2018 High Performance System Report

An Analysis of EMS System Design and Performance

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PREFACE

The Academy of International Mobile Healthcare Integration (AIMHI), formerly the Coalition of Advanced Emergency Medical Systems (CAEMS), is a professional association of North America's preeminent emergency healthcare providers. Member organizations are high-performance, high value systems that employ clinical, operational and financial practices specifically designed to maximize clinical proficiency, operational effectiveness and economic efficiency.

The AIMHI benchmarking studies perform a fundamental service to EMS by providing tools through which we can continue to learn about the strengths and weaknesses of today's emergency care system, ensure its progress and growth, and work to expand the reputation and efficiency of EMS nationally and internationally. The 2018 study is the latest addition to the body of knowledge required for effective service delivery and improvement.

The first study was published in 1998 at the request of the Metropolitan Ambulance Services Trust (MAST) and the City of Kansas City, Missouri. AIMHI members conducted subsequent studies in 2000, 2002, 2004, 2005, 2006, 2009, 2014 and now again in 2018. The AIMHI benchmarking studies have become valuable evidenced-based studies to share clinical, response-time and economic data across EMS systems serving diverse geographic and demographic communities. It is our ultimate goal to provide AIMHI members and the EMS community with tools, data, and outcomes to continue research that demonstrates the value of EMS as the initial point of entry to, and the safety net of the healthcare continuum.

The Academy of International Mobile Healthcare Integration

METHODOLOGY

Benchmarking is the art and science of comparing a system or system component with the best-measured performance or performance criteria. Accurate benchmarking requires standardized definitions, reliable data, accurate reporting, and a common measurement methodology. High Performance/High Value emergency medical systems (HP/HVEMS) share common characteristics, including publicly reported fractile response-time measurement, medical dispatch triage, and exclusivity of the market for both emergency and non-emergency transports. This establishes a commonality of components that allows for basic benchmarking.[1]

Each edition of the benchmarking survey has been incrementally modified to capture the historical elements and remain current with prevailing research and best practices. The 2018 benchmarking survey is a continuation of past practice and has included additional survey questions on timely topics such as Mobile Integrated Healthcare (MIH).

The benchmarking projects receive considerable support from the AIMHI members, and there is a high level of response to the survey instrument. A list of the 2018 participants is presented as Table 1.

Table 1: 2018 Participating Systems

Reporting Participant	Primary Service Area
Emergency Health Systems (EHS) Nova Scotia	Halifax, Nova Scotia
Emergency Medical Services Authority (EMSA) – Eastern Division	Tulsa, Oklahoma
Emergency Medical Services Authority (EMSA) – Western Division	Oklahoma City, Oklahoma
Mecklenburg EMS Agency	Charlotte, North Carolina
Medic EMS	Davenport, Iowa
MedStar Mobile Healthcare	Fort Worth, Texas
Metro EMS (MEMS) – LRAA	Little Rock, Arkansas
Niagara EMS	Niagara-on-the-Lake, Ontario
Northwell Health Center for Emergency Medical Services	Syosset, New York
Pinellas County EMS Authority/SunStar Paramedics	Largo, Florida
Regional Emergency Medical Services Authority - REMSA	Reno, Nevada
Richmond Ambulance Authority	Richmond, Virginia
Three Rivers Ambulance Authority (TRAA)	Fort Wayne, Indiana

[1] Overton, J., & Stout, J. (2002). System design. In A.E. Kuehl (Ed.), *Prehospital systems and medical oversight* (3rd ed.). Dubuque, IA: Kendall Hunt Publishing.

Stout and Overton (2002) have suggested that high performance emergency medical service systems (HPEMS) share key design features that are rarely associated with less effective systems.[2] These features include the following:

- **Sole Provider**: Exclusive market rights to furnish emergency and non-emergency ambulance service are granted to a sole and often competitively selected provider.
- **Control Center Operations**: The ambulance provider has control over the dispatch center.
- **Accountability**: HPEMS systems have performance requirements that can result in financial penalties or replacement of the provider when the requirements are not met. HPEMS systems use and collect data regularly to meet these performance requirements, which has allowed for the ability to collect data for the AIMHI market studies.
- **Revenue Maximization**: HPEMS systems incorporate the business function into their operations, with the resulting understanding of the billing requirements and maximization of revenues from Medicare, Medicaid, and other third-party payers.
- **Flexible Production Strategy**: HPEMS systems employ a single fleet of ALS units capable of handling any type of service request, resulting in all patients receiving the highest level of care and higher productivity levels.
- **Dynamic Resource Management (DRM)**: HPEMS systems use the flexible deployment technique, DRM, to move ambulances in anticipation of where that ambulance will be needed.

HPEMS systems have evolved, becoming extremely effective and efficient in design and function, delivering high-quality service with economic efficiency. The HPEMS system design uses prioritized dispatch protocols and computer algorithms that predict the temporal and geographical demand for services. By matching supply and demand, the system produces efficient staffing patterns that provide for quicker responses during predicted periods of peak demand and lower cost during predicted periods of low demand. Regardless of the governance of the system, a key element is that all service providers are held directly accountable to the public. Each has mandated response-time performance that is reported to a public governing body. If mandated response times are not achieved, the results are fines or replacement of the service provider.

The most intricate HPEMS system design is the Public Utility Model (PUM). The design feature may include a performance-based contract established by a governmental agency for the actual provider of services being a private agency. Some of the PUMs have chosen to self-operate,

[2] Ibid.

with all personnel employed by the public authority. System oversight, ownership of infrastructure, and accounts receivable are the responsibility of the public authority, and it is the contractor's sole responsibility to focus its expertise on field operation. The design aligns the interest of the parties by creating an environment of clinical excellence, superior response-time performance, and cost effectiveness.

While the majority of the systems participating in the 2018 Benchmarking Survey are PUMs (nine of 13), there are several variations in system design. In addition to the nine PUMS, there is one non-profit, two government-based operations, and a health system that participated. All of the representative agencies have exclusive rights for service with the exception of Northwell Health Center for EMS. Descriptions of the various organizational structures of the participants are presented as Table 2.

Table 2: Organizational Structure of Participating Agencies

Reporting Participant	Org. Structure	Exclusivity
Emergency Health Systems - Nova Scotia	Public Utility Model	Exclusive
Emergency Medical Services Authority (EMSA) – Eastern Division	Public Utility Model	Exclusive
Emergency Medical Services Authority (EMSA) – Western Division	Public Utility Model	Exclusive
Mecklenburg EMS Agency	Government 3rd Service	Exclusive
Medic EMS	501 (c) 3	Exclusive
MedStar Mobile Healthcare	Public Utility Model	Exclusive
Metro EMS (MEMS) – LRAA	Public Utility Model	Exclusive
Niagara EMS	Government 3rd Service	Exclusive
Northwell Health Center for Emergency Medical Services	Hospital Based	Non-Exclusive
Pinellas County EMS Authority/SunStar Paramedics	Public Utility Model	Exclusive
Regional Emergency Medical Services Authority – REMSA	Public Utility Model	Exclusive
Richmond Ambulance Authority	Public Utility Model	Exclusive
Three Rivers Ambulance Authority (TRAA)	Public Utility Model	Exclusive

For purposes of brevity in the tables and charts that follow in the report, participant agency names have been shortened as noted in Table 3 below.

Table 3. Key to Shortened Agency Names

Reporting Participant	Shortened Name Used in Tables and Charts
Emergency Health Systems - Nova Scotia	EHS–Nova Scotia
Emergency Medical Services Authority (EMSA) – Eastern Division	EMSA- (East) Tulsa
Emergency Medical Services Authority (EMSA) – Western Division	EMSA- (West) OKC
Mecklenburg EMS Agency	Mecklenburg
Medic EMS	Medic EMS
MedStar Mobile Healthcare	MedStar
Metro EMS (MEMS) – LRAA	MEMS-LRAA
Niagara EMS	Niagara EMS
Northwell Health Center for Emergency Medical Services	Northwell EMS
Pinellas County EMS Authority/SunStar Paramedics	Pinellas/SunStar
Regional Emergency Medical Services Authority – REMSA	REMSA
Richmond Ambulance Authority	Richmond
Three Rivers Ambulance Authority – TRAA	TRAA

STUDY SCOPE

This analysis examines the characteristics of the 13 HPEMS systems that responded to the survey and allows for a comparison of those systems. To ensure consistency, the author calculated many of the standardized measures. However, all data is self-reported and provided by the agencies. While the completeness of the data required for each survey question was sufficient overall, idiosyncrasies in how data is collected, reported, and defined varied across data sets. Therefore, few data sets had all 13 agencies represented. Missing data was ignored and was not utilized to determine measures of central tendency or distribution. Also, starting with Table 4 and Figure 1, a comment is added under each table and figure noting that only the agencies that answered the survey question(s) are included in the relevant tables and figures. Where relevant, kilometers were converted to miles and Canadian dollars were converted to US dollars.[3]

Data will be presented in nine broad categories:

1. General Information
2. Response Time Performance
3. Clinical Performance
4. Quality Assurance
5. Fleet Standards
6. Human Resource Performance
7. Costs
8. Revenue
9. Mobile Integrated Healthcare

The construction of the survey was based on prior years' survey questions. *Fitch & Associates* collected survey responses, assisted in analyzing the available data, and assembled the relevant information into this report format.

In closing, AIMHI is committed to continuing the system performance analysis projects. More than ever, its members recognize that delivering high-quality patient care in a cost-effective manner and providing evidence of value is paramount if EMS is to be a leader in the transforming healthcare environment.

[3] OFX, San Francisco, CA, "Yearly Average Exchange Rate Data," www.ofx.com/en-us/forex-news/historical-exchange-rates/yearly-average-rates/, accessed February 15, 2019.

SECTION 1: GENERAL INFORMATION

The initial step in establishing comparability across systems is to examine characteristics and demographics. Information was gathered that encompassed the geographic size and population of the service area, the number of responses, and the number of transports. In addition, a description of whether the primary service area encompassed a single jurisdiction or multiple jurisdictions is provided. Data is provided in tabular and graphical formats for convenience of review.

Table 4: System Demographics

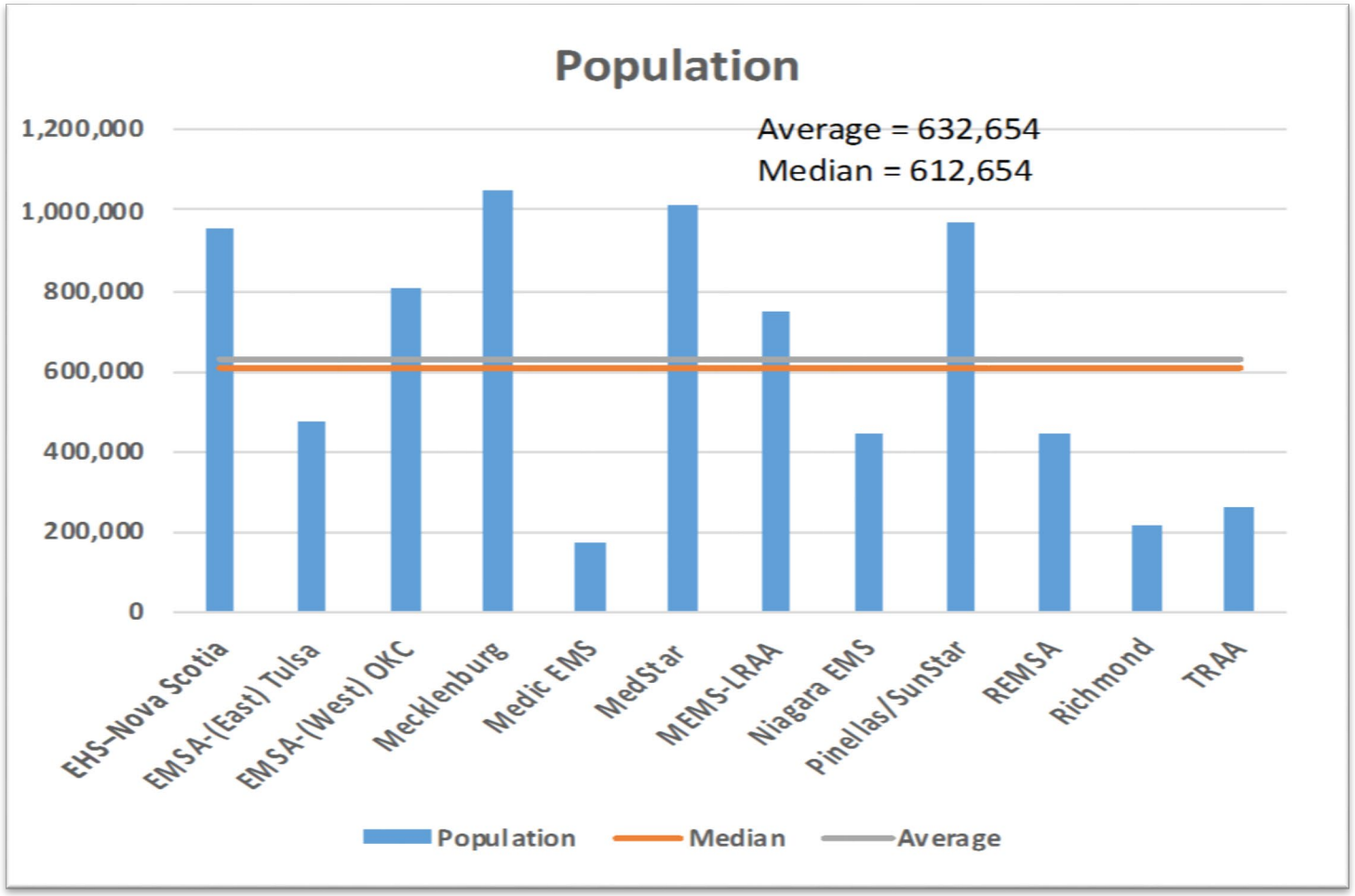
Reporting Participant	Primary Service Area	Single or Multiple Jurisdiction	Population	Square Miles	Density
EHS – Nova Scotia	Halifax, Nova Scotia	Single	957,600	21,340	45
EMSA – (East) Tulsa	Tulsa, Oklahoma	Multiple	474,613	260.53	1,822
EMSA – West) OKC	Oklahoma City, Oklahoma	Multiple	806,906	772	1,045
Mecklenburg	Charlotte, North Carolina	Multiple	1,054,835	546	1,932
Medic EMS	Davenport, Iowa	Multiple	175,000	406	431
MedStar	Fort Worth, Texas	Multiple	1,016,963	434	2,343
MEMS-LRAA	Little Rock, Arkansas	Multiple	750,000	2,200	341
Niagara EMS	Niagara-on-the-Lake, Ontario	Multiple	450,000	714	630
Northwell EMS	Syosset, New York	Multiple	11,000,000	1,498	7,343
Pinellas/SunStar	Largo, Florida	Multiple	970,637	608	1,596
REMSA	Reno, Nevada	Multiple	450,000	-	-
Richmond	Richmond, Virginia	Single	220,289	62	3,553
TRAA	Fort Wayne, Indiana	Single	265,000	110	2,409

Answers provided in square kilometers have been converted to square miles.

Only agencies that answered the survey question(s) are included in the above table.

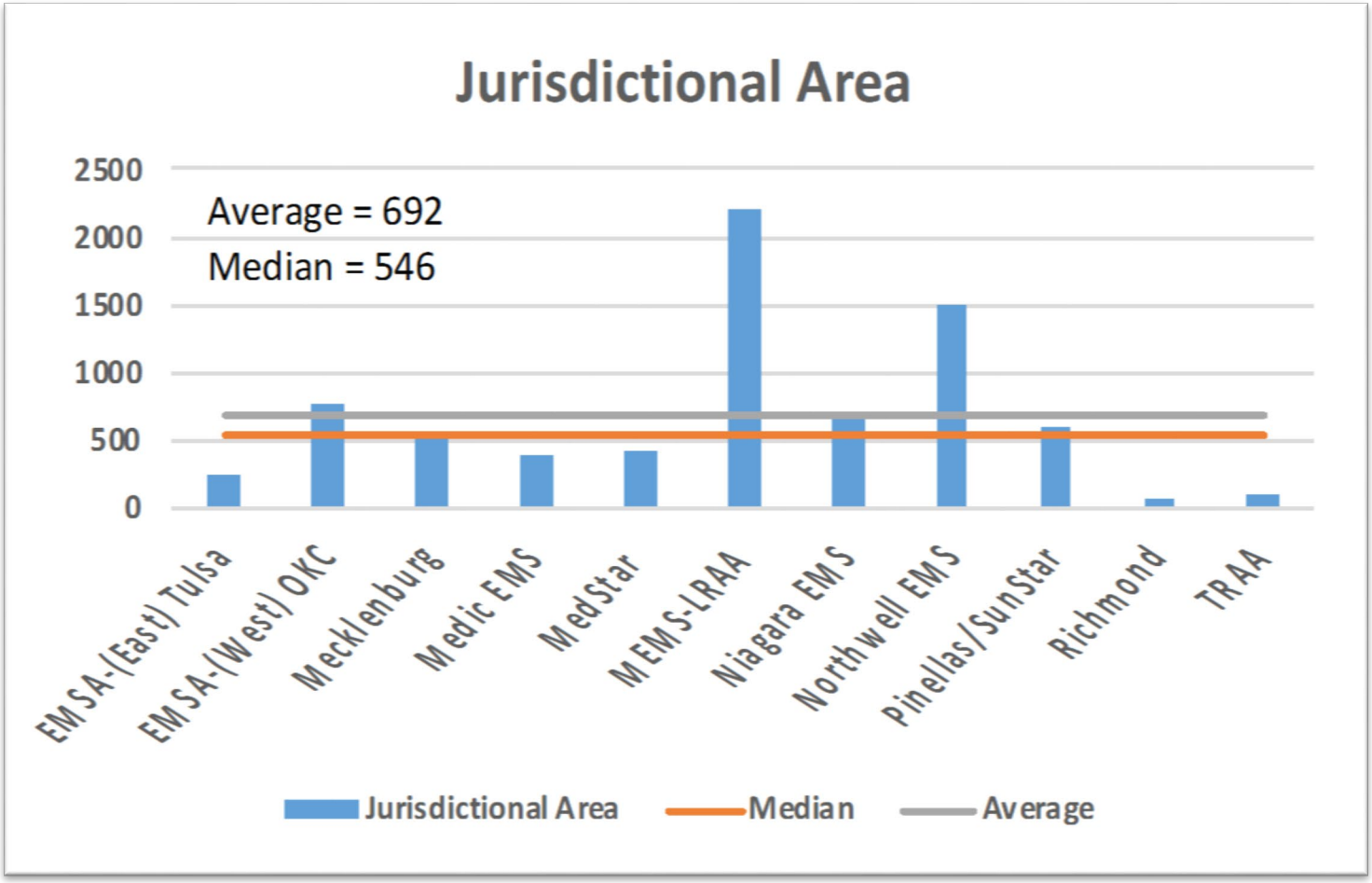
The following three figures provide graphic illustrations for the population, geographic area in square miles, and the per square mile population density covered by each jurisdiction.

Figure 1: Population by Jurisdiction



Northwell EMS service area population is 11 million and as significant outlier is not included in the figure above.
Only agencies that answered the survey question(s) are included in the above figure.

Figure 2: Geographic Area by Jurisdiction

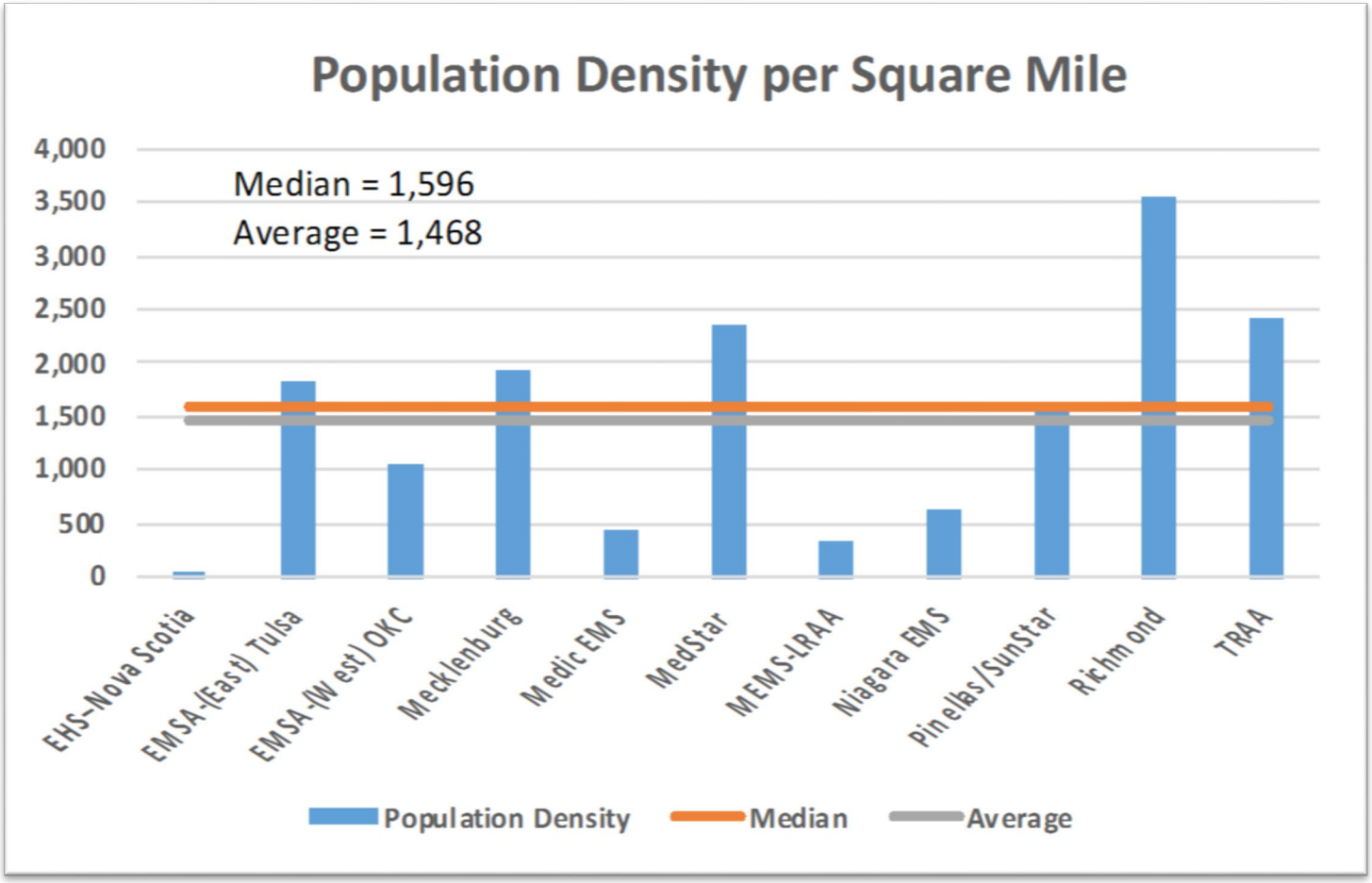


Answers provided in square kilometers have been converted to square miles.

EHS-Nova Scotia is not included in the figure above as its size of 21,430 square miles is a significant outlier.

Only agencies that answered the survey question(s) are included in the above figure.

Figure 3: Population Density



Answers provided in square kilometers have been converted to square miles.
Northwell EMS service area population is 11 million and as significant outlier is not included in the figure above.
Only agencies that answered the survey question(s) are included in the above figure.

Data was also collected regarding the response and patient transportation experiences. Elements of emergency and non-emergency responses and transports are provided, as well as several standardized measures, such as responses and transports per capita. Response and transport characteristics are summarized and presented beginning with Table 5 and followed by graphical representations.

