority. All proposals must be sealed and labeled on the outside of the sealed container to show the following: proposal to ***EMSA***; name of proposer; address of proposer and the name of the primary contact person. Submission must be received at the ***EMSA*** administrative office, 1417 North Lansing Avenue, Tulsa, Oklahoma, 74106-5906, no later than 3:00 p.m., Monday, June 16, 2008.

B. Mandatory Table of Contents

In order to ensure that the evaluation of the proposals is as equitable as possible, all proposals shall be submitted in the following format. Order and numbering conventions should be consistent with the required table of contents. The proposals will be scored in comparison with other proposer's offerings for each section identified in item D, "Evaluation of Proposals" of the "Submission and Scoring of the RFP" section of this document

I. Introduction
   A. Description of the Proposed Organizational Structure

II. Clinical Performance
   A. Suggested Medical Protocols (other than those of the Medical Control Board)
   B. Clinical Credentials of Field Personnel
   C. Financial Reserve for Clinical Upgrades
   D. Quality Improvement Processes
   E. In-service Training
   F. Employee Recruitment, Screening and Orientation
   G. Preceptor Qualifications/Status
   H. Internal Staff Support for Medical Director

III. Community Service/Education Programs

IV. Control Center Operations
   A. Qualifications of Personnel
   B. In-service Training
   C. Employee Recruitment, Screening and Orientation
   D. Methods for Fine Tuning Deployment Plans

V. Human Resources
   A. Treatment of Incumbent Workers
   B. Compensation and Benefits
   C. Leadership/Supervisory Training
   D. Diversity Awareness Training and Involvement Plan
   E. Health and Safety Programs

VI. First Responder Program Support

VII. Fleet and Equipment Issues
   A. Ambulance Maintenance Practices
   B. Equipment Maintenance Practices

VIII. Organization Experience and Key Personnel
   A. Experience Providing Similar Services
   B. On-site Personnel
   C. Off-site Personnel to Support Operations

IX. Administrative
   A. Provision of Insurance
   B. Method of Providing Performance Security

C. Proposal Format and Description of Required Contents

The proposer shall address each item in this section. Programs and offerings will be compared with other proposals. Any proposer whose response fails to incorporate or utilize these minimum standards may be ruled non-responsive. The proposer, at its option, may offer higher levels of performance for any component addressed in this RFP. .

I. Introduction

A. Description of Proposed Organizational Structure—
The proposer shall comprehensively describe the nature of the organizational entity proposed to be directly responsible for the provision of service under the contract. This shall include any relationship the proposed organization may have to a "parent" or "sister" company. Financial relationships, ownership, shared directorship, or relationships with other organizations shall be defined. Organizational charts and a complete description of the proposed organization should be included.

II. Clinical Performance

A. Suggested Medical Protocols
Minimum: Medical protocols that meet or exceed the clinical protocols provided in the RFP and are currently approved for use in the system.

B. Clinical Credentials of Field Personnel
Minimum: Personnel who make up every ambulance crew will be appropriately licensed for provision of advanced life support. Each ambulance shall be staffed with at least one (1) EMT-P and one (1) EMT-Basic.

Position and organizational chart should be included. The proposed job descriptions and the certification/licensure levels of personnel should be provided. The contractor should demonstrate its commitment to clinical excellence by including programs designed to respond to system clinical need and to proactively enhance system clinical performance.

C. Financial Reserve for Clinical Upgrades
Minimum: List the annual dollar amount to be reserved for non-mandatory clinical upgrades.

It is anticipated that internal clinical enhancements unrelated to the system standard of care set by the Medical Control Board would be desirable during the term of this contract. This clinical reserve for upgrades shall not be used to fund any system standard of care requirements outlined in this proposal.

D. Quality Improvement Processes
Minimum: Internal quality improvement program that identifies deviations from medical protocols, incomplete and inaccurate patient information, and opportunities for improvement.

The proposer shall describe a comprehensive quality improvement program covering all aspects of the contractor's operations that it intends to utilize in the performance of this contract. The description of the program should include the

type, frequency, and quantity of information that would be provided to the Medical Director to support his/her clinical oversight responsibilities.