The survey tool definitions for response characteristics used in the related tables and figures are as follows:

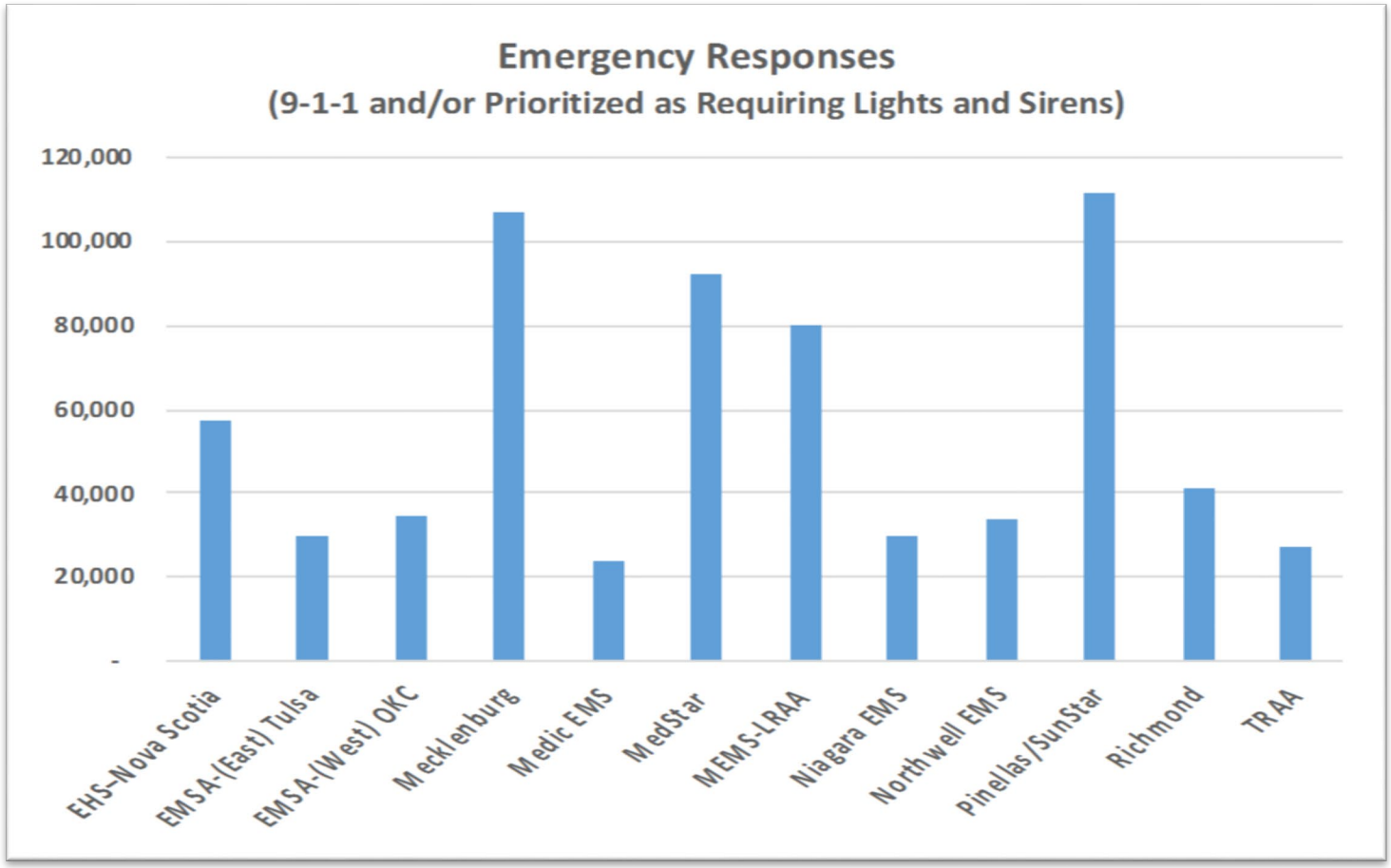
- **Emergency responses**: 9-1-1 and/or prioritized as requiring lights and siren responses
- **Non-emergency responses**: 9-1-1 and/or prioritized as not requiring lights and siren responses
- **Transfers**: 7-digit phone call transfers scheduled or unscheduled

Table 5: Response Characteristics

Agency Name	Emergency Responses	Non-Emergent Responses	Transfer Responses	All Responses
EHS – Nova Scotia	57,090	55,360	60,550	173,000
EMSA – (East) Tulsa	29,866	62,569	11,592	104,027
EMSA – (West) OKC	34,694	62,062	9,877	106,633
Mecklenburg	107,060	17,413	21,792	146,265
Medic EMS	23,999	959	7,921	32,879
MedStar	92,088	32,623	13,760	138,471
MEMS-LRAA	80,224	3,250	15,503	98,977
Niagara EMS	29,571	39,032	2,923	71,526
Northwell EMS	33,850	11,611	70,921	116,382
Pinellas/SunStar	111,544	77,870	54,726	244,140
Richmond	41,469	12,551	14,704	68,724
TRAA	27,415	6,418	4,218	38,051

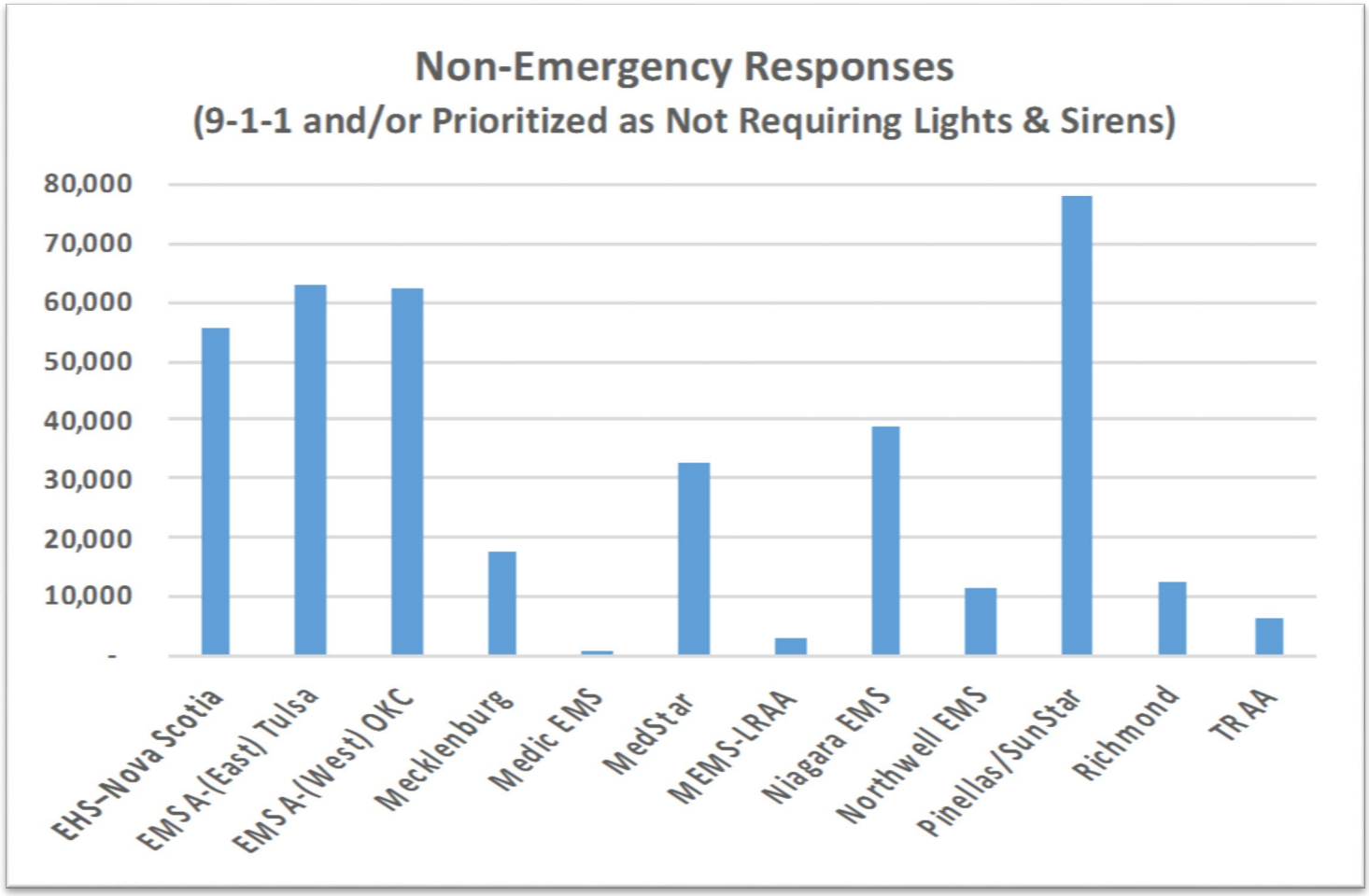
Only agencies that answered the survey question(s) are included in the above table.

Figure 4: Emergency Responses



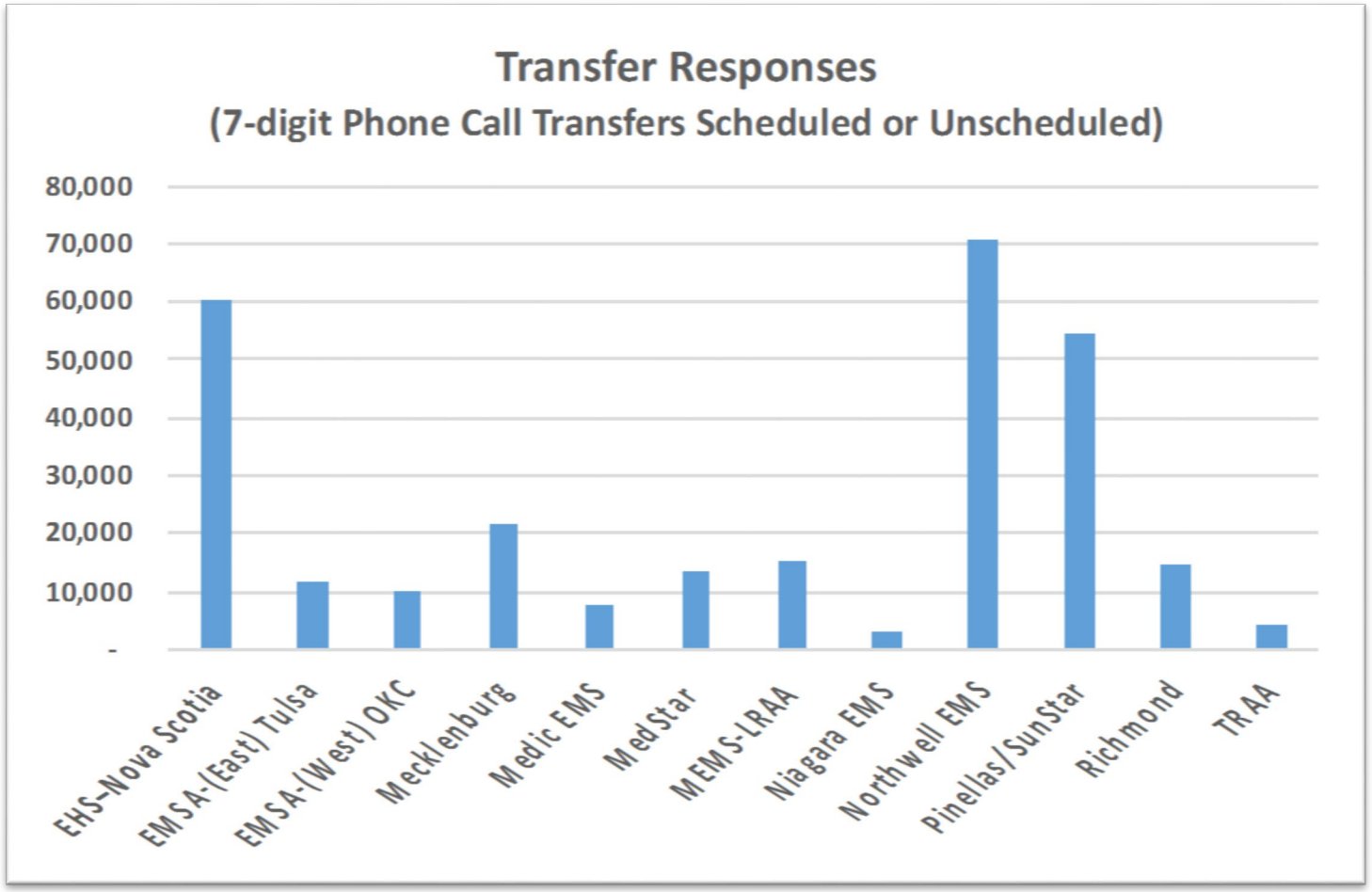
Only agencies that answered the survey question(s) are included in the above figure.

Figure 5. Non-Emergency Responses



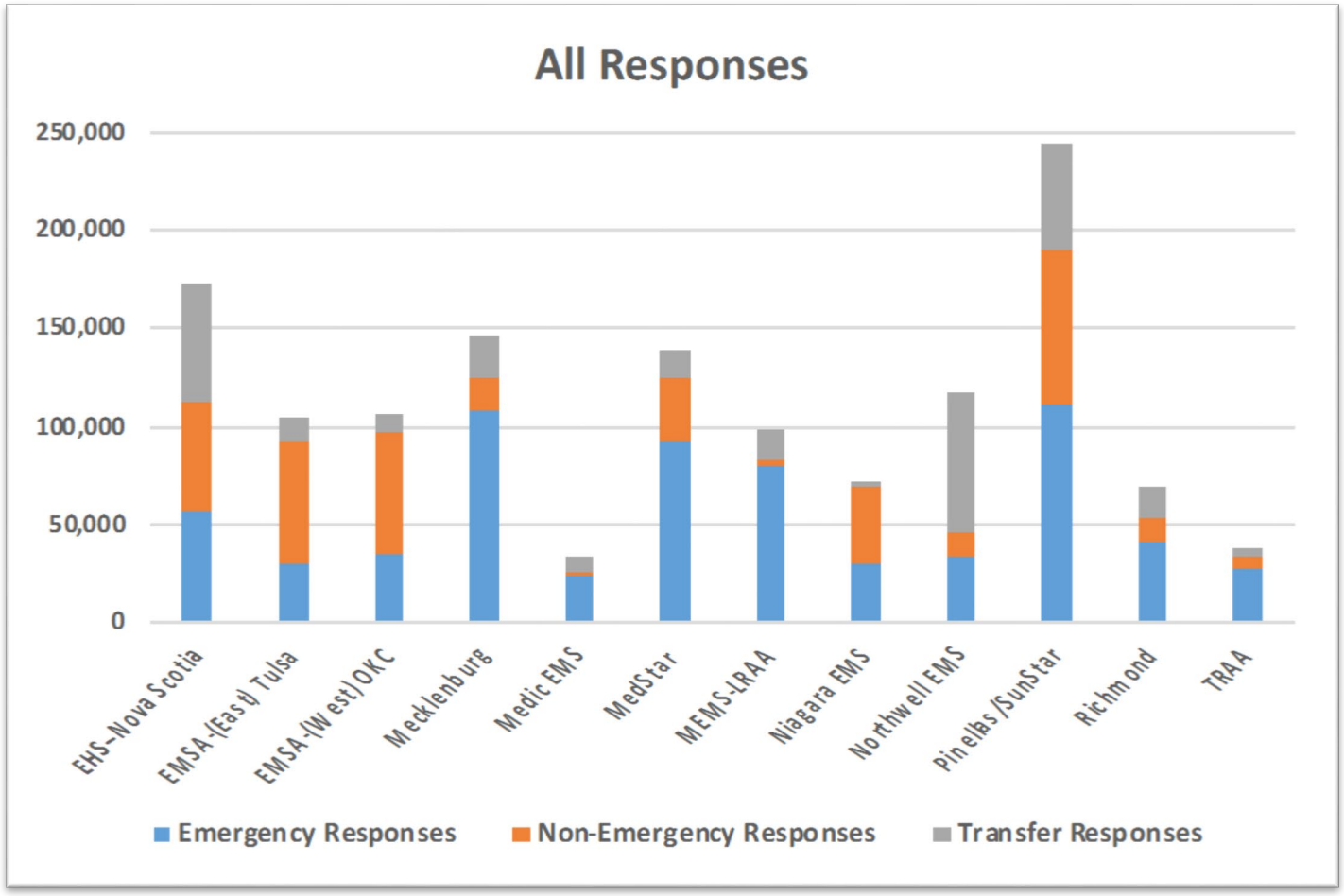
Only agencies that answered the survey question(s) are included in the above figure.

Figure 6. Transfer Responses



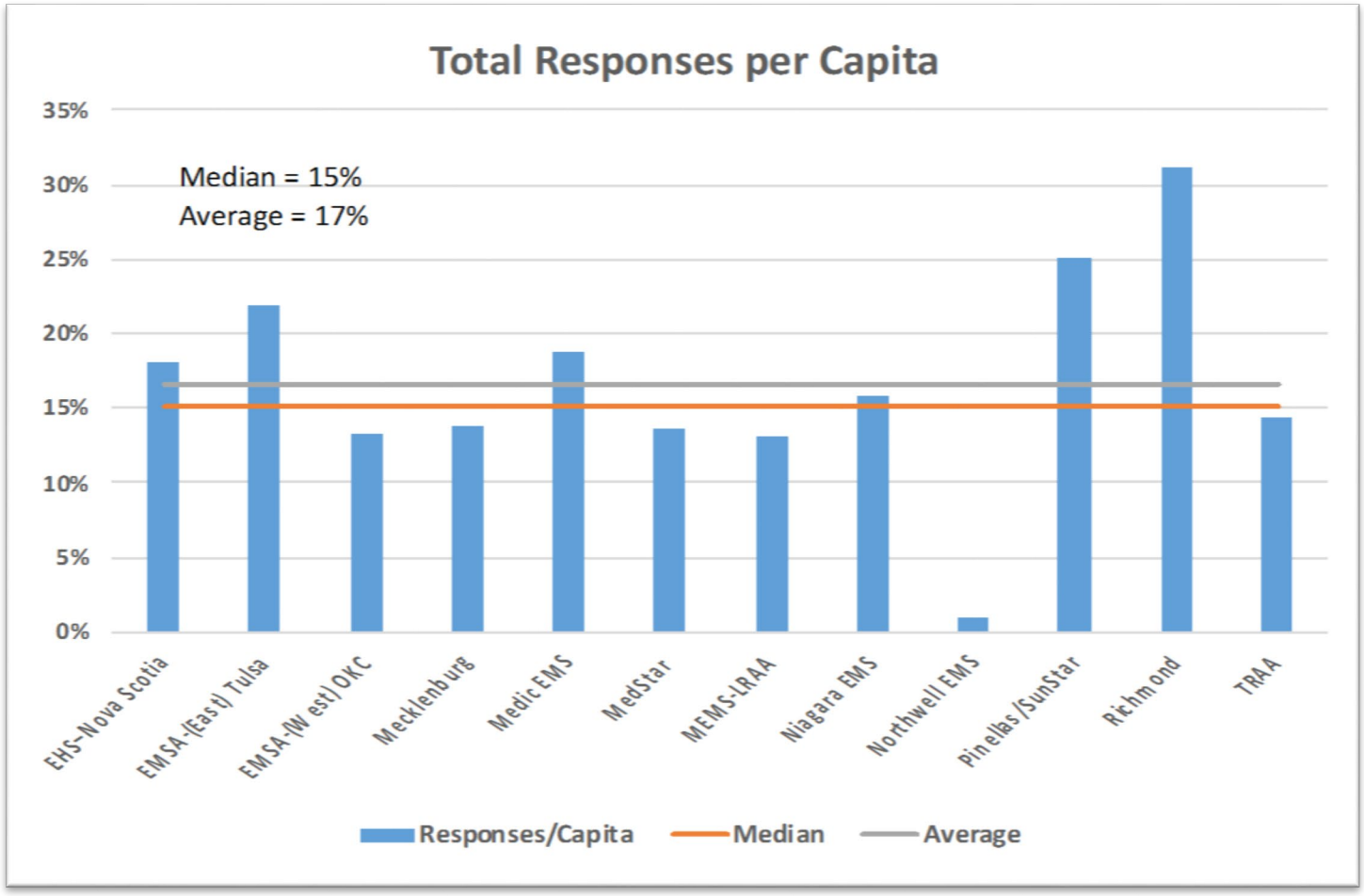
Only agencies that answered the survey question(s) are included in the above figure.

Figure 7. All Responses by Type



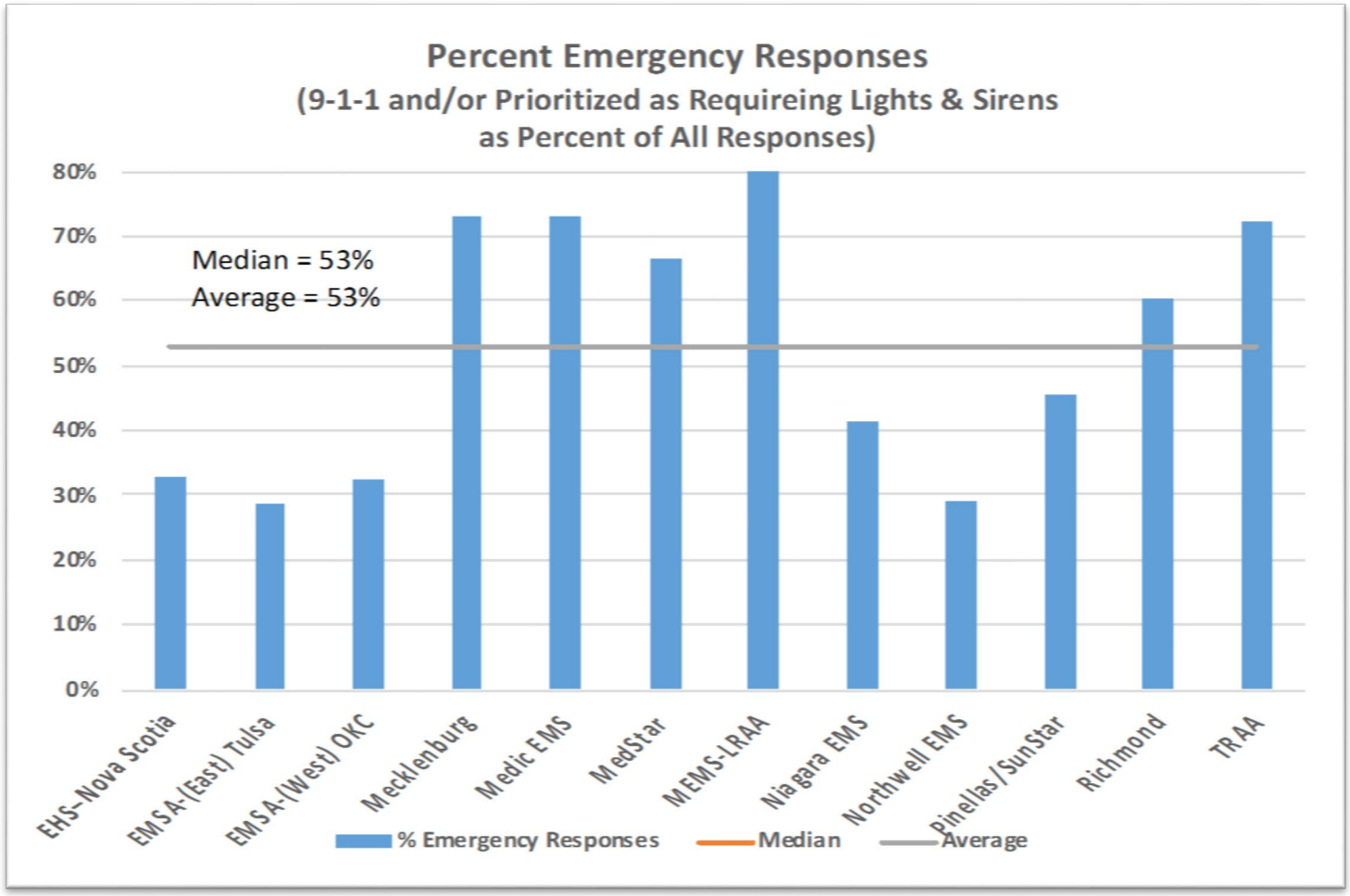
Only agencies that answered the survey question(s) are included in the above figure.

Figure 8: Responses per Capita



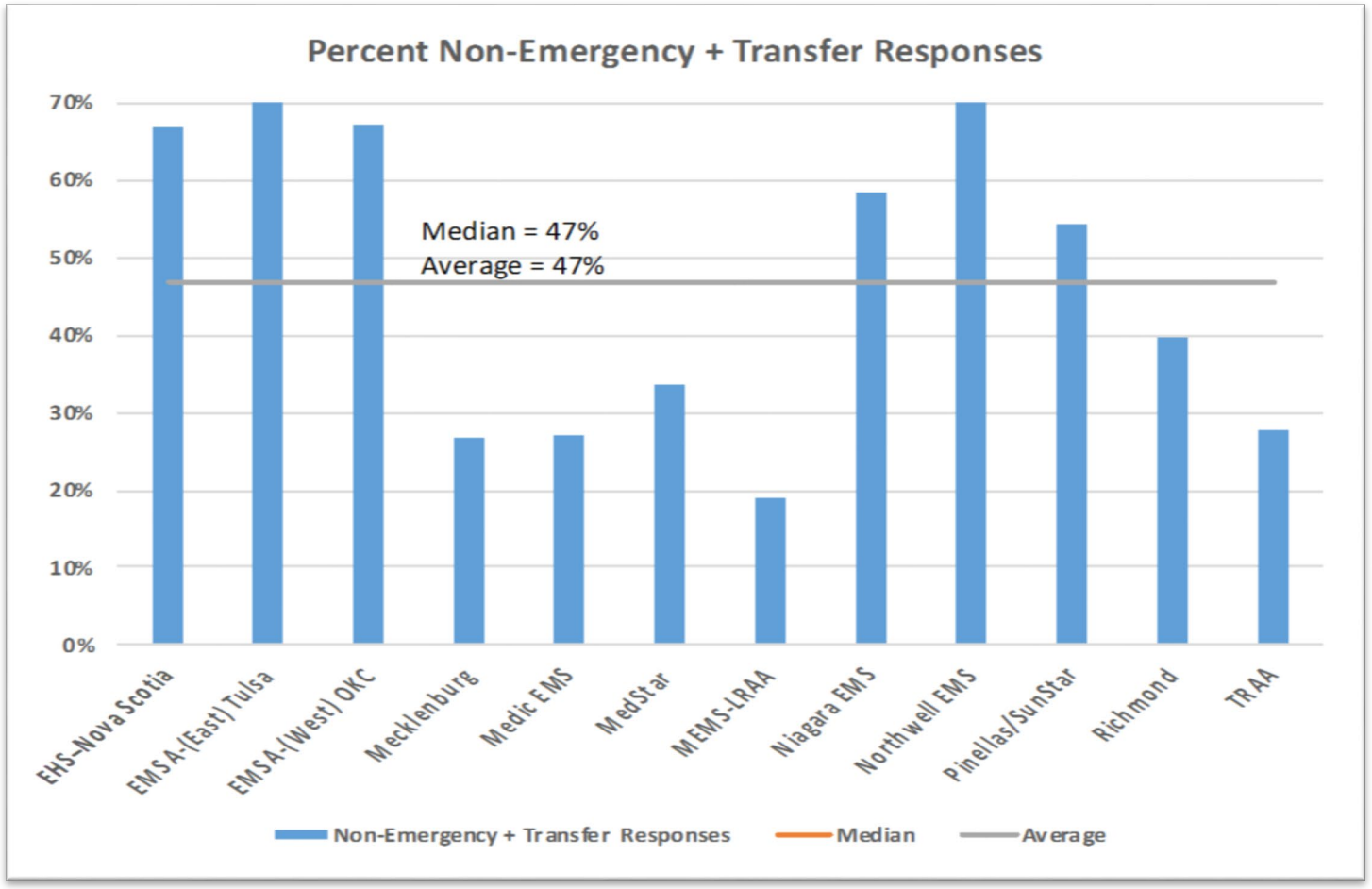
Only agencies that answered the survey question(s) are included in the above figure.

Figure 9. Percent Emergency Responses



Only agencies that answered the survey question(s) are included in the above figure.

Figure 10: Percent Non-Emergency + Transfer Responses



Only agencies that answered the survey question(s) are included in the above figure.

The survey tool definitions for transport characteristics used in the related tables and figures are as follows:

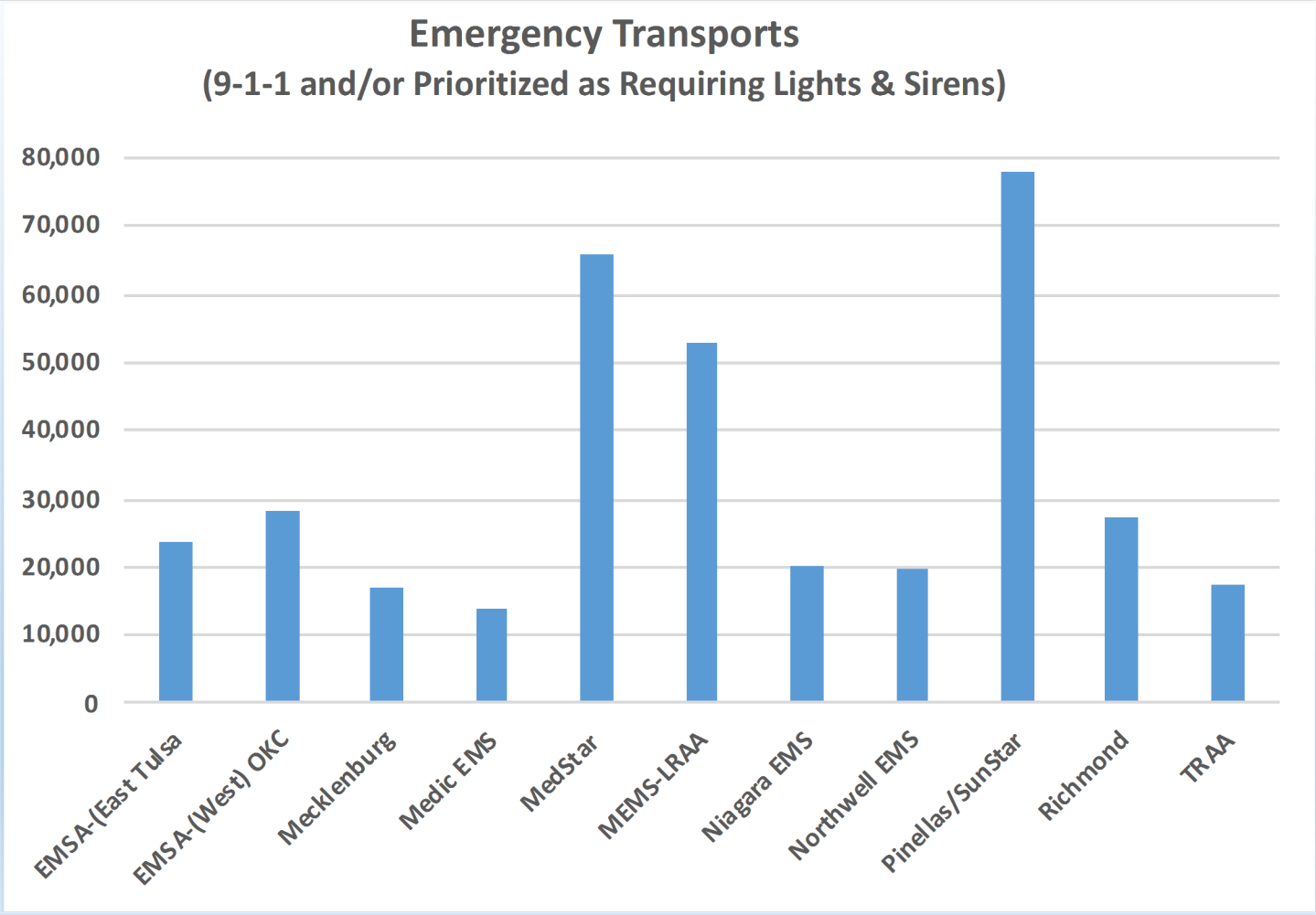
- **Emergency transports**: 9-1-1 and/or prioritized as requiring lights and siren responses
- **Non-emergency transports**: 9-1-1 and/or prioritized as not requiring lights and siren responses
- **Transfers-Transports**: 7-digit phone call transfers scheduled or unscheduled

Table 6: Transport Characteristics

Agency Name	Emergency Transports	Non-Emergency Transports	Transfer Transports	All Transports
EMSA –(East) Tulsa	23,865	41,132	12,283	77,280
EMSA – (West) OKC	28,118	43,209	9,682	81,009
Mecklenburg	16,841	74,098	21,331	112,270
Medic EMS	14,068	2,176	7,584	23,828
MedStar	65,761	22,149	13,168	101,078
MEMS-LRAA	52,947	2,806	15,150	70,903
Niagara EMS	20,076	21,324	2,870	44,270
Northwell EMS	19,568	6,602	24,396	50,566
Pinellas/SunStar	78,000	52,235	53,114	183,349
Richmond	27,219	9,111	14,199	50,529
TRAA	17,427	3,574	6,732	27,733

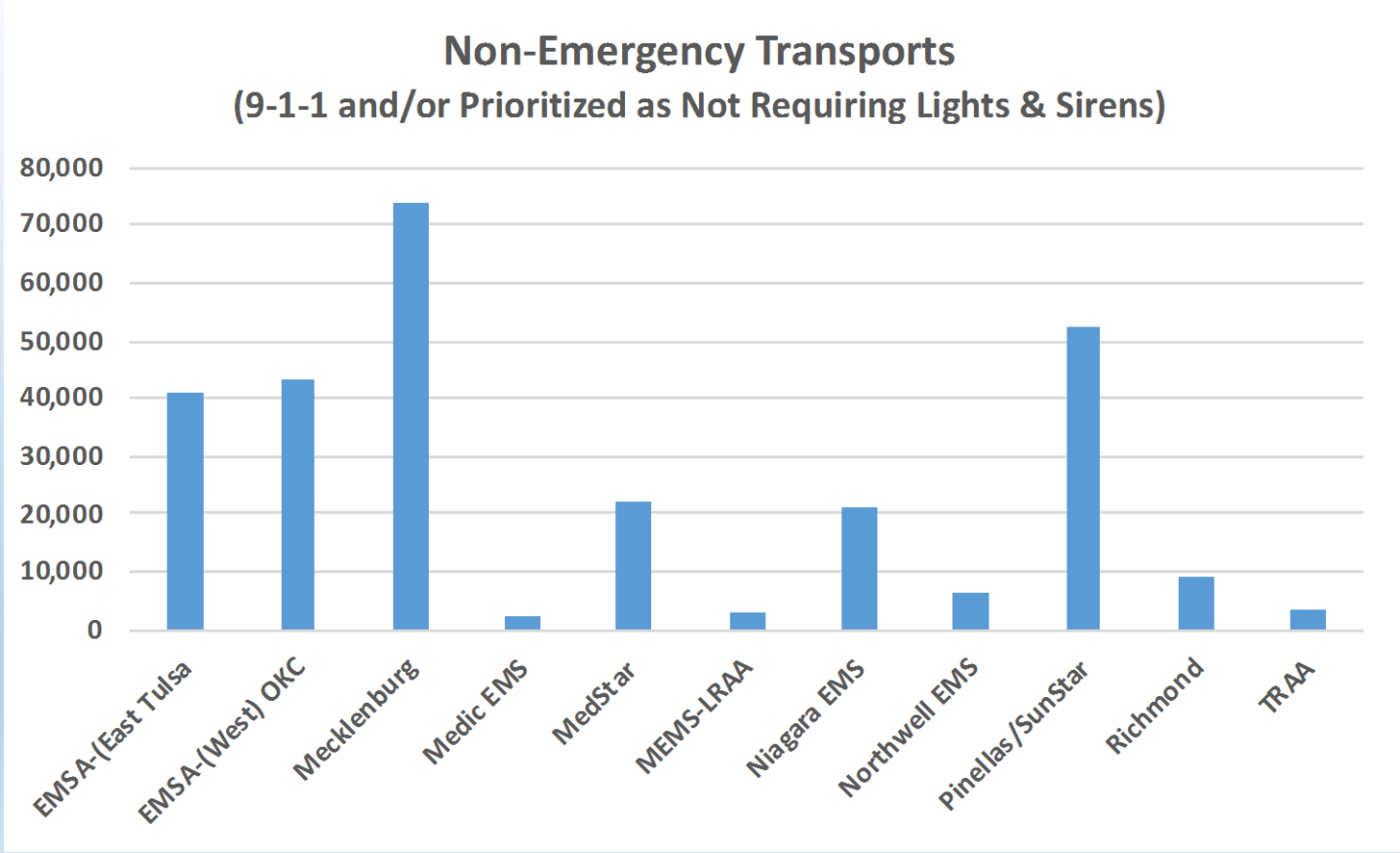
Only agencies that answered the survey question(s) are included in the above table.

Figure 11. Emergency Transports



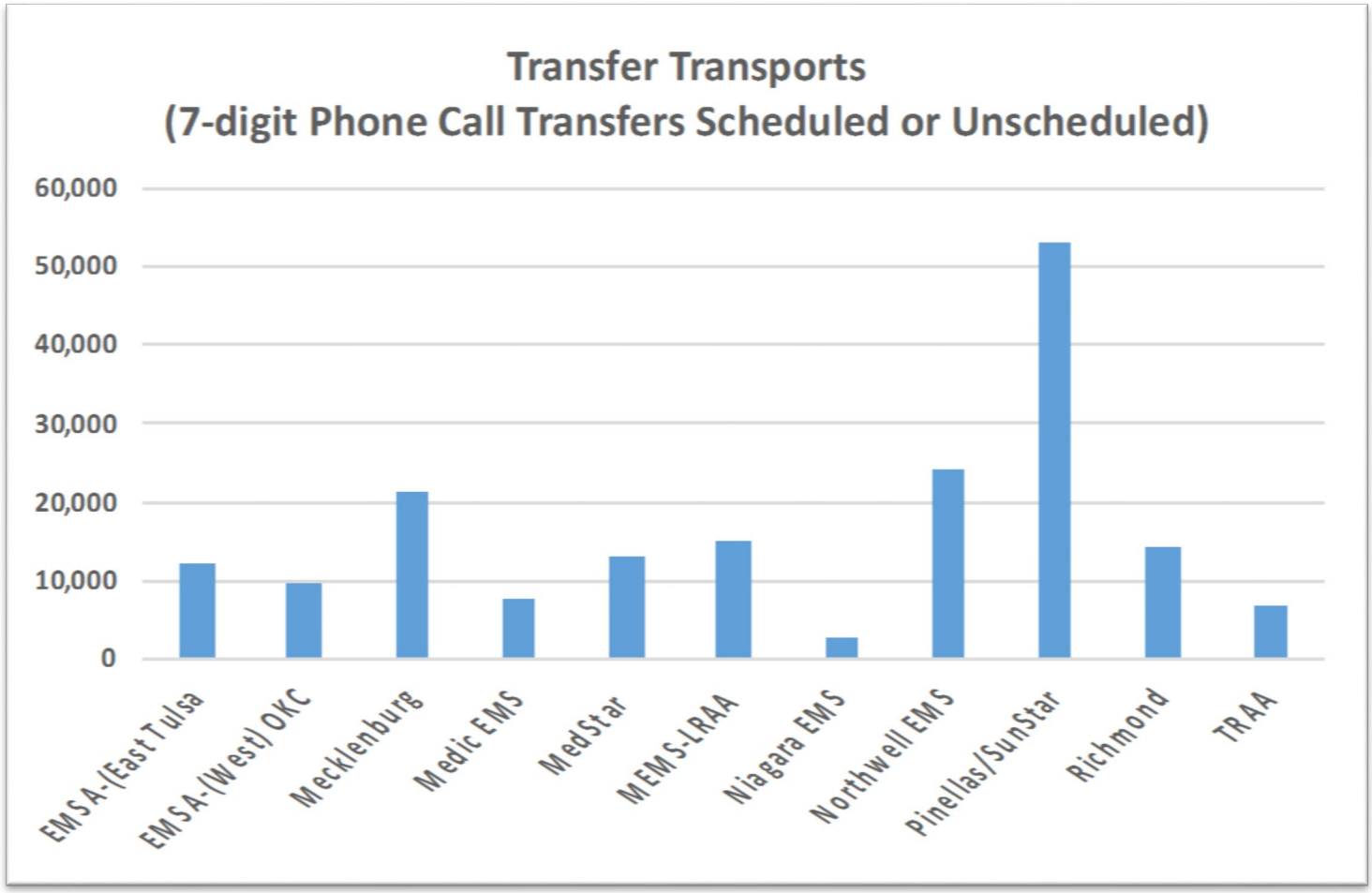
Only agencies that answered the survey question(s) are included in the above figure.

Figure 12. Non-Emergency Transports



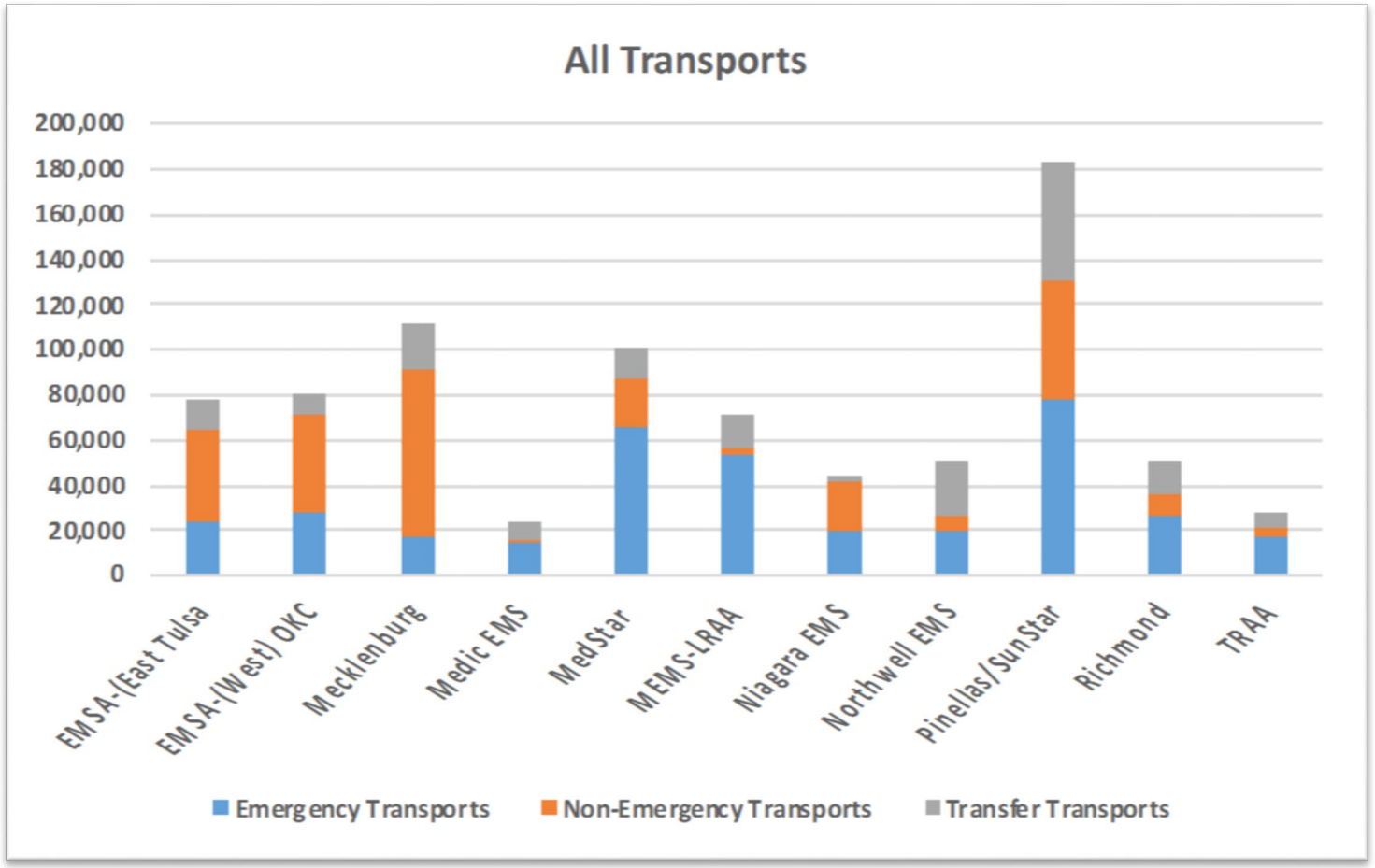
Only agencies that answered the survey question(s) are included in the above figure.

Figure 13. Transfer Transports



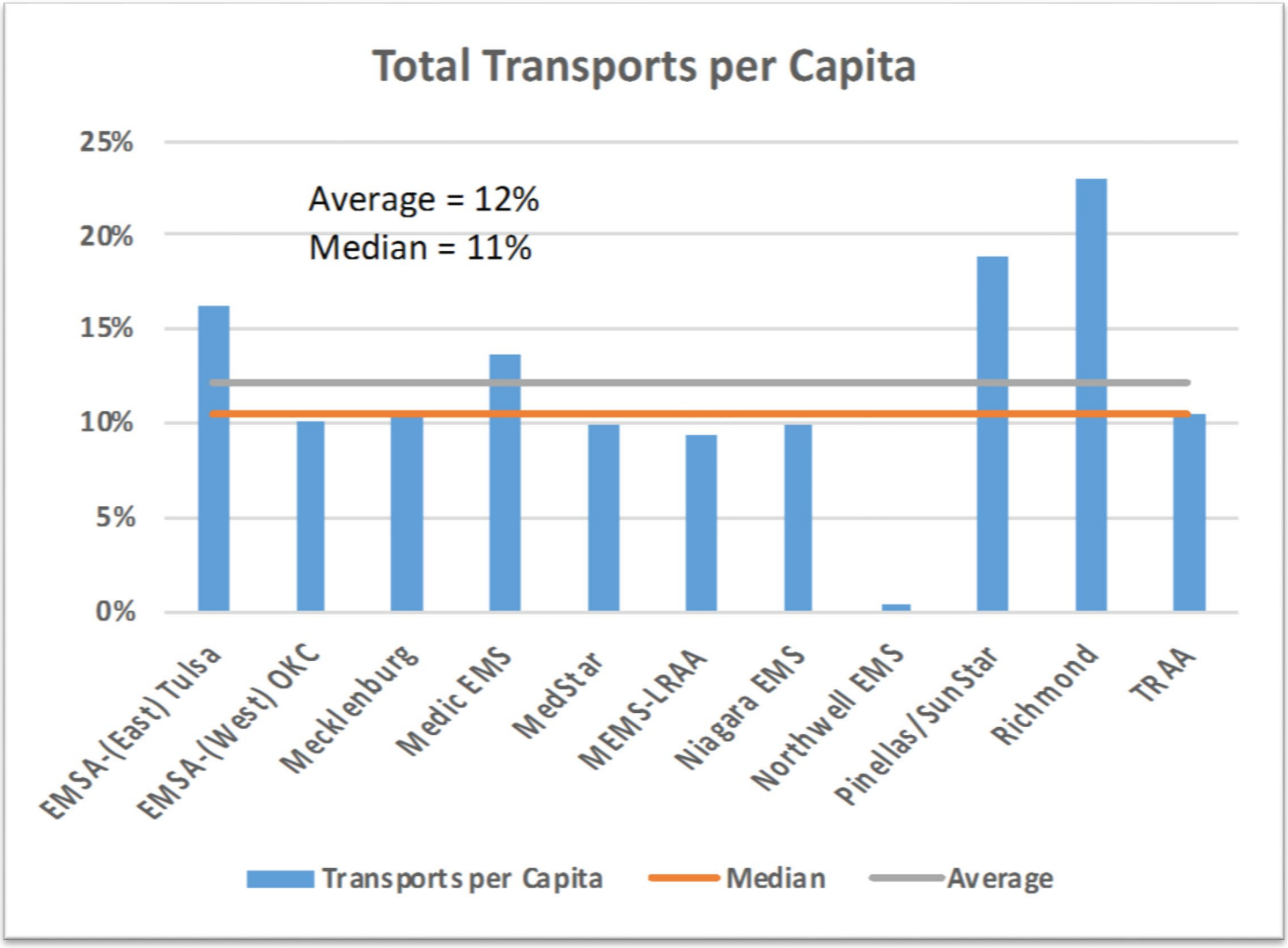
Only agencies that answered the survey question(s) are included in the above figure.

Figure 14: All Transports



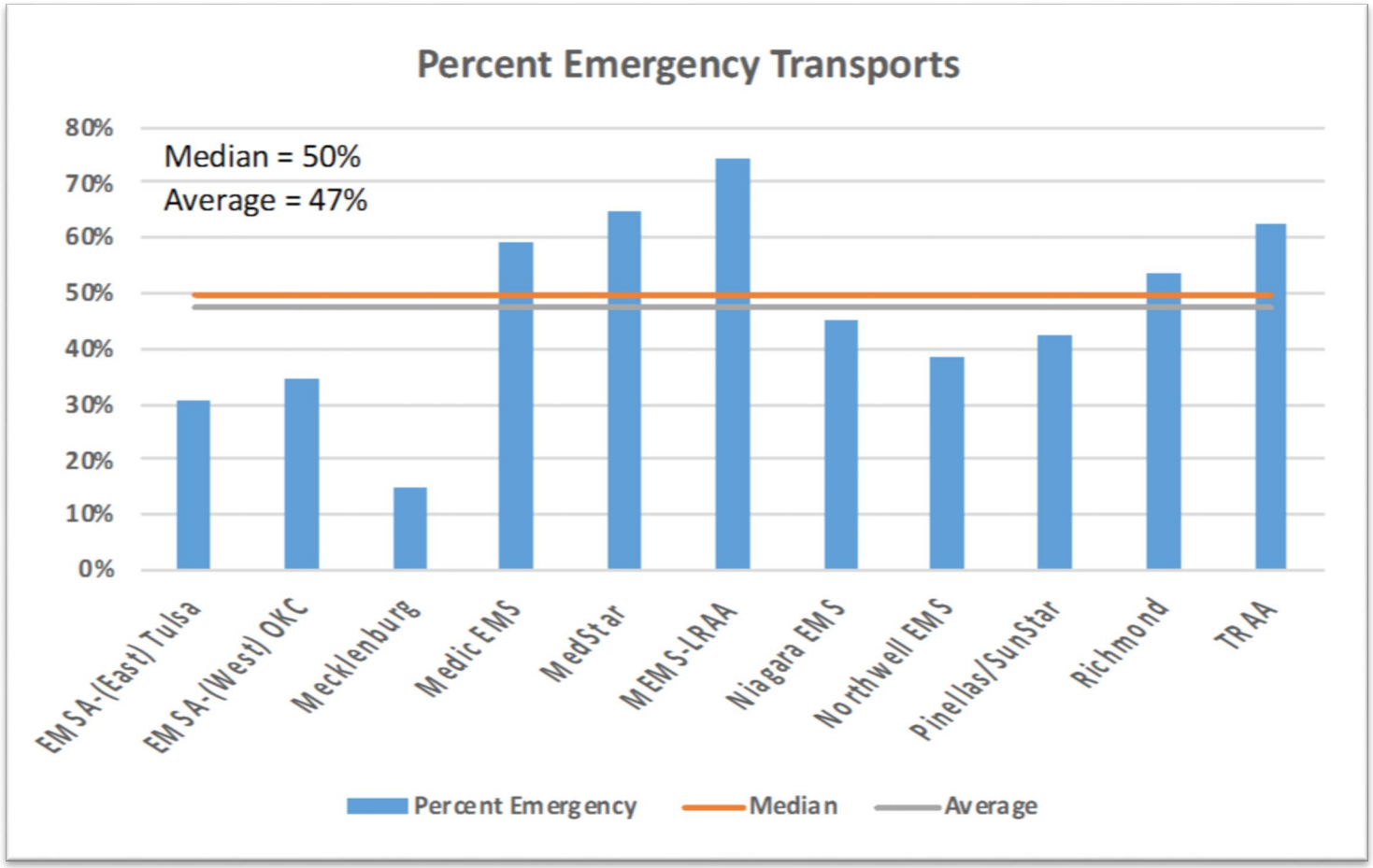
Only agencies that answered the survey question(s) are included in the above figure.