E. In-service Training
Minimum: Programs for employees to retain required certification and meet local requirements for their respective positions.

Proposers shall describe continuing education and special classes to be offered to personnel including: organizational policies as to what programs are voluntary and which are required; discussion of clinical upgrade training to be utilized; and, training and continuing education to address on–going operational and clinical activities.

F. Employee Recruitment, Screening and Orientation
Minimum: Document mechanisms to ensure that well-qualified employees are recruited, selected and oriented to the system.
Proposers shall describe the comprehensive program that will be utilized to recruit, screen and orient employees. The description should include recruitment methods, screening processes and tools, and orientation processes.

G. Preceptor Qualifications/Status
Minimum: Educational qualifications of clinical preceptors shall support the objective of developing on-going field education of staff.

Preceptors, sometimes referred to as field training officers, are an integral part of an EMS system serving as role models and facilitating quality improvement. Proposers shall describe the qualifications of its preceptors and the on-going training preceptors will receive.

H. Internal Staff Support for Medical Director
Minimum: Staff support for ***EMSA's*** Medical Director.

Describe the level, type and amount of support that the proposers will utilize to facilitate optimal medical control.

III. Community Service/Education Programs
Minimum: Development and implementation of community based programs to facilitate and improve injury/illness prevention and system access.

Proposer shall describe the type programs it would offer, proposed training equipment, job descriptions of key staff for this component. Proposer should describe innovative approaches to prevention and the dedicated and non-dedicated (in-service) staff commitment to this component.

IV. Control Center Operations
A. Qualifications of Personnel
Minimum: EMT-B equivalent, with certification in the Academy of EMS Dispatch and appropriate training in flexible deployment.

Each proposer shall describe qualifications and training of personnel and include procedures for telephone and pre-arrival instruction protocols.

B. In-service Training

Minimum: Necessary programs for employees to retain certification for communications positions.

Each proposer shall describe continuing education and special classes to be offered to personnel, including: organizational policies as to what programs are voluntary and which are required; description of communications upgrade training to be utilized; and, training and continuing education to address on-going communications activities.

C. Employee Recruitment, Screening and Orientation

Minimum: Document mechanisms to ensure that well qualified employees are recruited, selected and oriented to the system.

Each proposer shall describe the comprehensive program that will be utilized to recruit, screen and orient employees. The description should include recruitment methods, screening process and tools, and orientation processes.

D. Methods for Fine Tuning Deployment Plans

Minimum: Describe the process for modifying deployment techniques to ensure ambulances are appropriately located by hour of the day and day of the week to respond to requests for service.

Proposers shall describe the procedures and processes used to refine the deployment plan throughout the term of the contract. The description should include who will be involved in the process, what factors will be considered and how often the processes will be utilized.

V. Human Resources

A. Treatment of Incumbent Workers

Minimum: The incumbent work force will be given first consideration for employment by the incoming contractor.

Seniority transfer and programs for retaining personnel within the system should be described. Commitments to offer employment to the incumbent labor force shall be described.

B. Compensation and Benefits

Minimum: Salaries shall be comparable to the current salary levels.
Each proposer shall include specific wage scale, compensation increases, hours to be worked, and a complete description of the benefit package to be offered.

C. Leadership/Supervisory Training

Minimum: On-going training and development program for EMS managers and supervisors offered to those personnel at no cost. Managers should receive training equivalent to the American Ambulance Association's Ambulance Service Manager Certificate Program.

Proposers shall describe their plan for developing supervisory staff. If developed internally, describe the program content, instructional staff and time frame for implementation.

D. Diversity Awareness Training and Involvement Plan
Minimum: The proposer will describe its internal diversity awareness and involvement plan (including creating opportunities for minorities and economically disadvantaged workers) for implementation in the ***EMSA*** system.

Proposer shall provide copies of its affirmative action plan and compliance reports.

E. Health and Safety Programs
Minimum: The contractor shall propose and demonstrate that it will have multiple programs to enhance the safety and health of the work force and patients. These shall minimally include service-wide driver training programs, safety and risk management.