Figure 15: Transports per Capita



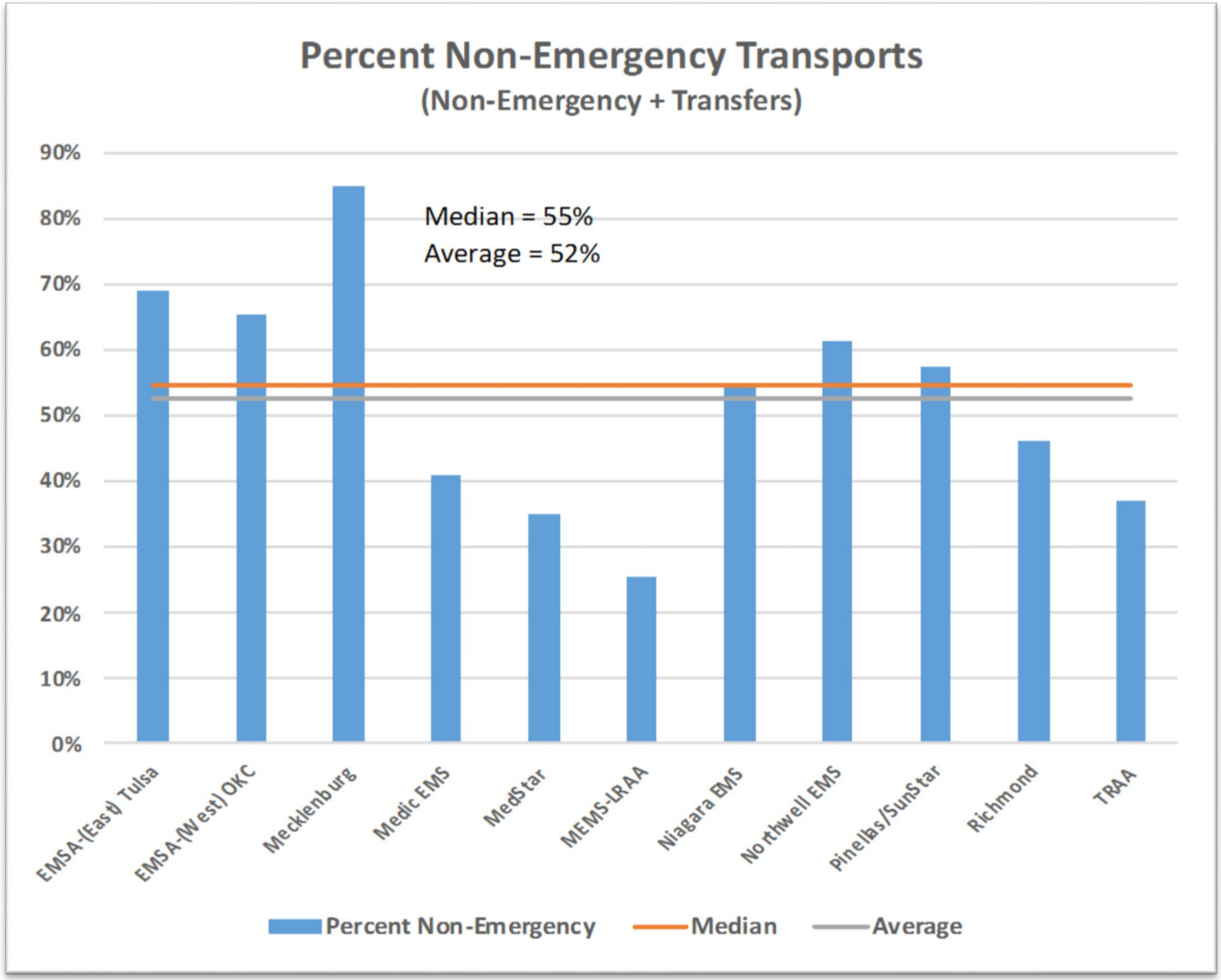
Only agencies that answered the survey question(s) are included in the above figure.

Figure 16. Percentage Emergency Transports



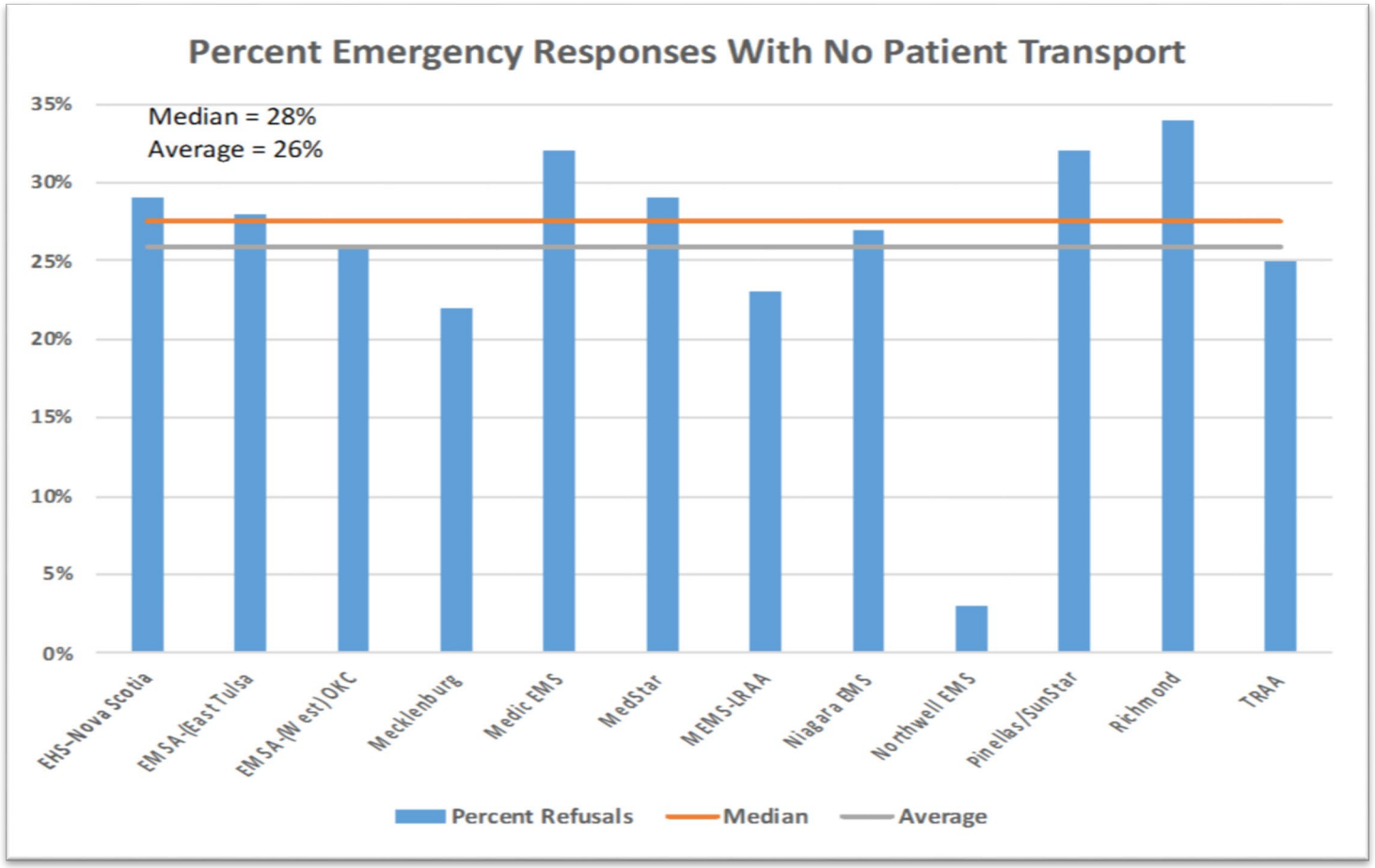
Only agencies that answered the survey question(s) are included in the above figure.

Figure 17: Percentage Non-Emergency Transports



Only agencies that answered the survey question(s) are included in the above figure.

Figure 18: Percent of Emergency Responses That Are Refusals or Denials (No Patient Transport)



Only agencies that answered the survey question(s) are included in the above figure.

For the above figure, the survey question asked for the percentage of emergency responses resulting in a refusal or denial. A refusal or denial was defined as no patient transport.

SECTION 2: RESPONSE TIME PERFORMANCE

A predetermined response-time standard, combined with a requirement that the EMS system be held accountable to achieve that standard, becomes the single most significant variable when determining the cost of providing service. This section provides an overview of the methodology used to determine response-time measurement and examines the required standard for each system.

The most important factors in achieving successful cardiopulmonary resuscitation are the early initiation of high quality CPR and rapid defibrillation.[4] The survival rate from untreated ventricular fibrillation decreases up to 10% for every minute that passes with no intervention.[5] For decades it was believed that responding with Basic Life Support (BLS) with early defibrillation capability within four minutes, and ALS within eight minutes further enhances the patient's chance of survival.[6, 7] Consequently, the eight-minute response time has become the recognized standard for the provision of EMS in the urban setting.[8]

In discussions about response time, it is helpful to keep in mind that the response-time standards for life-threatening emergencies used in HPEMS represent the maximum amount of time, not the minimum or ideal amount of time, in which a response to a life-threatening emergency should occur. These standards were established to obtain a specific level of quality in the most cost-effective manner possible.

Research continues to demonstrate the importance of rapid-response times to certain critical emergencies. Pons et al., "identified a survival benefit when the response time was less than or equal to 4 minutes."[9] They argue that rapid-response times benefit only a small percentage of patients and that "little work has been done to determine" what response-time standard is "appropriate for the other 99% of emergencies to which EMS providers respond". The use of Automatic External Defibrillators (AEDs) has given the public the ability to rapidly initiate the critical care (CPR and defibrillation) necessary for successful resuscitation. Pons et al., also state

[4] International Liaison Committee on Resuscitation: 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2005: 112-Supplement December 13.
[5] Advanced Life Support Working Party of the European Resuscitation Council: Guidelines for adult advanced cardiac life support. *Resuscitation,* 1992 (24), 111-121.
[6] Eisenberg, M.S., Bergner, L., & Hallstrom, A. Out-of-hospital cardiac arrest: improved survival with paramedic services. *Lancet,* 1980, 812-815.
[7] Eisenberg, M.S., Copass, M.K., & Hallstrom, A., et. al. Management of out-of-hospital cardiac arrest: Failure of basic emergency medical technician services. *JAMA*, 1980 (243), 1049-1051.
[8] Commission on Accreditation of Ambulance Services. 201 – Clinical Standard: 201.05 Response Times. Glenview, IL.
[9] Pons, P.T., Haukoos, J.S., Bludworth, W., et. al. Paramedic response time: Does it affect patient survival? *Academy of Emergency Medicine,* 2005 (12), 594-600.

that the impact of this new technology needs to be considered when evaluating response-time standards.

These studies suggest the importance of tracking both first-responder response times to critical emergencies, as well as documenting whether CPR and AED have been administered before the arrival of the EMS response. These factors appear to be as important to survival as the ALS ambulance response time.[10]

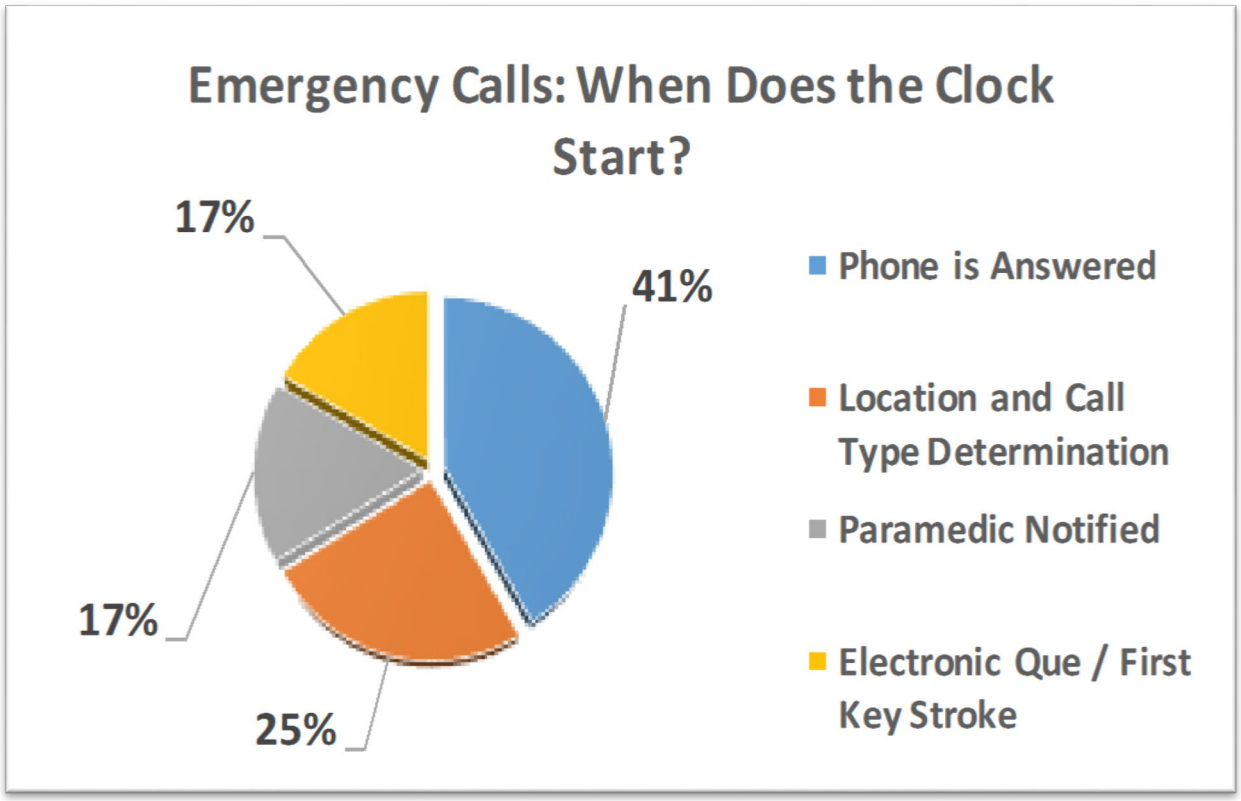
Traditionally, response times had been measured as an average. However, to ensure equitable service to all segments of a community, fractile response-time measurement was introduced as part of the structure of the first HPEMS system and is now a hallmark of all HPEMS systems. A fractile response-time measurement establishes a percentage of reliability that must be met for all patients experiencing an emergency event.[11]

Response-time equalization for all patients under the fractile response-time measurement requires a different deployment of resources than that of a system that produces the average response times acceptable in some communities. All HPEMS systems use advanced deployment practices that acknowledge both temporal and geographical patterns of activity and manage the deployment and redeployment of resources to meet response-time performance requirements. The foundation of these practices is an algorithm developed from a statistical chart showing the historical call volume for each hour of day and day of week.[12]

The implementation of HPEMS coincided with the publication of response-time studies. As a result, the “eight-minute” response-time definition has varied from 7 minutes, 59 seconds, to 9 minutes, depending on the system involved. Similarly, the calculation varies slightly among systems. For example, several systems "start the clock" with the receipt of address, call-back telephone number and chief complaint, while others start the clock with the automated receipt of the 9-1-1 number by Automatic Number Identification (ANI) through the local telephone service provider, and yet others begin the time measurement when the unit is dispatched. Regardless of the differences, all participating systems measure response from their initial point of accountability to the arrival of a transport-capable ALS ambulance at the scene. An aggregate illustration of when the clock starts is provided in the figure below. Universally, all agencies reported stopping the clock as the unit arrived on scene or in designated staging location.

[10] Ibid.
[11] Overton, J., & Stout, J. (2002). System design. In A.E. Kuehl (Ed.), *Prehospital systems and medical oversight* (3rd ed.). Dubuque, IA: Kendall Hunt Publishing.
[12] Ibid.

Figure 19: Proportion of Agency Description of When the Clock Starts



Note: All respondents reported stopping the clock at arrival on scene or in designated staging area.
Only agencies that answered the survey question(s) are included in the above figure.

To ensure compliance to a response-time standard, penalties are commonly applied in HPEMS systems. Response-time penalties are reported for both emergency and non-emergency responses.

All survey participants, with the exception of Emergency Health Services Nova Scotia, indicated that a fractile measurement was utilized. Response time compliance is reported as required by all agencies except for Medic EMS and Niagara EMS. The determination of "emergency (non-life threatening) or emergency (no lights and sirens)" is utilized less frequently and the data is now captured in either the "emergency" or "non-emergency" data points.

The "max penalty" descriptor represents a cap on the penalty amount for out of compliance responses.

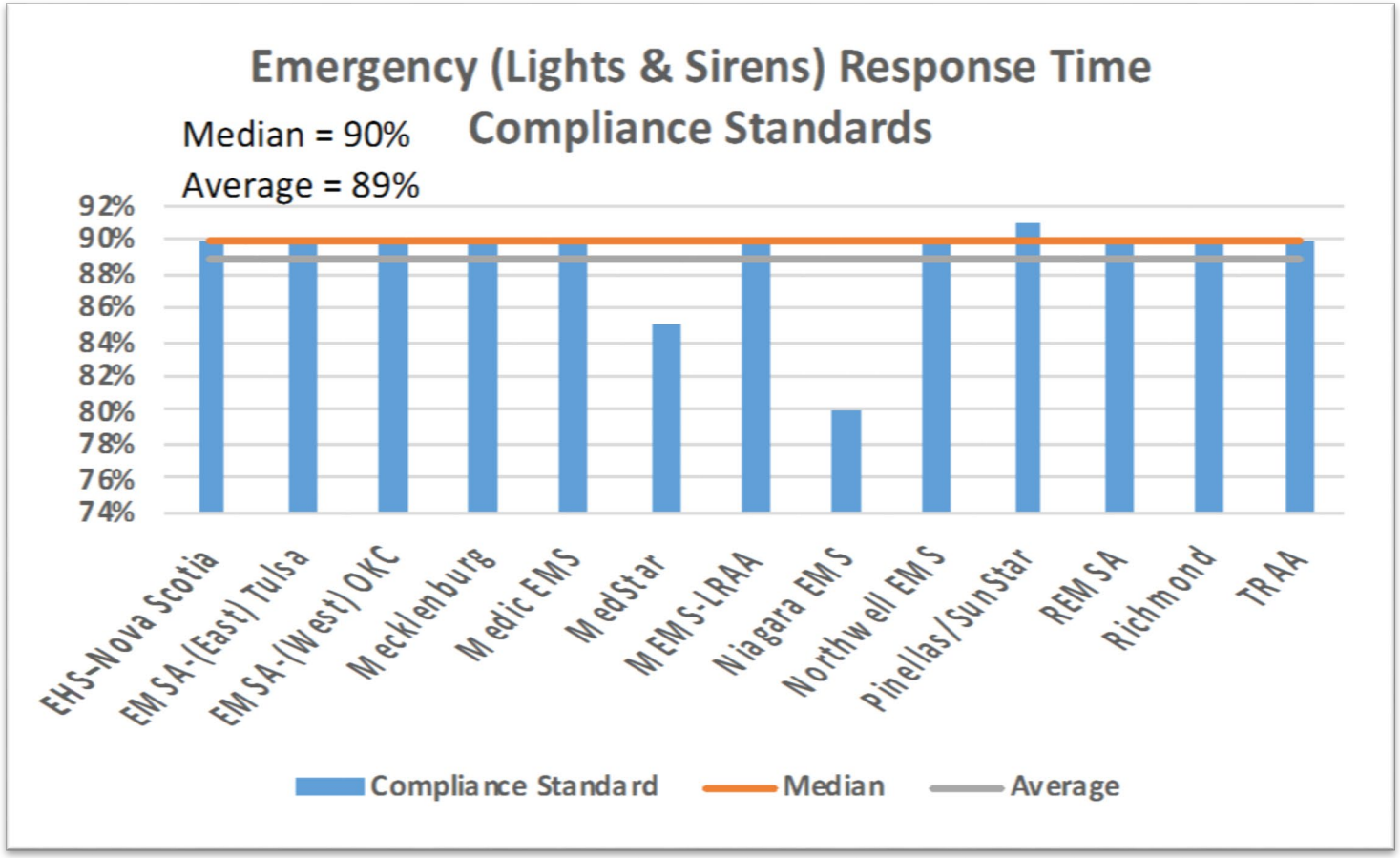
Table 7: Life-Threatening Emergency (Lights & Sirens) Response Characteristics

Agency Name	Response Time (mm:ss)	Compliance Standard	Per Minute Fine	Max Penalty
EHS – Nova Scotia	8:59 average	90%		
EMSA – (East) Tulsa	10:59	90%	$10.00	$250.00
EMSA – (West) OKC	10:59	90%	$10.00	$250.00
Mecklenburg	10:59 & 12:59	90%		-
Medic EMS	7:59	90%		
MedStar	11:00	85%		
MEMS - LRAA	8:59 & 12:59	90%		
Niagara EMS	8:00	80%		
Northwell EMS	12:00	90%		
Pinellas/SunStar	10:00	91%	$7.00	
Richmond	8:59	90%		
TRAA	8:30 & 10:30	90%	$10.00	$500.00

Note: Mecklenburg EMS indicated response time standard as 10:59 for P1 and 12:59 for P2.

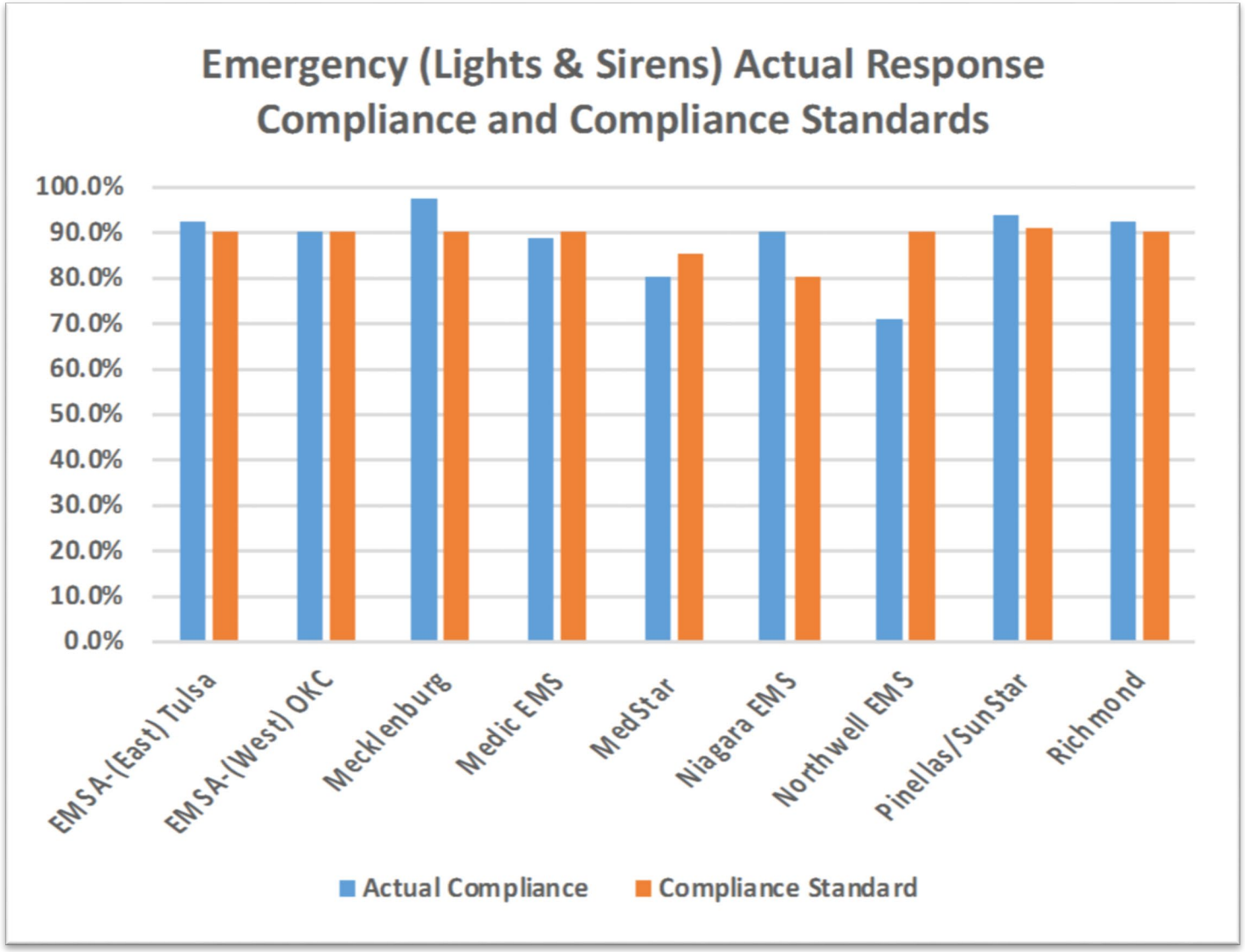
Only agencies that answered the survey question(s) are included in the above table.

Figure 20. Life-Threatening Emergency (Lights & Sirens) Compliance Standards



Only agencies that answered the survey question(s) are included in the above figure.

Figure 21: Life-Threatening Emergency (Lights & Sirens) Actual Compliance and Compliance Standards



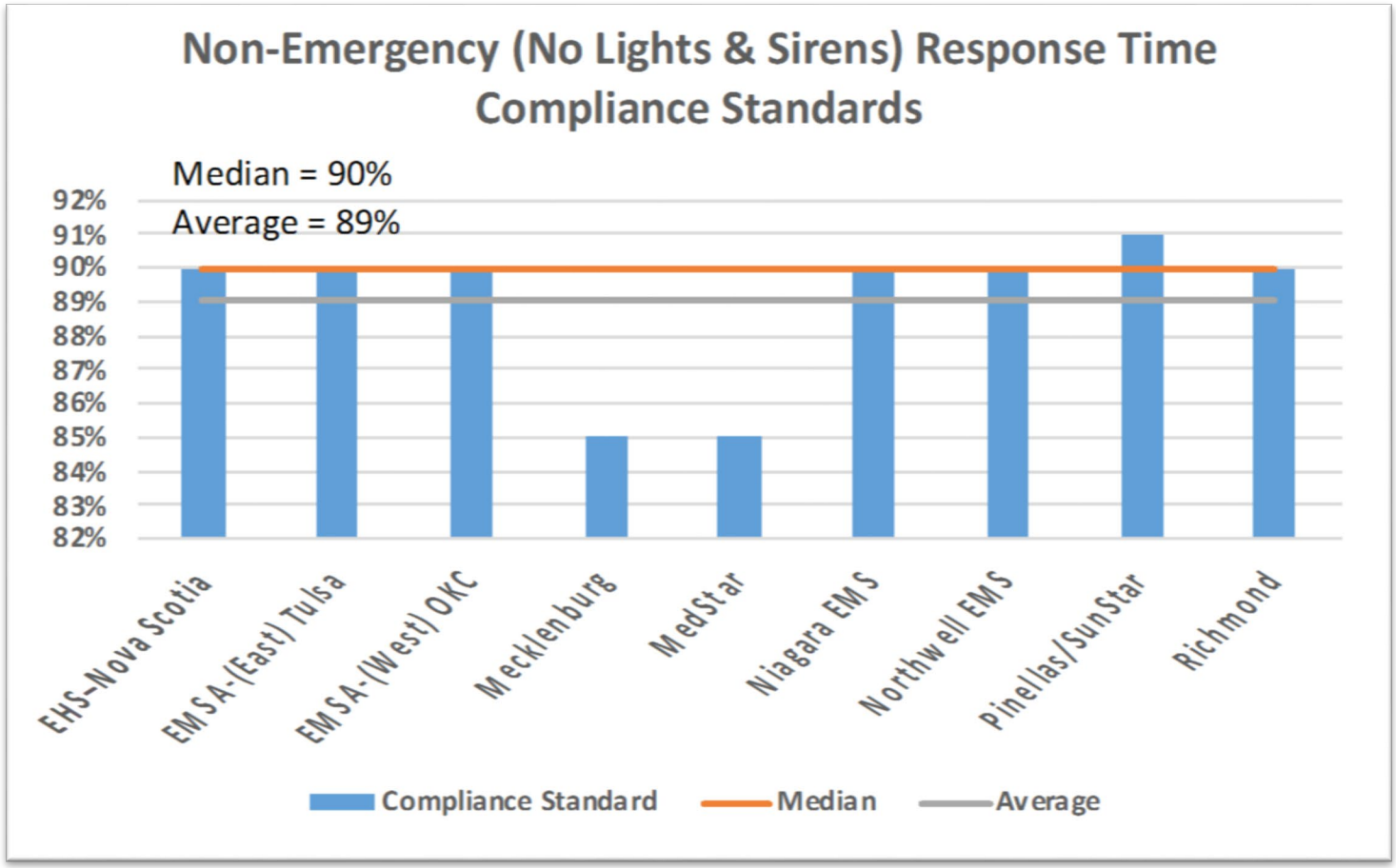
Only agencies that answered the survey question(s) are included in the above figure.

Table 8: Non-Emergency (No Lights & Sirens) Response Characteristics

Agency Name	Response Time (mm:ss)	Compliance Standard	Per Minute Fine	Max Penalty
EHS – Nova Scotia	average 14:59	90%	-	-
EMSA – (East) Tulsa	24:59	90%	$10.00	$250,00
EMSA – (West) OKC	24:59	90%	$10.00	$250.00
Mecklenburg	20:00	85%		
MedStar	17:00	85%		
Niagara EMS	15:00	90%		
Northwell EMS	30:00	90%		
Pinellas/SunStar	20:00	91%	$3.00	-
Richmond	12:59	90%		

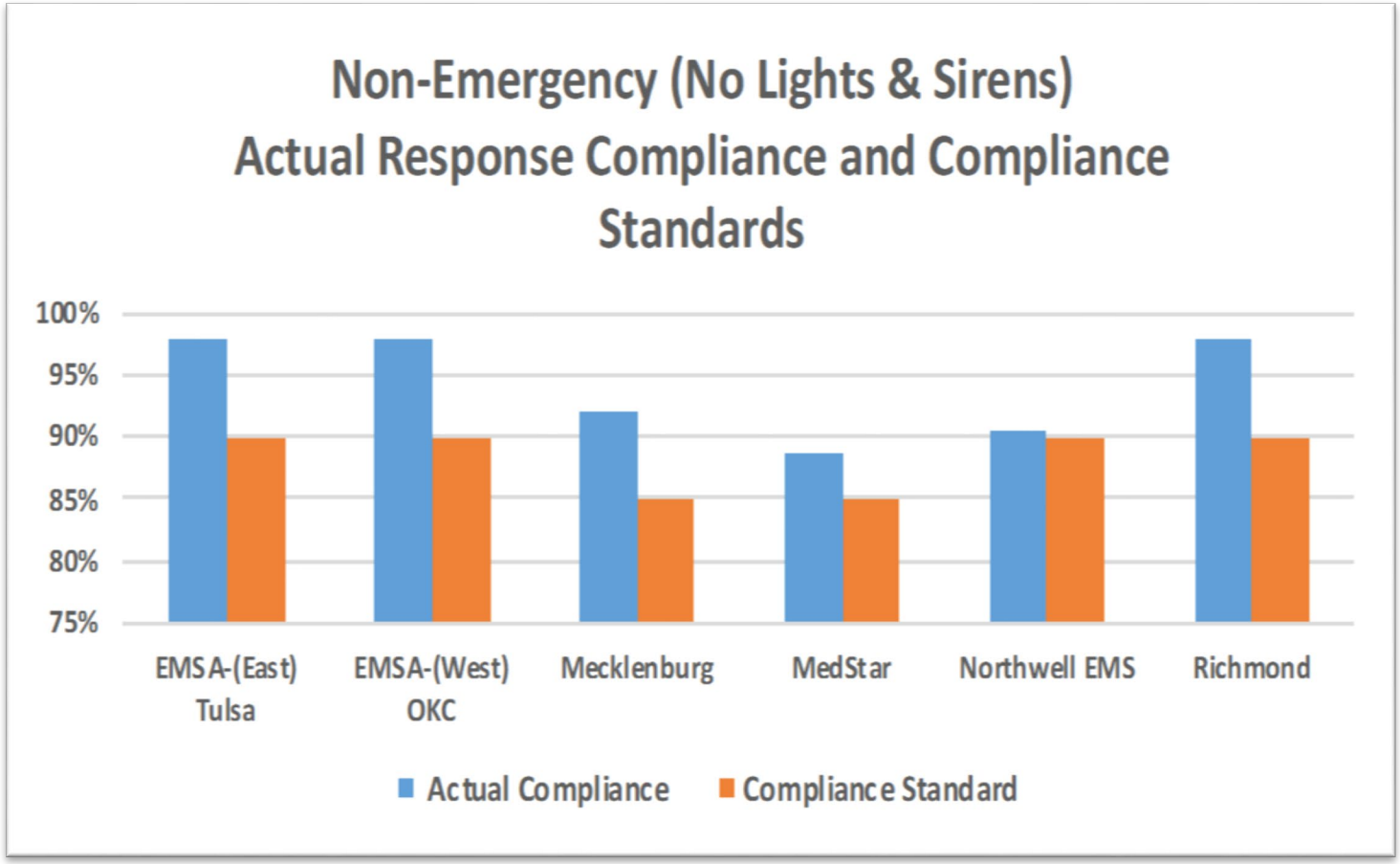
Only agencies that answered the survey question(s) are included in the above table.

Figure 22. Non-Emergency (No Lights & Sirens) Compliance Standards



Only agencies that answered the survey question(s) are included in the above figure.

Figure 23: Non-Emergency (No Lights & Sirens) Actual Response Compliance and Compliance Standards



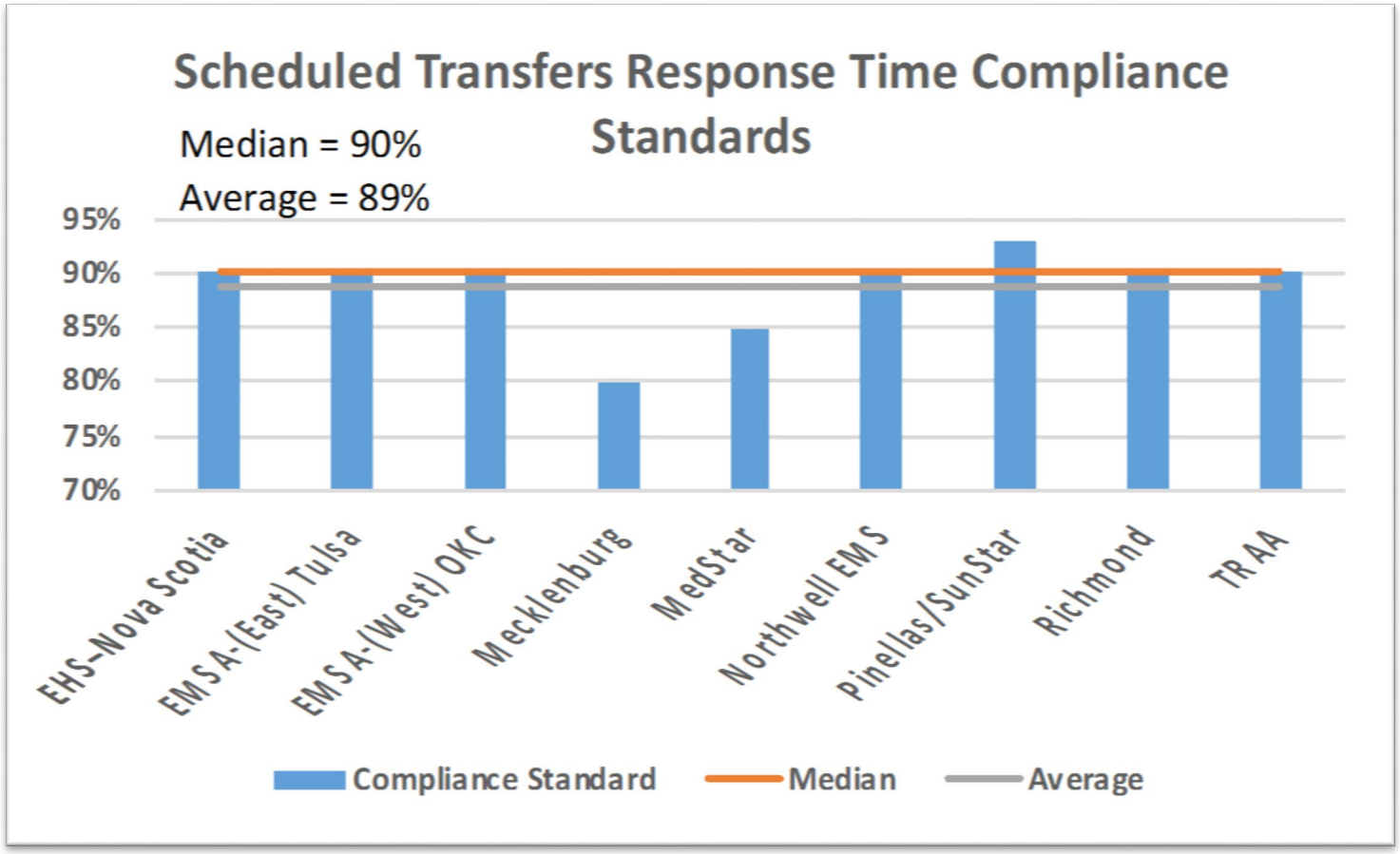
Only agencies that answered the survey question(s) are included in the above figure.

Table 9: Scheduled Transfers Response Characteristics

Agency Name	Response Time (mm:ss)	Compliance Standard	Per Minute Fine	Max Penalty
EHS – Nova Scotia	average 19:59	90%		
EMSA – (East) Tulsa	15:00	90%	$10.00	$130.00
EMSA – (West) OKC	15:00	90%	$10.00	$130.00
Mecklenburg	Not in contract	80%		
MedStar	60:00	85%		
Northwell EMS	10:00	90%		
Pinellas/SunStar	60:00	93%	$3.00	
Richmond	19:59	90%		
TRAA	60:00	90%	$5.00	$300.00

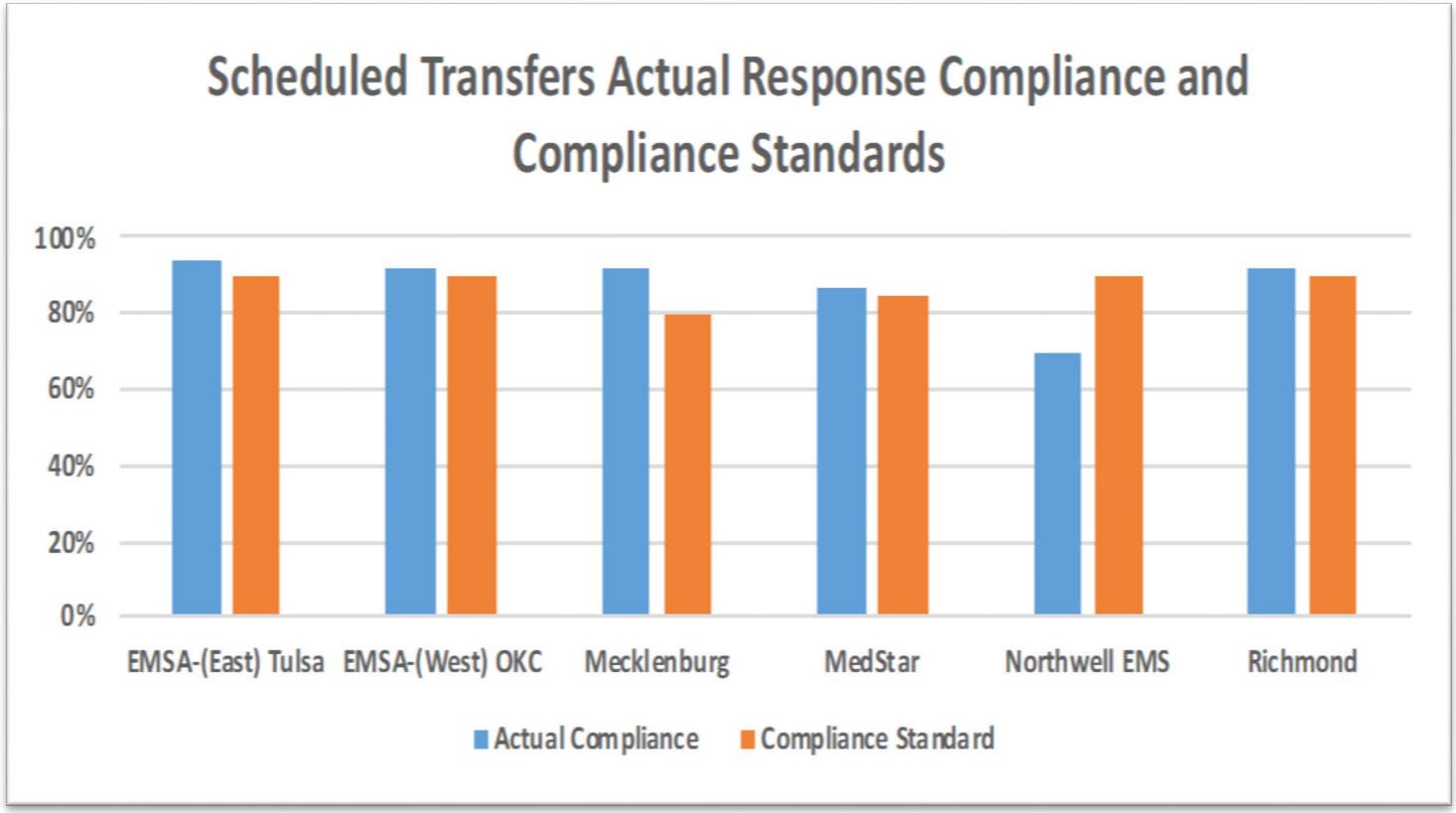
Only agencies that answered the survey question(s) are included in the above table.

Figure 24. Scheduled Transfers Response Time Compliance Standards



Only agencies that answered the survey question(s) are included in the above figure.

Figure 25: Scheduled Transfers Actual Response Compliance and Compliance Standards



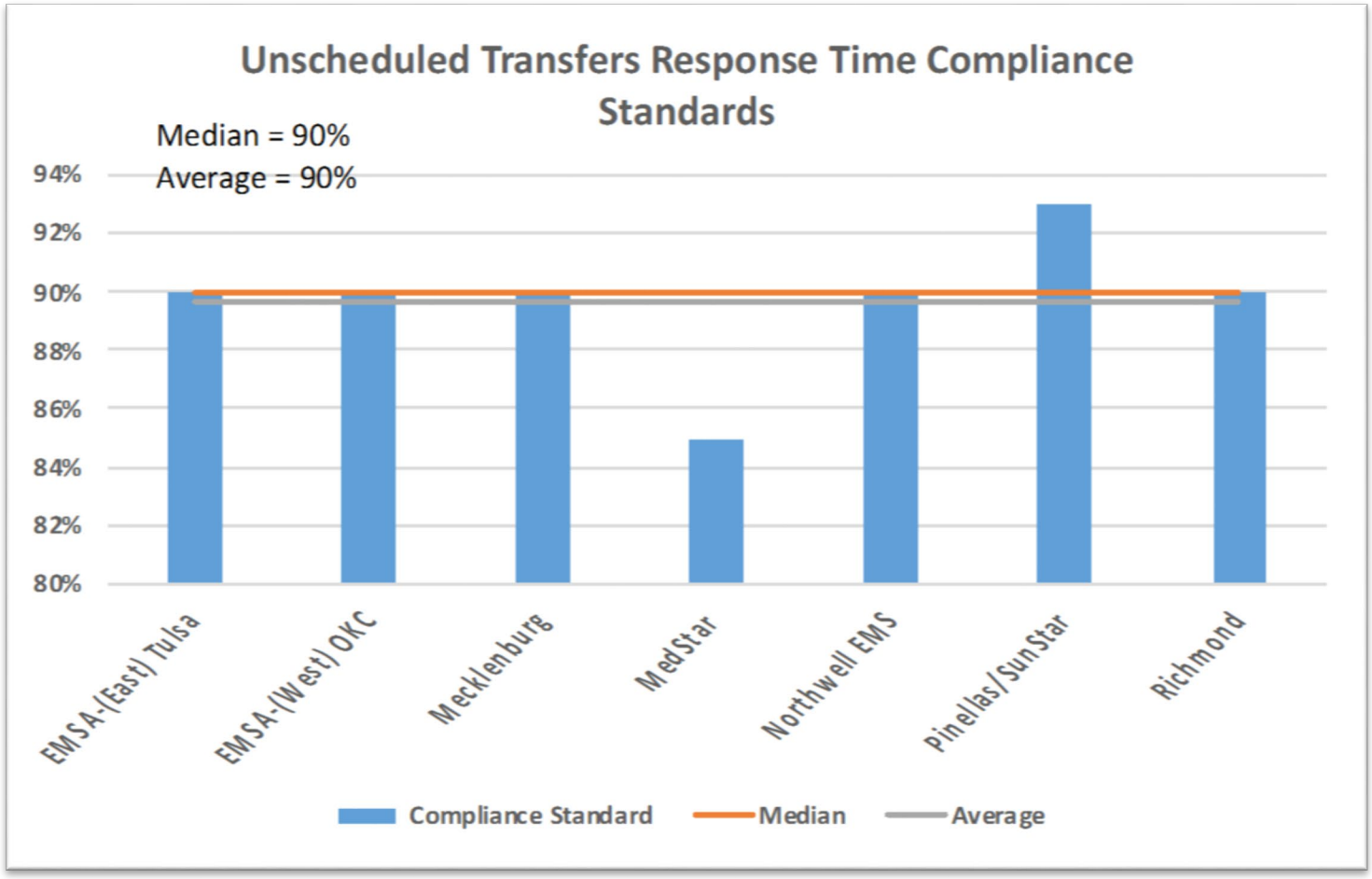
Only agencies that answered the survey question(s) are included in the above figure.

Table 10: Unscheduled Transfers Response Characteristics

Agency Name	Response Time (mm:ss)	Compliance Standard	Per Minute Fine	Max Penalty
EHS – Nova Scotia	average 59:59	90%		
EMSA – (East) Tulsa	60:00	90%	$10.00	$130.00
EMSA – (West) OKC	60:00	90%	$10.00	$130.00
Mecklenburg	20:00			
MedStar	60:00	85%		
Northwell - EMS	60:00	90%		
Pinellas/SunStar	60:00	93%	$3.00	
Richmond	59:59	90%		

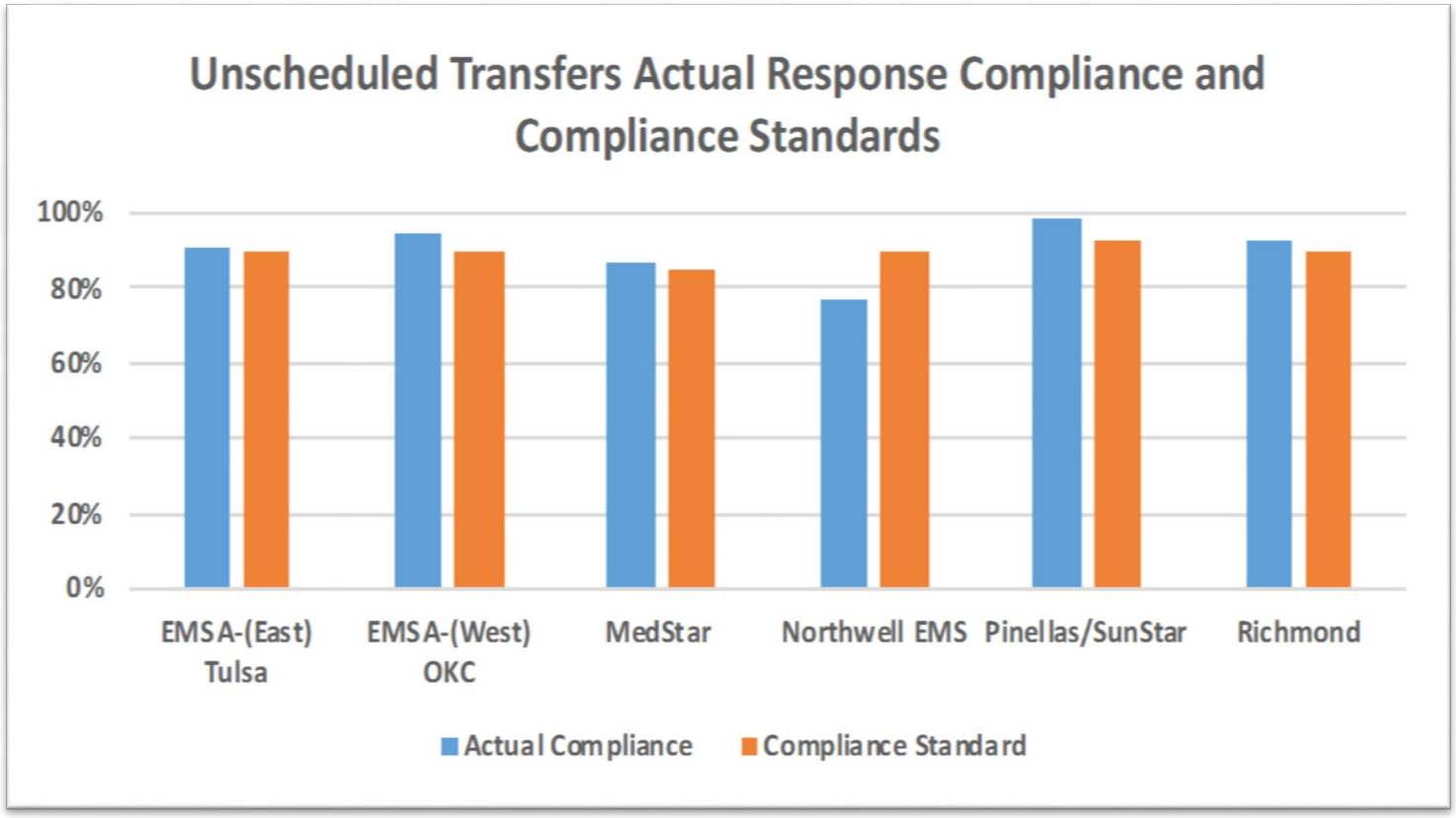
Only agencies that answered the survey question(s) are included in the above table.

Figure 26: Unscheduled Transports Response Time Compliance Standards



Only agencies that answered the survey question(s) are included in the above figure.

Figure 27. Unscheduled Transports Actual Response Compliance and Compliance Standards



Only agencies that answered the survey question(s) are included in the above figure.

Agencies were asked if they had response time performance measures by geography. The typical approach is to define geographic zones based on population density. The theoretical and practical assumption is that varying levels of service can coexist across the primary service area due to the individual geographic areas' willingness and/or ability to pay for a commensurate level of services. For example, a rural area could neither afford the tax contribution or the billing rates necessary to maintain urban services.