The proposer shall identify its intention to implement a driving program equivalent to the "Road Safety and SafeForce" driving program. Such a program, once selected, is considered a part of the essential assets of the operation, and therefore any equipment shall be part of the infrastructure provided for the contractors use by EMSA. The proposer should also present its policies and intentions regarding safety and health maintenance of its employees.

VI. First Responder Program Support
Minimum: Supply and equipment exchange program shall be established.
First response is a key element in every EMS system. Proposer will describe programs and policies that it will implement to support the first responder program.

VII. Fleet and Equipment Issues
A. Ambulance Maintenance Practices
Minimum: Each proposer shall completely describe its ambulance maintenance program.

B. Equipment Maintenance Practices
Minimum: The proposer shall completely describe its EMS equipment maintenance program.

VIII. Organization Experience and Key Personnel
A. Experience Providing Similar Services
Minimum: The proposer shall have experience in providing services in a comparable community.

Each proposer shall describe the communities, services and systems for which services comparable to those requested in the RFP are currently being provided. Provide references that directly indicate satisfactory performance.

B. On-site Personnel
Minimum: Proposer will provide resumes of all key management and middle management personnel which will be working on-site in the ***EMSA*** system. These

resumes should include, but are not limited to, the control center supervisor(s), fleet manager(s), production manger(s), and risk manger(s).

C. Off-site Personnel to Support Operations
Minimum: Proposer will identify and provide resumes or other information regarding personnel who will support operations, but will not reside on-site.

IX. Administrative

A. Provision of Insurance
Minimum: Provider shall evidence ability to meet all requirements described in the RFP.

B. Method of providing performance security
Minimum: Each proposer shall describe the method by which it will provide the required performance security.

D. Evaluation of Proposals

Proposals will be evaluated by the Selection Committee, which will include the following nine (9) members:

1. Two members of the Board of Trustees of ***EMSA*** from each Division;
2. One member each from the City Councils of Oklahoma City and Tulsa;
3. One individual experienced in EMS operations;
4. Two physicians chosen by and representing the Medical Control Board, one of which may be the Medical Director.

Neither ***EMSA*** staff nor legal advisors shall serve as members of the Selection Committee, but may be asked to provide technical support for the committee. Investigations of proposers' submissions and services may be conducted as deemed necessary by ***EMSA***. Such investigation could include a site visit should one be desired.

Proposals will be evaluated as follows:

1. Compliance with RPP – Proposals determined to be non-compliant with the RFP will be eliminated. Compliance means that the proposal is submitted by a bidder that has been qualified to submit a bid through the credentialing process, the proposal deposit in the amount and type specified has been received, the mandatory table of contents has been followed, order and numbering conventions are consistent with the required table of contents, programs and offerings described in the proposal meet the prescribed minimum standards, and complete pricing information is submitted in the format stipulated in the RFP.
2. Review of Qualifications for Providing Transport Service – Each proposer's qualifications for providing the ALS transport service will be reviewed by the Selection Committee. Each proposer will have the opportunity to make an oral presentation to the Selection Committee that is no more than one hour in length, with a 30-minute question and answer period following. Presentations will be conducted in the ***EMSA*** administrative offices in Tulsa, Oklahoma at a time and date prescribed by the committee. The order of the presenters will be randomly determined.