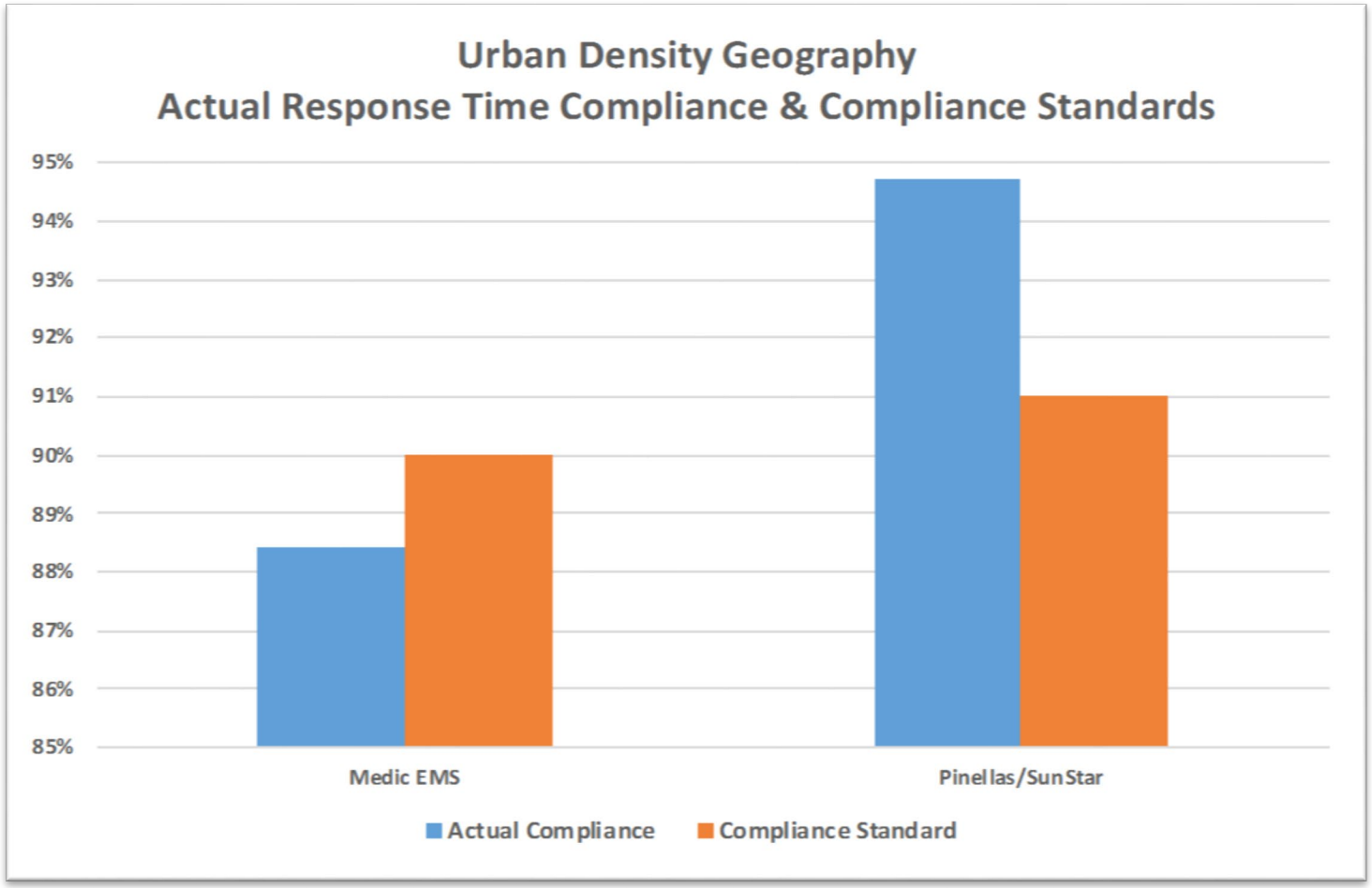
Of the six agencies that reported having geographic zones, three provided response time performance and compliance information. Some agencies that may only have an urban density throughout the primary service area did not report in this format. Similarly, the two EMSA agencies also have sub-zone performance areas, which may have created some ambiguity as to whether to report in one or both sections.

Table 11: Geographic Response Characteristics by Population Density

Agency Name	Geographic Responses?	Urban Time Standard	Suburban Time Standard	Rural Time Standard	Compliance Standard
EHS - Nova Scotia	Yes	8:59	14:59	39:59	90%
EMSA – (East) Tulsa	Yes				
Medic EMS	Yes	7:59		14:59	90%
MEMS-LRAA	Yes				
Pinellas/SunStar	Yes	10:00/20:00			91%
REMSA	Yes				

Only agencies that answered the survey question(s) are included in the above table.

Figure 28: Urban Density Compliance



EHS-Nova Scotia is not included in the above figure as EHS reported having a compliance standard but did not report actual compliance.
Average and Median not meaningful with only two respondents.
Only agencies that answered the survey question(s) are included in the above figure.

None of the agencies responded to the question regarding actual suburban density compliance. Only Medic EMS responded to the question regarding actual rural density compliance indicating a 90.8% actual against a 90% compliance standard.

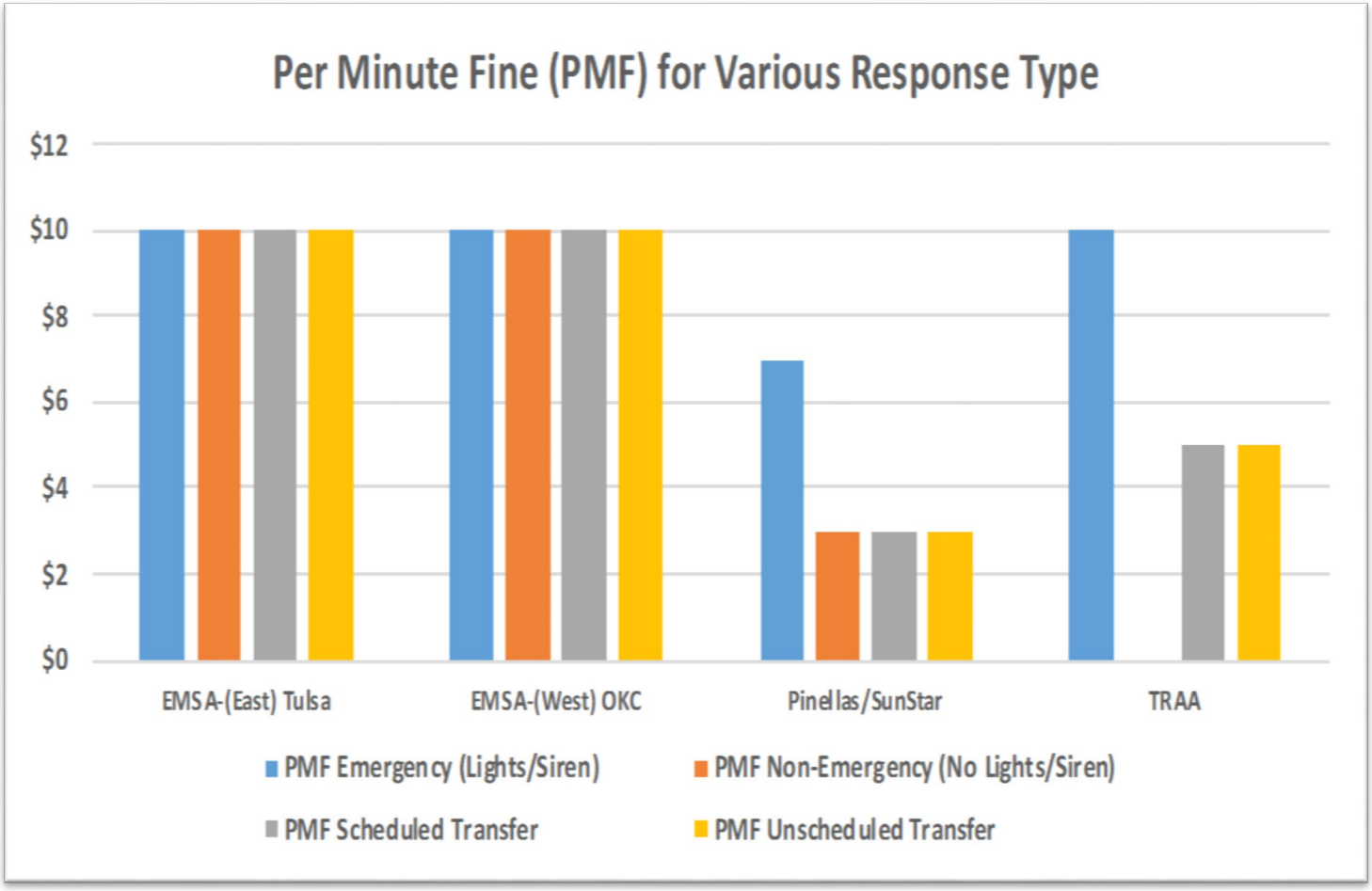
Several agencies affirmed that they have sub-zone response time performance. However, the specific performance measures were not provided in each case.

Table 12: Description of Utilization of Subzones in Deployment

Agency Name	Subzones?	Description
EHS – Nova Scotia	No	
EMSA – (East) Tulsa	Yes	Monitor 15% variability
EMSA – (West) OKC	Yes	Monitor 15% variability
Mecklenburg	No	
Medic EMS	No	
MedStar	No	
MEMS-LRAA	No	
Niagara EMS	No	
Northwell EMS	No	
Pinellas/SunStar	Yes	Response Zone response time compliance for ALS first response. Zone is the geographic area for the closest Fire Station.
REMSA	Yes	Fire first response each have their own jurisdictional set response time measures.
Richmond	Yes	Priority 1 response times for each of the 4 zones within the City of Richmond: 8:59 or less, 87.5% of the time.
TRAA	Yes	Require 85% compliance in each of 4 sub-zones of same response time requirement listed for emergency responses.

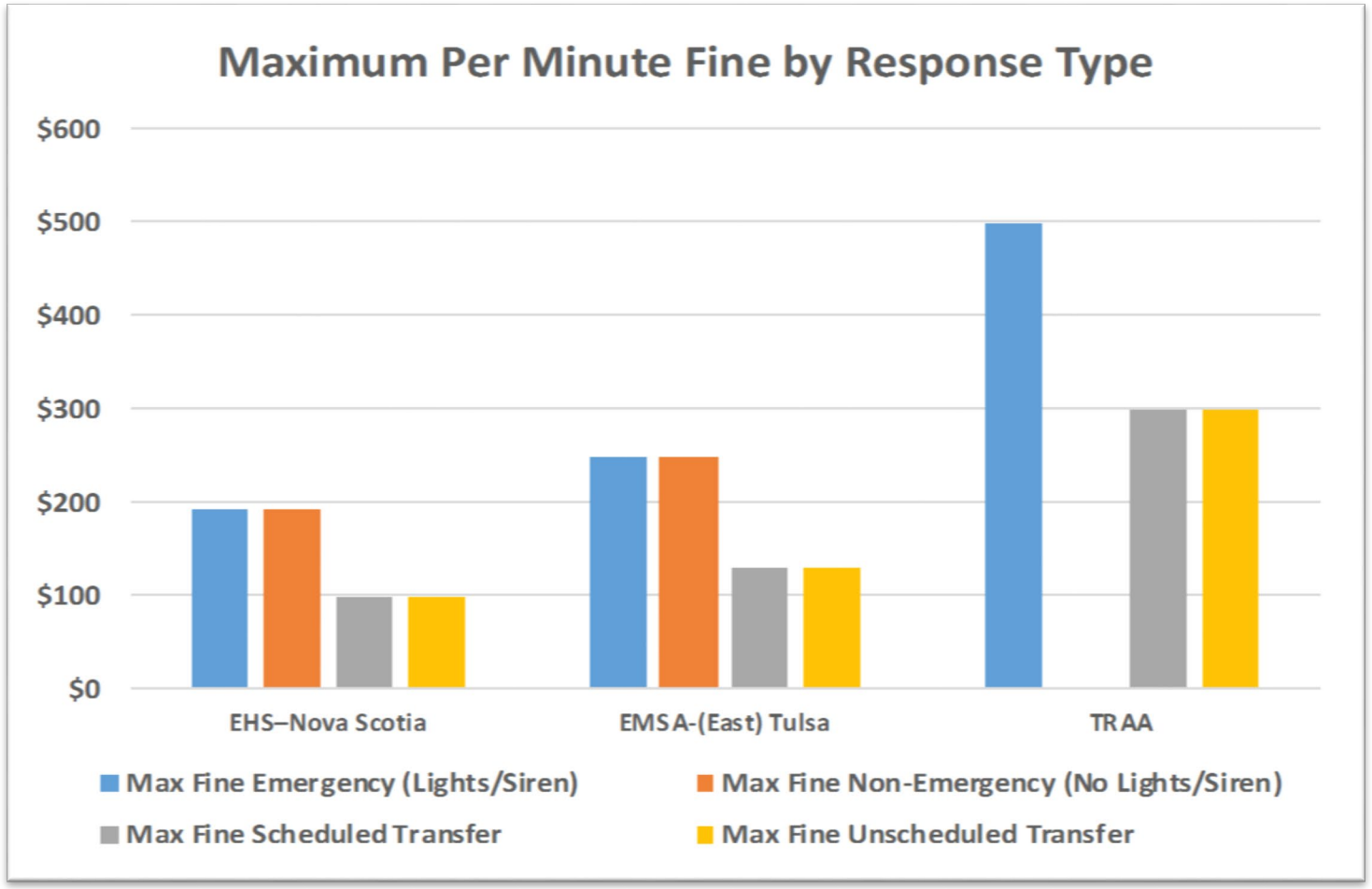
Only agencies that answered the survey question(s) are included in the above table.

Figure 29: Per Minute Fine for Various Responses



Only agencies that answered the survey question(s) are included in the above figure.

Figure 30: Per Call Maximum Fine by Response Type



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

The analysis requested information regarding the measurement and required performance of the medical first responders (MFR). Of the responding agencies, three identified that they actively measured MFR performance and two indicated that it was required. The data is presented in the table below.

Table 13. Medical First Responder Performance Requirements

Agency Name	MFR Time Measured?	MFR Compliance Required?
EHS – Nova Scotia	No	No
EMSA – (East) Tulsa	No	
EMSA – (West) OKC	No	
Mecklenburg	No	No
Medic EMS	No	No
MedStar	No	No
MEMS-LRAA	No	
Niagara EMS	No	
Pinellas/SunStar	Yes	Yes
REMSA	Yes	No
Richmond	No	No
TRAA	No	

Only agencies that answered the survey question(s) are included in the above table.

Finally, several miscellaneous questions were included in this section of the analysis. Results are presented in the table below.

Table 14: Miscellaneous Response and System Design Information

Agency Name	AED w/in 5 Minutes Response Time	Strategic Deployment based on Historic or Predicted Calls	Required Performance with Termination Provision in Contract
EHS – Nova Scotia	Yes	Yes	Yes
EMSA – (East) Tulsa	No	Yes	Yes
EMSA – (West) OKC	No	Yes	Yes
Mecklenburg	No	Yes	No
Medic EMS	No	Yes	No
MedStar	No	Yes	No
MEMS-LRAA	No	Yes	No
Niagara EMS	Yes, 6 min @ 55%	Yes	No
Northwell EMS	Varies by Community	Yes	Yes
Pinellas/SunStar	Yes	Yes	Yes
REMSA	No	Yes	Yes
Richmond	No	Yes	n/a
TRAA	No	Yes	Yes

Only agencies that answered the survey question(s) are included in the above table.

SECTION 3: CLINICAL PERFORMANCE

The all-ALS feature of the HPEMS system design continues to be debated. [13, 14] Opponents cite two factors in these discussions: first is the degradation of field provider ALS skills and second is the ability of the dispatcher to accurately triage the call.[15] However, opponents of the all-ALS feature assume that all callers access the EMS system through 9-1-1, which is not the case. Nursing homes, skilled-care facilities, and even hospitals requesting interfacility transport can and do access EMS through a seven-digit telephone number. Results have shown that after the calling party was interrogated using rigid dispatch protocols, 12 percent of these patients were found to require at least one ALS intervention.[16] The all-ALS concept continues to be debated. The two articles referenced in the footnote below are a small sample of the ongoing discussions.[17]

National Registry certification is not required in all systems. As EMS has advanced and new treatment modalities have been introduced, some systems are requiring additional training beyond EMT-Paramedic for personnel. This includes Advanced Cardiac Life Support (ACLS), Pre-hospital Trauma Life Support (PHTLS), and Pediatric Advanced Life Support (PALS), or other specialty qualifications. In many locales, training opportunities are limited, but a number of HPEMS systems either have obtained or are striving for 100 percent certification.

Patient care begins when the telephone rings. For those calls where information is available, Emergency Medical Dispatchers (EMDs) trained to deliver Dispatch Life Support through the use of pre-arrival instructions can, and do, make a difference. The participating HPEMS systems have implemented the use of the Advanced Medical Priority Dispatch System (AMPDS), which is a protocol-driven dispatch algorithm for determining the patient's severity level, the type of responding resources that may be needed, and the assistance that can be given by the dispatcher before the ambulance arrives.[18]

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[13] Stout, J., Pep, P.E., & Mossesso, V.N. (2000) All advanced life support vs. tiered response ambulance systems. *Prehospital Emergency Care,* 4, 1-16.
[14] Curka, P.A., Pepe, P.E., & Ginger, V.F., et. al. (1993). Emergency medical services dispatch. *Annals of Emergency Medicine,* 22, 1688-1695.
[15] Stratton, S.J. (1992). Triage by emergency medical dispatchers. *Prehospital Disaster Medicine,* 7, 263-269.
[16] Wilson, B., Gratton, M.C., Overton, J., et. al. (1992). Unexpected ALS procedures on non-emergency calls: The value of a single-tier system. *Prehospital Disaster Medicine,* 7, 380-382.
[17] Robbins, V.D. (2017) Analyzing the Threshold for ALS Response in EMS Protocol. *Journal of Emergency Medical Services*, Jems.com, accessed November 2018; Kimmel, K. & Persse, D. (2015) Background and Advantages of a Tiered EMS Response in a Large, Fire-Based EMS Model. *Health Care: Current Reviews*. Omicsonline.org, accessed November 2018.
[18] Clawson, J.J. (2002). Emergency medical dispatch. In AE Kuehl (ed.), *Prehospital Systems and Medical Oversight,* (3rd ed.). Dubuque, IA: Kendall Hunt Publishing.

Table 15: Dispatch and First Response Clinical Characteristics and Certifications

Agency Name	Minimum Level of Dispatch Certification	Priority Dispatch Protocols Used	Response Mode Determined by	First Response Provided by	Minimum Level Required by First Response
EHS – Nova Scotia	Paramedic & EMD	Yes	Local EMS Regulatory Entity	Fire & Community Groups	EMT-Basic w/ AED
EMSA – (East) Tulsa	EMT & EMD	Yes	Local Medical Control	Fire	EMS-Basic
EMSA – (West) OKC	EMT & EMD	Yes	Local Medical Control	Fire	EMS-Basic
Mecklenburg	EMD	Yes	Local Medical Control	Fire	EMT-Basic w/ AED
Medic EMS	EMD	Yes	Local Medical Control	Fire	EMR
MedStar	EMD	Yes	Local Medical Control	Varies by Community	Varies
MEMS-LRAA	EMD	Yes	Local Medical Control	Fire	Varies
Niagara EMS	EMD	Yes	Local Medical Control	Fire	EFR
Northwell EMS	EMT & EMD	Yes	Local Medical Control	Varies by Community	EMT-Basic w/ AED
Pinellas/SunStar	EMT & EMD	Yes	Local Medical Control	Fire	EMT-Paramedic
REMSA	Paramedic & EMD	Yes	Local EMS Regulatory Entity	Fire	EMT-Basic w/ AED
Richmond	EMT & EMD	Yes	Local Medical Control	Fire	EMT-Basic w/ AED
TRAA	EMT & EMD	Yes	NAED Protocols with Local Medical Control	Fire	EMT-Basic w/ AED

Only agencies that answered the survey question(s) are included in the above table.

Table 16: Ambulance Response and Staffing Characteristics

Agency Name	All ALS or ALS/BTS Tiered Ambulance Response	Minimum ALS Ambulance Staffing	Minimum BLS Ambulance Staffing	Critical Care Transport	Critical Care Transport Minimum Staffing
EHS – Nova Scotia	ALS/BLS (E & Non-E)	1 Intermed. / 1 Basic	2 Basic	Yes	1 EMT/ 1 CCT-P / 1 RN (or RT)
EMSA – (East) Tulsa	ALS (E & Non-E/ ALS/BLS Transfers)	1 Paramedic / 1 Basic	2 Basic	No	N/A
EMSA – (West) OKC	ALS E:ALS/BLS (Non-E & Transfers)	1 Paramedic / 1 Basic	2 Basic	No	N/A
Mecklenburg	ALS (E & Non-E/ ALS/BLS Transfers)	1 Paramedic / 1 Basic	2 Basic	No	N/A
Medic EMS	ALS (E & Non-E/ ALS/BLS Transfers)	1 Paramedic / 1 Basic	2 Basic	Yes	1 SCT, 1 EMT, + SCT or Paramedic
MedStar	ALS (E & Non-E/ ALS/BLS Transfers)	1 Paramedic / 1 Basic	2 Basic	Yes	CCP medics in fly cars add to ALS MICU crew
MEMS-LRAA	ALS/BLS (E & Non-E)	1 Paramedic / 1 Basic	2 Basic	No	N/A
Niagara EMS	1 Adv. Care Paramedic / 1 Primary Care Medic	2 Paramedics	-	No	N/A
Northwell EMS	ALS Only (E, Non-E & transfers)	1 Paramedic / 1 Basic	2 Basic	Yes	1-2 CC Paramedic
Pinellas/SunStar	ALS (E & Non-E/ ALS/BLS Transfers)	1 Paramedic / 1 Basic	2 Basic	Yes	1 CCRN, 1 CC-Medic, 1 EMT
REMSA	ALS (E & Non-E/ ALS/BLS Transfers)	1 Paramedic / Intermed.	1 Intermed. 1 Basic	Yes	-
Richmond	ALS (E & Non-E/ ALS/BLS Transfers)	1 Paramedic / 1 Basic	2 Basic	Yes	-
TRAA	ALS Only (E, Non-E & transfers)	1 Paramedic / 1 Basic	Not Allowed	No	N/A

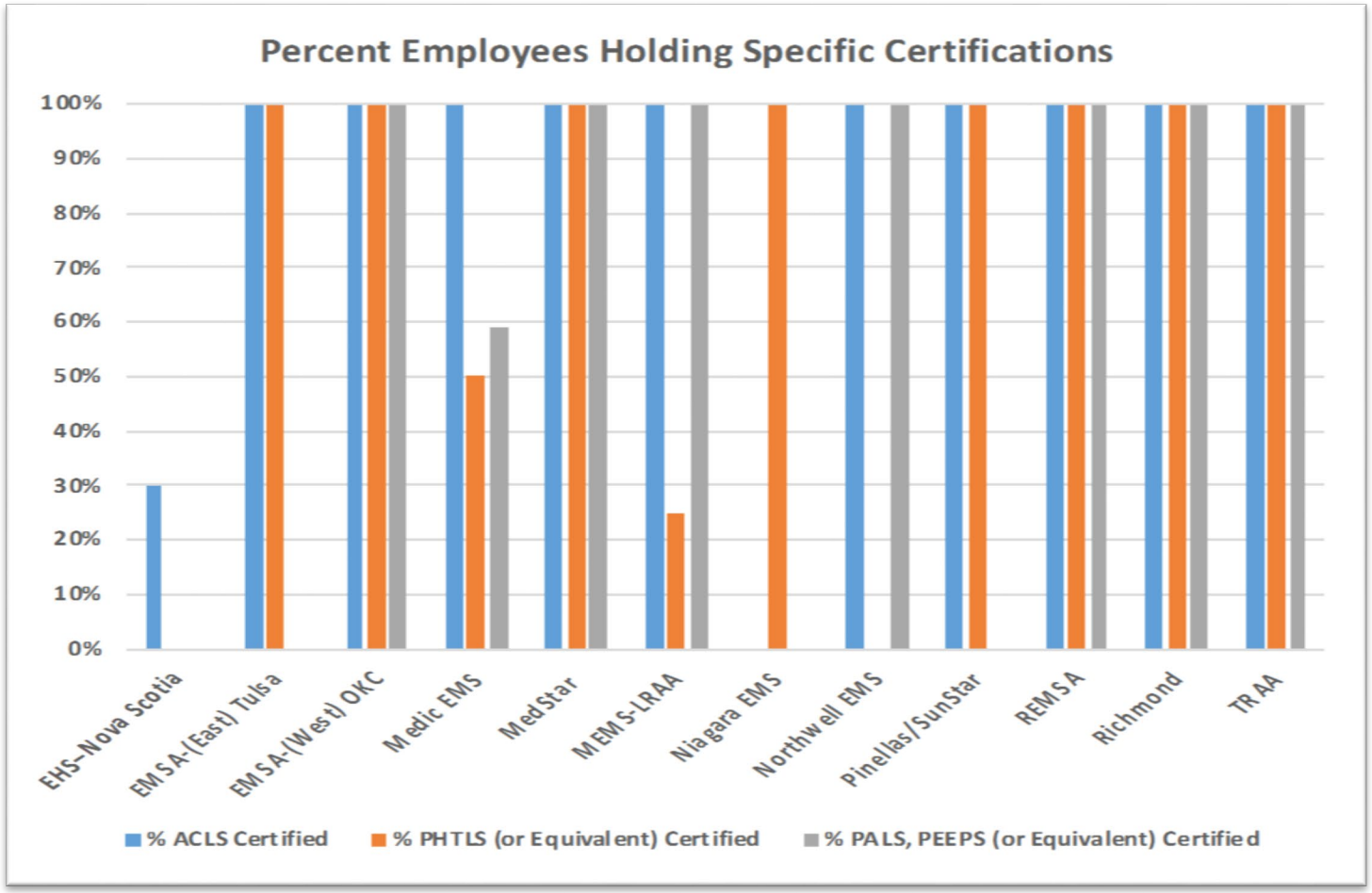
Only agencies that answered the survey question(s) are included in the above table.

Table 17: Clinical Certifications by Agency

Agency Name	National Registry or Equivalent for EMT-I	National Registry or Equivalent for Paramedic	National Registry or Equivalent for Nurse	Percent ACLS Certified	Percent PHTLS (or Equivalent) Certified	Percent PALS, PEPP (or Equivalent Certified)
EHS – Nova Scotia	Yes	Yes	Yes	30%		
EMSA – (East) Tulsa	Yes	Yes	No	100%	100%	
EMSA – (West) OKC	Yes	Yes		100%	100%	100%
Mecklenburg	No	No	No	-not mandatory	-not mandatory -	-not mandatory
Medic EMS	No	No	No	100%	50%	59%
MedStar	No	No	No	100%	100%	100%
MEMS-LRAA	Yes	Yes	Yes	100%	25%	100%
Niagara EMS	-	Yes	-	-	100%	-
Northwell EMS	No	No	No	100%	-	100%
Pinellas/SunStar	No	Yes	No	100%	100%	0%
REMSA	Yes	Yes	Yes	100%	100%	100%
Richmond	No	Yes	No	100%	100%	100%
TRAA	Yes	Yes	-	100%	100%	100%

Only agencies that answered the survey question(s) are included in the above table.

Figure 31: Percent of Employees Holding Selected Certifications



Only agencies that answered the survey question(s) are included in the above figure.

A description of the participating agencies selected clinical interventions is presented in Table 18. Field Thrombolytics was not included for formatting reasons. The only agency that reported providing field thrombolytics is Nova Scotia. Similarly, a description of the participating agencies' prevention and community risk reduction activities are provided in Table 19.

In addition, descriptions are provided in tabular form for agency training programs differentiated by "employees only" and "community", respectively.

Table 18. Description of Selected Interventions Provided by Agency

Agency Name	IV	Intubation	12-Lead ECG	RSI	Defibrillation	Ventilators	External Pacing	End Tidal CO2	Needle Thoracotomy	Needle Cricothyrotomy	NG Tube / Lavage	CO2 Capnography	Amiodarone	Vasopressin	LMA	King	Combitube	Therapeutic Hypothermia	CO Detection
EHS – Nova Scotia	Yes	Yes	Yes		Yes	Yes													
EMSA – (East) Tulsa	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes					Yes	
EMSA – (West) OKC	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes			Yes	
Mecklenburg	Yes	Yes	Yes		Yes		Yes	Yes	Yes					Yes		Yes		Yes	
Medic EMS	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes				Yes
MedStar	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes		Yes	Yes			Yes			
MEMS-LRAA	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	No		Yes	
Niagara EMS	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes		Yes	Yes			Yes			
Northwell EMS	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes		Yes			Yes
Pinellas/SunStar	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
REMSA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes			Yes	Yes	Yes		Yes
Richmond	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes			
TRAA	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes			Yes		Yes	

All indicated Intraosseous Infusion; Pinellas added Cyanokit & HazMat meds; Nova Scotia added Field Thrombolitics.

Only agencies that answered the survey question(s) are included in the above table.

Table 19: Description of Prevention and Community Risk Reduction Programs by Agency

Agency Name	Public CPR	Drunk Driving Prevention	Public First-aid	Drowning Prevention	Car seat Inspections	Flu Shots	Child Safety	Elderly Safety
EHS – Nova Scotia	No	No	No	No	Yes	No	Yes	Yes
EMSA – (East) Tulsa	Yes	No	No	No	No	No	Yes	No
EMSA – (West) OKC	Yes	No	No	No	No	No	No	No
Mecklenburg	Yes	-	-	-	Yes	-	Yes	-
Medic EMS	Yes	Yes	Yes	No	Yes		Yes	Yes
MedStar	Yes	No	Yes	Yes	No	Yes	Yes	Yes
MEMS-LRAA	Yes	No	Yes	No	No	No	Yes	No
Niagara EMS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pinellas/SunStar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
REMSA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Richmond	Yes	No	No	No	Yes	No	No	No
TRAA	Yes	No	Yes	No	Yes	No	No	No

Three Rivers also indicated a "Safe Sleep Program".

Only agencies that answered the survey question(s) are included in the above table.

Table 20: Agency Training Programs for Employees

Agency Name	EMT	EMT-I	EMT-P	ACLS	PHTLS	TEMS	Rescue	AMLS	PALS	CPR Healthcare	CPR Community Hands Only
EMSA – (East) Tulsa	No	No	Yes	No	No	No	No	No	No	Yes	No
EMSA – (West) OKC	No	No	Yes	Yes	No	No	No	No	No	No	No
Mecklenburg	No	No	No	No	No	No	No	No	No	Yes	Yes
Medic EMS	Yes	No	No	Yes	Yes	No	No	No	Yes	Yes	No
MedStar	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No
MEMS-LRAA	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Niagara EMS	No	No	No	No	Yes	No	No	No	No	Yes	Yes
Northwell EMS	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	No
Pinellas/SunStar	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
REMSA	No	No	No	No	No	Yes	Yes	No	No	No	No
Richmond	Yes	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes
TRAA	No	No	No	Yes	Yes	Yes	No	Yes	Yes	No	No

Only agencies that answered the survey question(s) are included in the above table.

Table 21: Agency Training Programs for the Community

Agency Name	EMT	EMT-I	EMT-P	ACLS	PHTLS	TEMS	Rescue	AMLS	PALS	CPR Healthcare	CPR Community Hands Only
EMSA – (East) Tulsa	No	No	No	No	No	No	No	No	No	Yes	Yes
EMSA – (West) OKC	No	No	No	No	No	No	No	No	No	No	Yes
Mecklenburg	No	No	No	No	No	No	No	No	No	No	Yes
Medic EMS	Yes	No	No	Yes	Yes	No	No	No	Yes	Yes	Yes
MedStar	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
MEMS-LRAA	No	No	No	No	No	No	No	No	No	Yes	Yes
Niagara EMS	No	No	No	No	No	No	No	No	No	Yes	Yes
Northwell EMS	No	No	No	No	Yes	No	No	Yes	No	No	No
Pinellas/SunStar	No	No	No	No	No	No	No	No	No	Yes	Yes
REMSA	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Richmond	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes
TRAA	No	No	No	No	No	No	No	No	No	Yes	Yes

Only agencies that answered the survey question(s) are included in the above table.

Table 22: Description of Special Response Programs

Agency Name	Do MDs Routinely Respond to Emergencies?	Is There a Formalized Multi-Casualty Response Plan?
EHS – Nova Scotia	Not at all	Yes
EMSA – (East) Tulsa	Not at all	Yes
EMSA – (West) OKC	Not at all	Yes
Mecklenburg	Occasionally	Yes
Medic EMS	Not at all	Yes
MedStar	Occasionally	Yes
MEMS-LRAA	Not at all	Yes
Niagara EMS	Not at all	Yes
Northwell EMS	Not at all	Yes
Pinellas/SunStar	Not at all	Yes
REMSA	Not at all	Yes
Richmond	Not at all	Yes
TRAA	Not at all	Yes

Only agencies that answered the survey question(s) are included in the above table.

Table 23: National Protocols Adopted by Agency

Agency Name	STEMI	Stroke	Cardiac Arrest	Hypoglycemia	Asthma	Trauma
EHS – Nova Scotia	Yes	Yes	Yes	Yes	Yes	Yes
EMSA – (East) Tulsa	No	No	No	No	No	No
EMSA – (West) OKC	No	No	No	No	No	No
Mecklenburg	Yes	Yes	Yes	Yes	Yes	Yes
Medic EMS	Yes	Yes	Yes	Yes	Yes	Yes
MedStar	No	No	No	No	No	No
MEMS-LRAA	Yes	Yes	Yes	Yes	Yes	Yes
Niagara EMS	Yes	Yes	Yes	-	-	Yes
Northwell EMS	No	No	No	No	No	No
Pinellas/SunStar	Yes	Yes	Yes	Yes	Yes	Yes
REMSA	Yes	Yes	Yes	Yes	Yes	Yes
Richmond	No	No	No	No	No	No
TRAA	Yes	Yes	Yes	-	-	Yes

Only agencies that answered the survey question(s) are included in the above table.

Table 24: Description of National Protocols Utilized by Agency

Agency	National Protocols Utilized
Medic EMS	AHA, ACS, PHTLS
Mecklenburg	AHA, ACS
Niagara EMS	Ontario Base Hospital, Ontario Stroke Network, Ontario Cardiac Care Network
Pinellas/SunStar	STEMI/Stroke/SCA=AHA; Hypoglycemia/Asthma=Consensus; Trauma=American College of Surgeons
MEMS-LRAA	USDAT National Standard Curriculum

Only agencies that answered the survey question(s) are included in the above table.

Table 25: Description of Utilization and Integration of ePCR

Agency Name	ePCR Vendor	Integrated with Cardiac Monitor	Transmit 12-Lead ECG	ePCR Integrated with Other Systems	Integration
EHS – Nova Scotia	Medusa	Yes	Yes		
EMSA – (East) Tulsa	ZOLL	Yes	Yes	No	
EMSA – (West) OKC	ZOLL	Yes	Yes	Yes	
Mecklenburg	Medusa	Yes	Yes	Yes	Sweet Billing, CAD, MARVLIS
Medic EMS	ZOLL	Yes	Yes	Yes	ZOLL CAD, custom applications (approx. 70)
MedStar	Image Trend	Yes	Yes	Yes	Integrated with CAD; allows the monitor data to be pulled from the ZOLL Cloud into the ImageTrend chart.
MEMS-LRAA	Medusa	Yes	Yes	No	Integrated with CAD
Niagara EMS	InterDev	Yes	No	Yes	CAD integration
Northwell EMS	Sansio	Yes	No	Yes	Tri-Tech CAD, FirstWatch and FirstPass
Pinellas/SunStar	ZOLL	Yes	Yes	Yes	FirstWatch; FirstPass, ESO Hospital Data Exchange
REMSA	ZOLL	Yes	No	No	
Richmond	ZOLL	Yes	No	Yes	FirstWatch and Billing Software
TRAA	Sansio	No	Yes	Yes	CAD to ePCR to billing software

Only agencies that answered the survey question(s) are included in the above table.

Respondents were requested to report survival from cardiac arrest using the Utstein template, which allows for standardized reporting of cardiac arrest.[19] The AHA recommends that EMS systems "measure the rate of survival" for victims of cardiac arrest.[20] Survival is presented in this report as arrival at emergency department with pulse and rhythm; eventually, it will be presented as "hospital discharge" to comply with the AHA guidelines. Many systems still are working with area hospitals to develop processes for gathering and reporting this data.

Table 26: Attempted Resuscitations & Percent of Successful Resuscitation by Presenting Rhythm

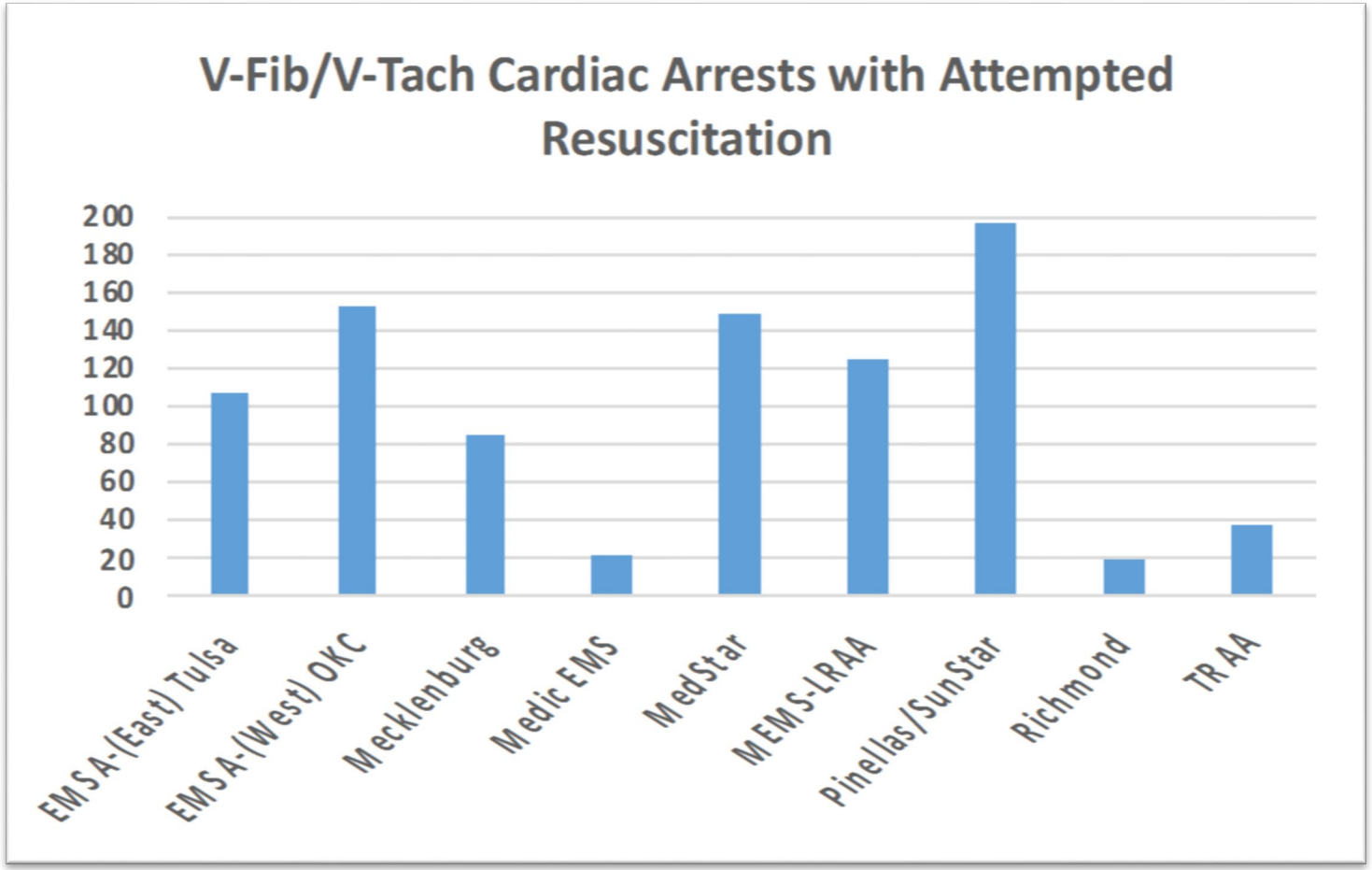
Agency Name	V-Fib/V-Tach	Resuscitation Rate	PEA/EMD	Resuscitation Rate	Asystole	Resuscitation Rate	All Utstein Resuscitation Rate
EMSA – (East) Tulsa	107	6%	236	<1%	242	0%	1%
EMSA – (West) OKC	152	8%	284	<1%	435	0%	2%
Mecklenburg	86	76%	190	44%	44	38%	55%
Medic EMS	22	45%	38	34%	49	14%	28%
MedStar	148	82%	212	58%	561	17%	37%
MEMS-LRAA	125	50%	138	25%	297	12%	24%
Pinellas/SunStar	197	45%	165	34%	410	20%	30%
Richmond	20	20%	34	21%	21	14%	19%
TRAA	38	76%	41	51%	93	23%	41%
Median	107	45%	165	30%	242	15%	28%
Average	99	45%	149	34%	239	14%	26%

Only agencies that answered the survey question(s) are included in the above table.

[19] Cummins, R.O., Chamberlain, D.A., Abramson, N.S., et. al. (1991). Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: The Utstein style. *Annals of Emergency Medicine,* 20, 861-887.

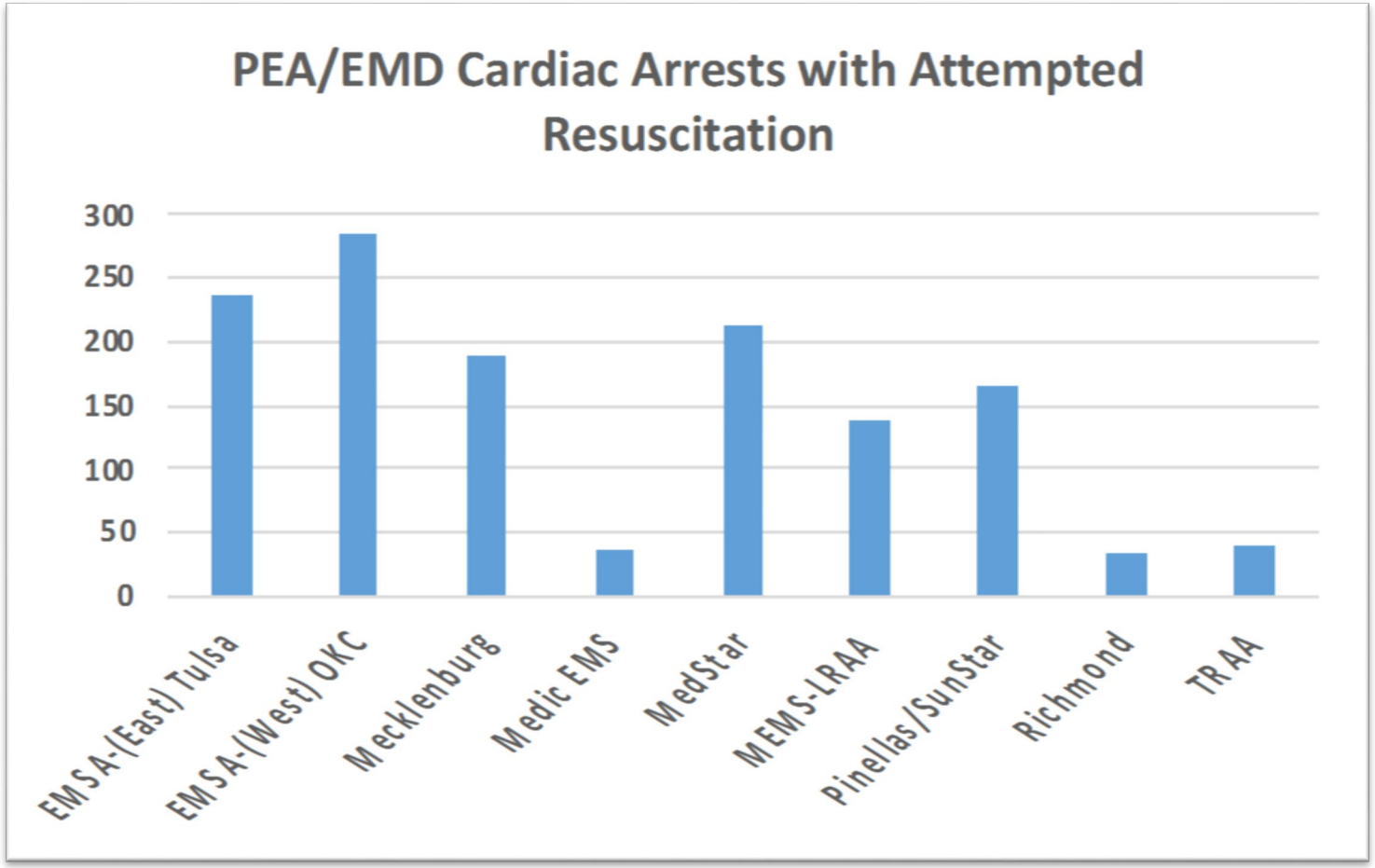
[20] International Liaison Committee on Resuscitation: 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2005: 112-Supplement December 13.

Figure 32. Number V-Fib/V-Tach Cardiac Arrests with Attempted Resuscitation



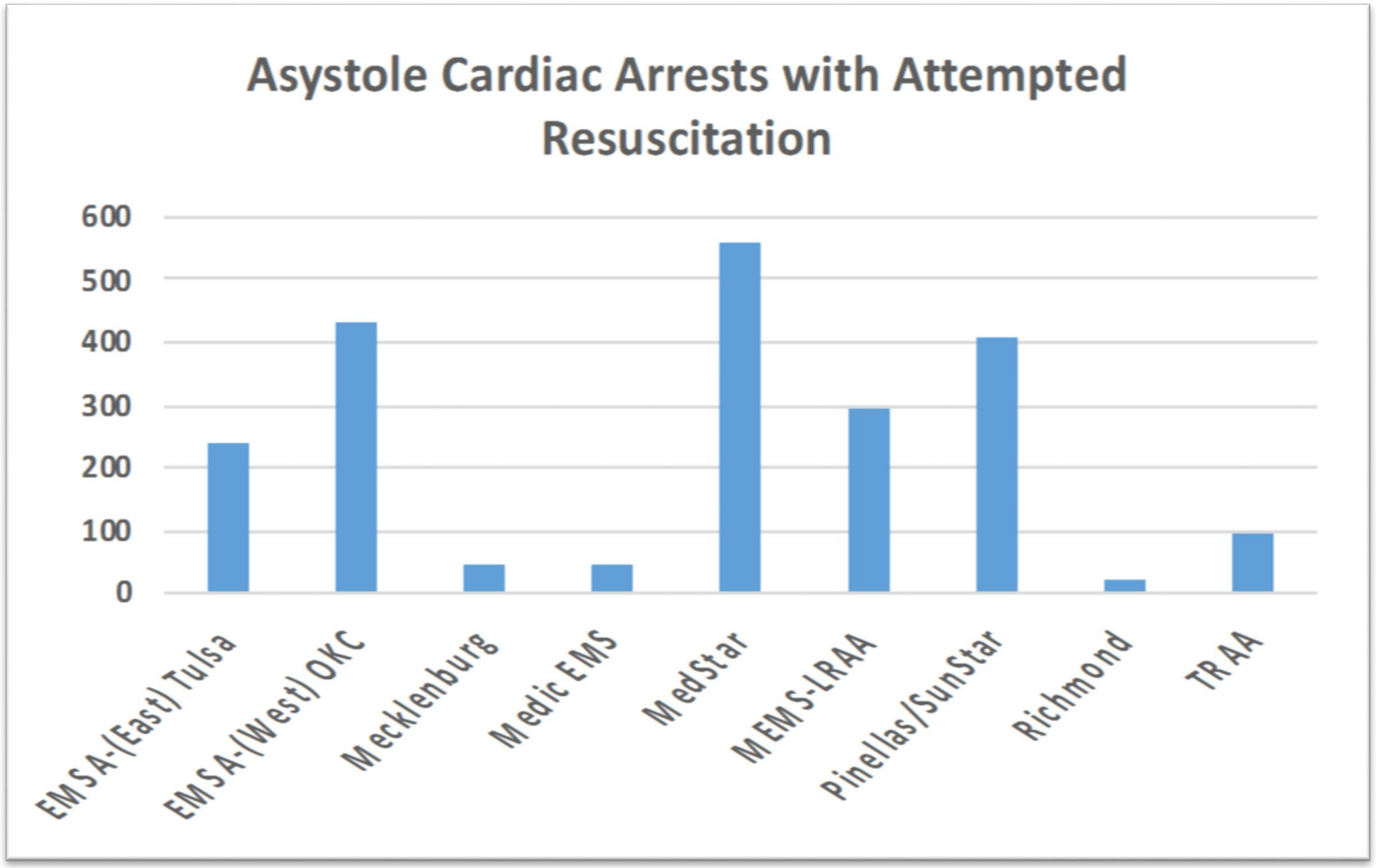
Only agencies that answered the survey question(s) are included in the above figure.