3. Award of Points for Qualifications to Provide Transport Service – Scoring will be based on a point system with points allocated to each category in the required outline format of the proposal. Each proposal shall be separately and independently scored by each Selection Committee member as follows:
    a. *Compare*. Each committee member shall individually compare submissions relating to a single category (e.g., Control Center Operations – Qualifications of Personnel).
    b. *Identify the strongest submission and assign maximum points*. On the basis of that comparison, each committee member shall identify the strongest submission in that category and shall award to that proposer the maximum points shown for that category.
    c. *Award relative points to other submissions*. Having assigned the maximum possible points to the strongest submission, each individual committee member shall then award points to the other proposals in that category, consistent with such member's assessment of the relative strengths of the competing proposals, on that category only. For example, if the maximum number of points available in a category is 10, the proposal judged the best will be awarded 10 points. The second best will be awarded less than 10 points; the third best will be awarded fewer points than the second best, and so on.
    d. *Repeat process for all criteria*. Each individual committee member shall then repeat steps a. – c. until scores have been assigned for all categories shown on the scoring sheets.
    e. *Tabulate scores*. The EMSA CFO and an outside accounting firm will tabulate the points.
4. Award of Points for Pricing for ALS Transport – Pricing for ALS transport will be evaluated by the EMSA CFO and an outside accounting firm and a total cost of each proposal for the five-year period will be presented to the Selection Committee. The proposer judged to have the lowest price will be awarded 200 points. Points for the remaining proposals will be awarded based on the inverse ratio of each proposer's price to the best price. For example, if proposer A's price is 20% higher than the best price, proposer A will be awarded 80% of the maximum number of points. Each proposer's point award will then be multiplied by nine.
5. Overall Compilation of Points for ALS Transport–The total points for proposals to provide ALS transport will consist of a maximum of 2,700 points for qualifications to provide ALS transport services (300 times 9 selection committee members) and 1,800 for price (200 times 9), for a grand total of 4,500 possible points. The proposal with the highest point total will be judged the best.
   Recommendation – The Selection Committee recommend to the ***EMSA*** Board of Trustees which proposal best meets the requirements of the RFP and the ***EMSA*** system.

An example tally sheet is included as Attachment R.

E. Scoring Criteria

It is ***EMSA's*** specific intent that the clinical and operational quality of service be the primary factor in this procurement. Therefore, ***EMSA***'s scoring methodology includes the opportunity for points to be awarded to those proposers whose service quality is independently judged on an objective basis to be clearly superior.

ITEM		POINTS	
I.	Introduction		
	A. Description of the Proposed Organizational Structure		0
II.	Clinical Performance		
	A. Suggested Medical Protocols		05
	B. Clinical Credentials of Field Personnel		10
	C. Financial Reserve for Clinical Upgrades		10
	D. Quality Improvement Processes		10
	E. In-service Training	10	
	F. Employee Recruitment, Screening and Orientation	10	
	G. Preceptor Qualifications/Status		05
	H. Internal Staff Support for Medical Director	05	
			65
III.	Community Service/Education Programs	**25**	
IV.	Control Center Operations		
	A. Qualifications of Personnel	10	
	B. In-service Training	10	
	C. Employee Recruitment, Screening and Orientation	10	
	D. Methods for Fine Tuning Deployment Plans	20	
			50
V.	Human Resources		
	A. Treatment of Incumbent Workers		10
	B. Compensation and Benefits	10	
	C. Leadership/Supervisory Training		10
	D. Diversity Awareness Training and Involvement Plan	10	
	E. Health and Safety Programs	10	
			50
VI.	First Responder Program Support	**25**	
VII.	Fleet and Equipment Issues		
	A. Ambulance Maintenance Practices	20	
	B. Equipment Maintenance Practices	5	
			25
VIII.	Organization Experience and Key Personnel		
	A. Experience Providing Similar Services		20
	B. On-site Personnel		30
	C. Off-site Personnel to Support Operations		10
			50

IX.	Administrative		
	A. Provision of Insurance		0
	B. Method of Providing Performance Security	0	
	Total Quality Points		300
	Pricing Information		200
	TOTAL POINTS		500

Pricing

A. Overview

EMSA reserves the right to award a contract for ALS transport
During the term of the contract, it is possible that Medicare may change its payment methodology to allow payment for an ambulance response and treatment without transport. If such event occurs (and assuming appropriate medical protocols are developed), ***EMSA*** will meet with the contractor to ensure that the collective interests and incentives of ***EMSA*** and the contractor are properly aligned regarding reimbursement to the contractor for such services.

B. Base Price

EMSA has determined that the contractor shall be paid on a per transport basis

C. Evaluation

Points for pricing will be awarded based on the Base Price as described in the "Evaluation of Proposals" section of this RFP. However, all other pricing information will be reviewed and evaluated, and proposals that do not give serious consideration to the alternatives will be considered non-compliant. For example, in each alternative that encompasses a Priority 1 response time of eleven (11) minutes and fifty-nine (59) seconds, ***EMSA*** expects that prices will be considerably lower than prices based on an eight (8) minute and fifty-nine (59) second response time.

Pricing Sheets have been added as Attachment T to this request for proposal.