Figure 33. Number PEA/EMD Cardiac Arrests with Attempted Resuscitation



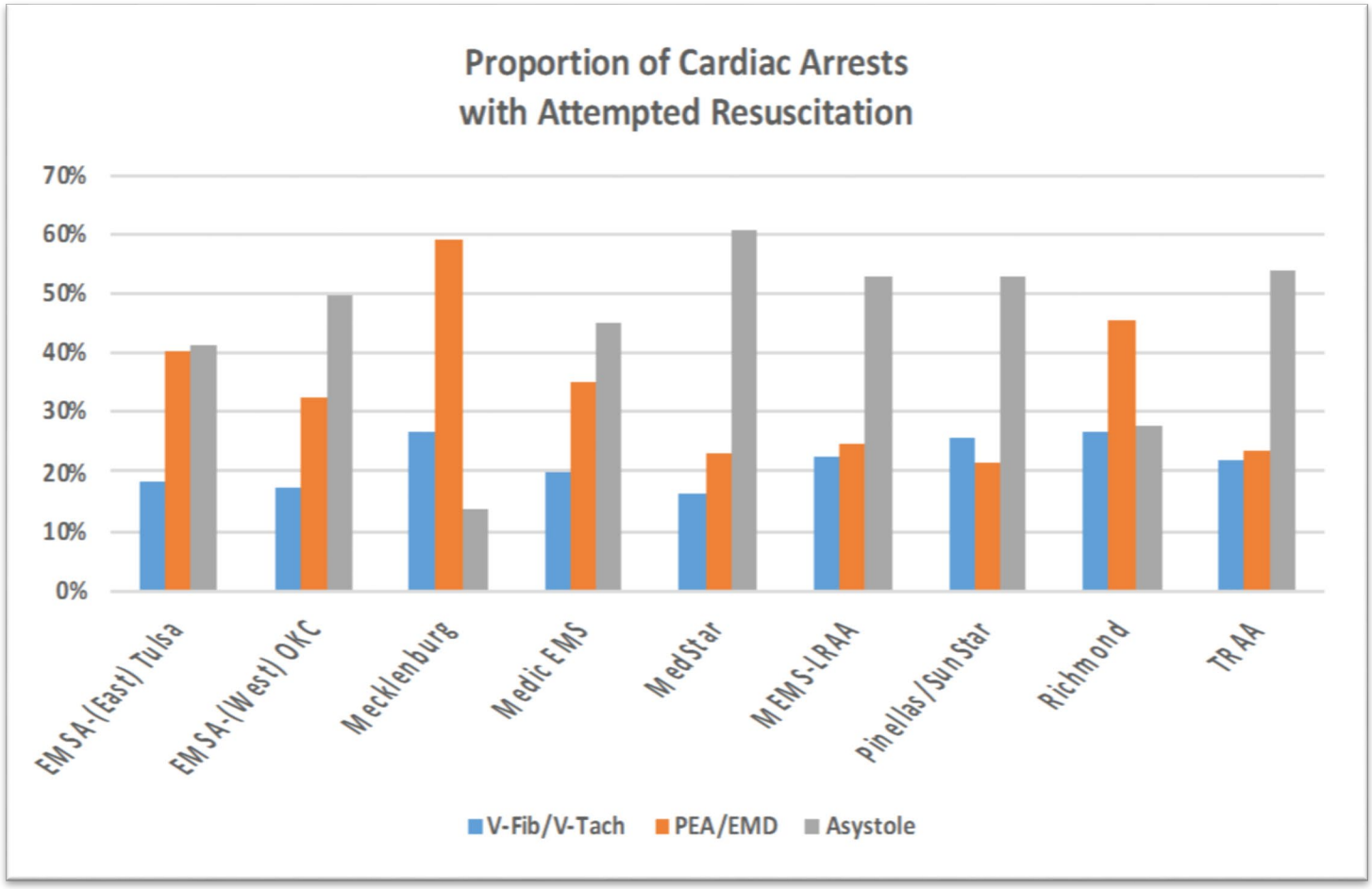
Only agencies that answered the survey question(s) are included in the above figure.

Figure 34. Number Asystole Cardiac Arrests with Attempted Resuscitation



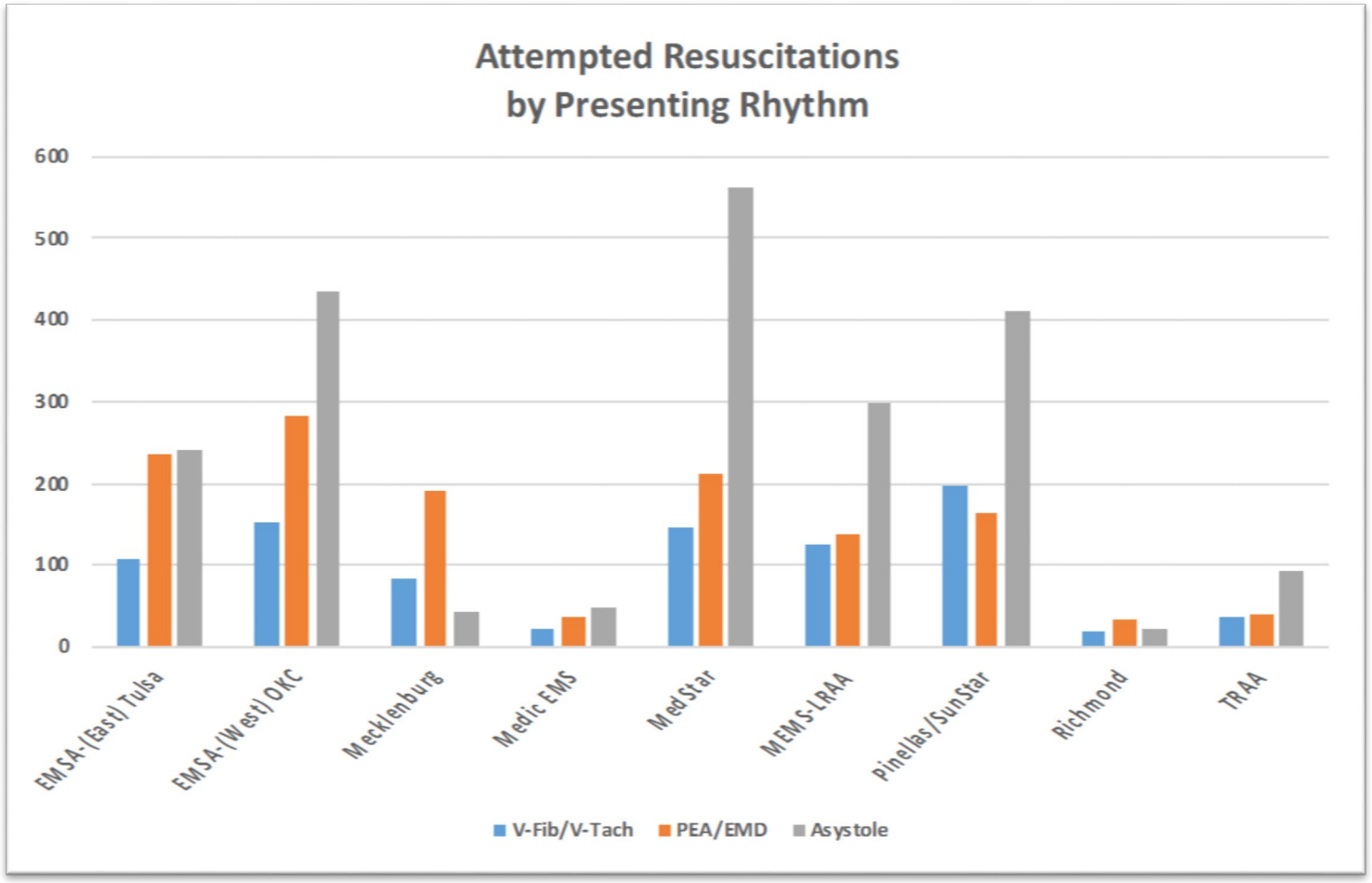
. Only agencies that answered the survey question(s) are included in the above figure.

Figure 35: Proportion of Total Cardiac Arrests with Attempted Resuscitation



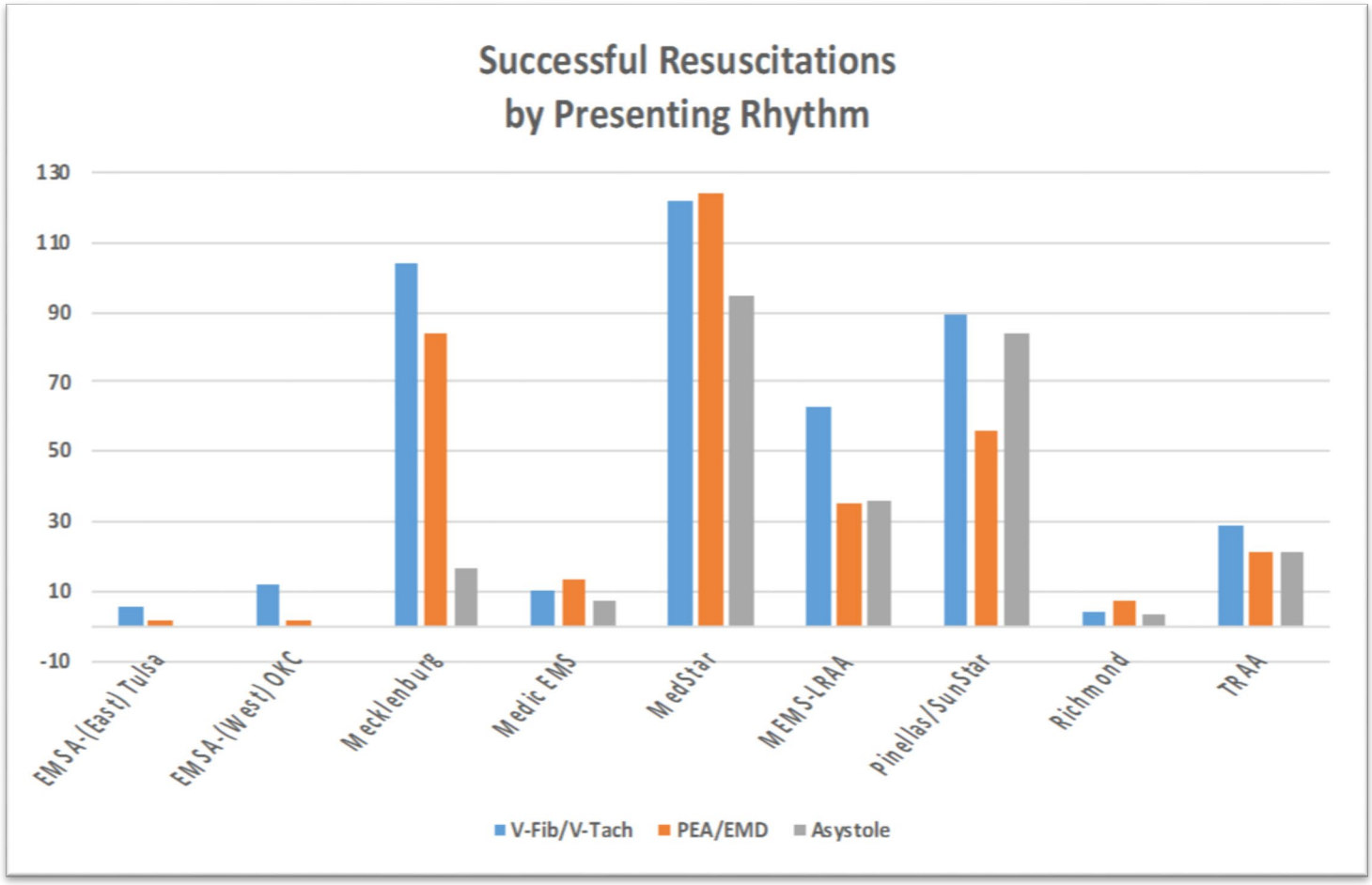
Only agencies that answered the survey question(s) are included in the above figure.

Figure 36: Number of Attempted Resuscitations by Presenting Rhythm



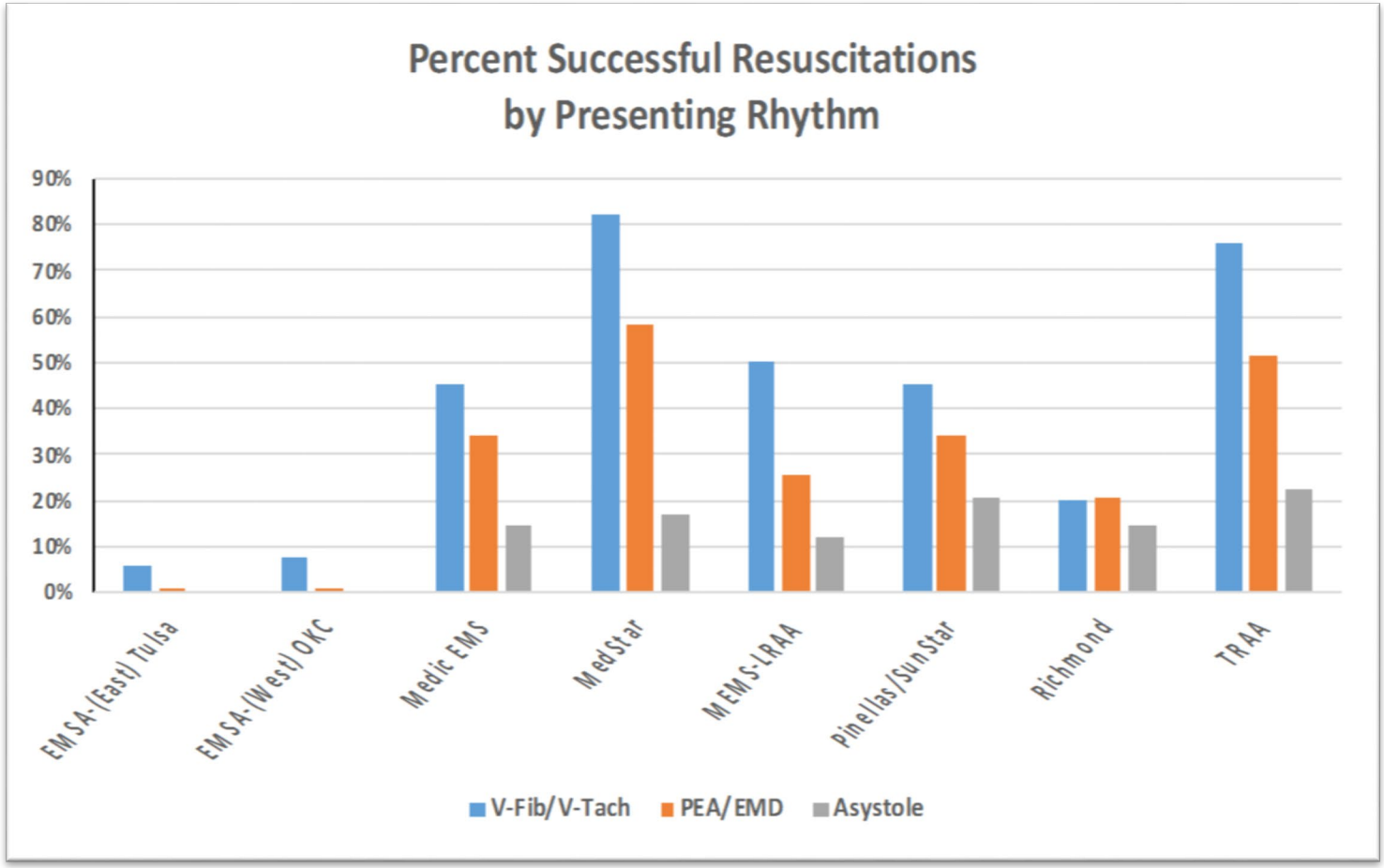
Only agencies that answered the survey question(s) are included in the above figure.

Figure 37: Number of Successful Resuscitations by Presenting Rhythm



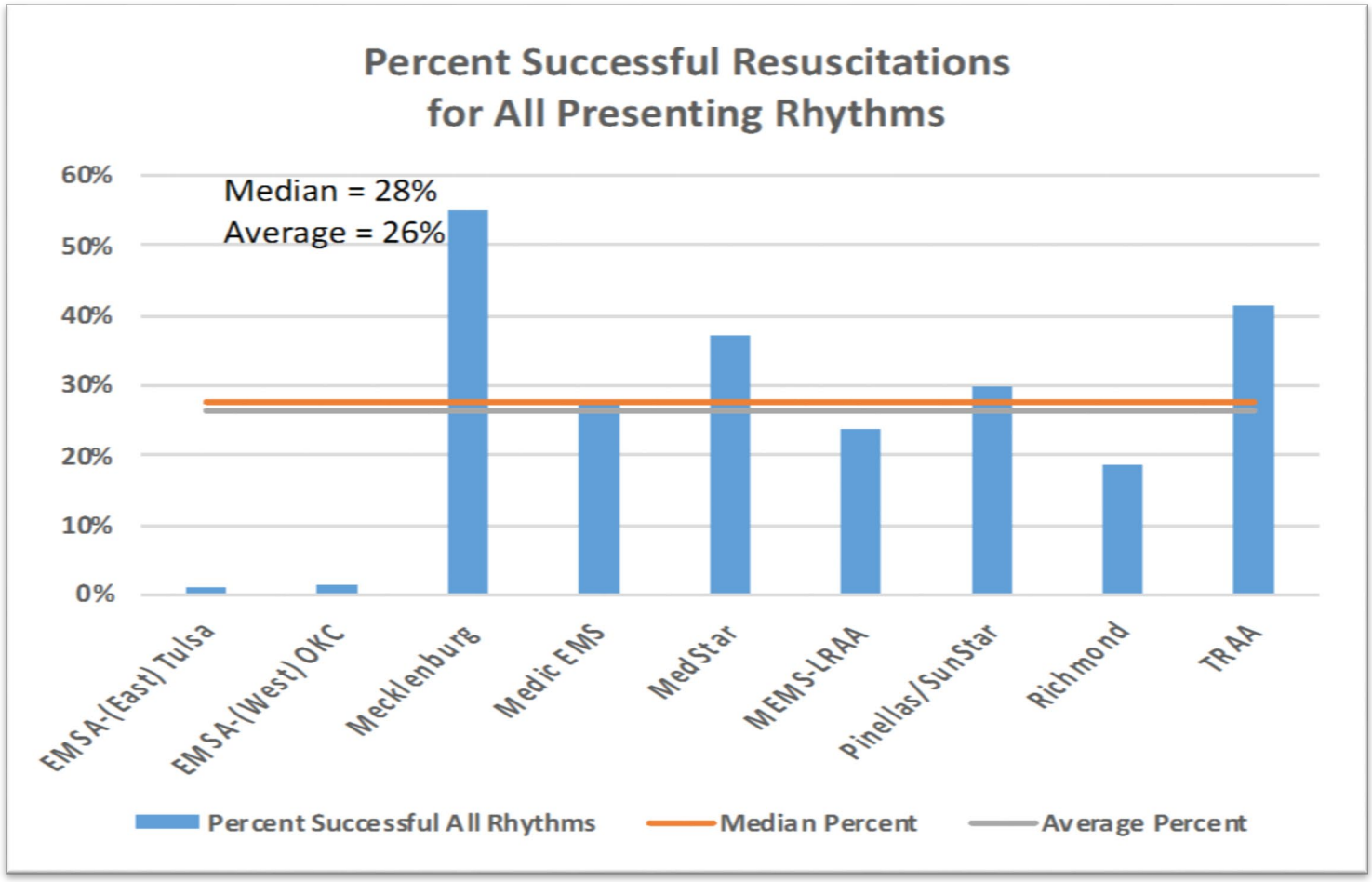
Only agencies that answered the survey question(s) are included in the above figure.

Figure 38. Percent Successful Resuscitations by Presenting Rhythm



Only agencies that answered the survey question(s) are included in the above figure.

Figure 39: Percent Successful Resuscitations for All Presenting Rhythms



Only agencies that answered the survey question(s) are included in the above figure.

SECTION 4: QUALITY ASSURANCE

Another hallmark of HPEMS systems is the commitment to continuous quality improvement. Quality Assurance and Quality Improvement (QA/QI) are necessary elements to evaluate current performance and to design the deployment system, protocols, training, curriculum, and the introduction of technology, in an effort to improve clinical care and economic efficiency.

A description of the organizational structure and design of the medical control functions, customer satisfaction, and system accreditation and awards are provided throughout Section 4.

Table 27: Description of Dispatch Quality Assurance Program

Agency Name	Formal Dispatch QA Program?	Percentage of Cases Reviewed?	Percentage of Cases Compliant to Protocol?	QA Software Vendor?
EHS – Nova Scotia	Yes	3%	94%	Aqua
EMSA- (East) Tulsa	Yes	3%	93%	Aqua
EMSA- (West OKC	Yes	2%	93%	-
Mecklenburg	Yes	3%	94%	Aqua
Medic EMS	Yes	16%	90%	-
MedStar	Yes	6%	93%	Aqua
MEMS-LRAA	Yes	6%	98%	-
Niagara EMS	Yes	4%	89%	Aqua
Northwell EMS	Yes	5%	93%	Aqua
Pinellas/SunStar	Yes	-	-	Aqua
REMSA	Yes	-	-	-
Richmond	Yes	10%	93%	Aqua
TRAA	Yes	20%	95%	Aqua

Only agencies that answered the survey question(s) are included in the above table.

Table 28: Description of Organizational Structure, Funding, and Duties for Medical Direction

Agency Name	Medical Director /Office	Medical Control Board	FTE or Hr/Wk of Medical Director (If MD Office)	Funding Source for Medical Control	Duties of OMD
EHS – Nova Scotia	Yes	No	30	100% Dept Health & Wellness	Provincial Medical Director oversees all aspects of the system, including Medical First Responders, Ground, Air, Comm and innovation programs. Oversees a number of on-line physicians, consultants, and medical experts.
EMSA - (East) Tulsa	No	Yes	-	89% ambulance/11% local FDs	Medical oversight, protocol development
EMSA - (West) OKC	No	Yes	-	89% ambulance/11% local FDs	Medical oversight, protocol development
Mecklenburg	Yes	Yes	24	100% ambulance	Set protocol, assess competency of providers, perform clinical review and oversight, EMS Fellowship Program, Guide Research activity, Report Clinical Performance to Governing Boards
Medic EMS	Yes	No	5	*Note 1	Medical Control is provided by the local receiving hospitals and a county-wide Physician's Advisory Board. Our Medical Director Protocol development and oversight, quality assurance and performance improvement.
MedStar	Yes	Yes	12.1 FTE	100% Authority	Medical control provides QA of EMS runs, provides on line protocol guidance for crew questions, provides CE to Authority employees and first responders and credentials emergency responders in the system. This is done with 10 Authority FTEs, a full-time medical director, 0.8 Associate Medical Director, and a 0.3 MIH Medical Director as well as utilization of field providers to assist in CE, credentialing, etc.
MEMS-LRAA	Yes	No	16	100% ambulance	• On line direction for termination of resuscitation • On line direction for orders outside the standing "off-line" protocols • Approves urgent transports from one facility to another Medical control is responsible for deciding what our protocols will be. They are key in the creation and implementation of these protocols that are based on the latest science. Medical control is also over the training department, who makes sure all of our employees are updated with the education of our medical procedures. Medical control is also on call for all emergency consults from medical and traumatic emergencies.
Niagara EMS	Yes	No	5	100% EMS	Oversight of Response Plan based on determinates measured against clinical data/outcomes including tiered response recommendations for other first responder agencies
Northwell EMS	Yes	No	.75	100% Hospital	Protocol management; Quality Management; Staff credentialing; Health System interface; Executive Committee Member
Pinellas/SunStar	Yes	Yes	2 FTE	50%/50% Prop tax/fees	Full time Medical Director; Two 1/2 FTE Associate Medical Directors; 100% Physician level Online Medical Control 24/7 via Radio.
REMSA	Yes	Yes	30	100% ambulance	
Richmond	Yes	No	10	n/a	QA/QI, protocols, ALS provider clearance.
TRAA	Yes	Yes	10	100% ambulance	Make medical policy, standing orders and protocols as well as locally certify medics to work in system.

**Note: Medic EMS - Combination of first responders, ambulance services, and receiving hospital facilities. Only agencies that answered the survey question(s) are included in the above table. Few agencies labeled Medical Director time as either FTEs/week or hour/week. Future survey tools should address this issue.*

Table 29: Description of Medical Oversight for QA Program

Agency Name	Number of FTE Equivalents (Exclusive of MD) involved in Oversight and QA pogrom	Chart Review?	Percentage of Charts Reviewed?	Individual Skills Measured?	Percentage of Individuals Skills Measured?	Training/QA Records Management	Formal Training Officers Program	Continuing Education Program	System Studies and Research
EHS – Nova Scotia	1.50	Yes	5%	Yes	50%	Yes	No	Yes	Yes
EMSA - (East) Tulsa	5.00	Yes	-	Yes	-	Yes	Yes	Yes	Yes
EMSA - (West) OKC	4.00	Yes	-	Yes	-	Yes	Yes	Yes	Yes
Mecklenburg	6.00	Yes	51%	Yes	-	Yes	Yes	Yes	Yes
Medic EMS	2.00	Yes	100%	Yes	-	Yes	Yes	Yes	Yes
MedStar	10.00	Yes	*Note 1	No	-	No	Yes	Yes	Yes
MEMS-LRAA	3.00	Yes	-	Yes	-	Yes	Yes	Yes	Yes
Niagara EMS	4.00	Yes	5%	Yes	-	Yes	Yes	Yes	Yes
Northwell EMS	3.75	Yes	-	Yes	-	Yes	Yes	Yes	Yes
Pinellas/SunStar	6.00	Yes	100% **Note 2	Yes	*** Note 3	Yes	Yes	Yes	Yes
REMSA	1.50	Yes	40%		40%	Yes	Yes	Yes	Yes
Richmond	2.00	Yes	15%	Yes	-	Yes	Yes	Yes	Yes
TRAA	1.00	Yes	100%	Yes	-	Yes	Yes	Yes	Yes

**Note 1: MedStar - Critical Interventions. **Note 2: Pinellas/SunStar - 100% First Pass with 15-20% human review.*

****Note 3: Pinellas/SunStar - First Pass (no % was provided)*

Only agencies that answered the survey question(s) are included in the above table.

Table 30: Description of Customer Satisfaction Measurement Program

Agency Name	Is Customer Satisfaction Measured?	How is it measured?	Is it Externally Reported?	Reported To Whom?
EHS – Nova Scotia	Yes	Comment cards	Yes	Auditor General, Public Accounts Committee of the Legislature, Annual Report, Web site
EMSA - (East) Tulsa	Yes	Telephone survey	Yes	Yes
EMSA - (West) OKC	Yes	Telephone survey	Yes	board and public (online)
Mecklenburg	Yes	Telephone survey	Yes	Included in annual report
Medic EMS	Yes	Comment cards	Yes	Board of Directors, listed on our website at www.medicems.com
MedStar	Yes	Telephone survey	Yes	Published to stakeholders and website monthly
MEMS-LRAA	No	n/a	Yes	-
Niagara EMS	Yes	Comment cards	No	No
Northwell EMS	Yes	Comment cards	Yes	-
Pinellas/SunStar	Yes	Telephone survey		EMS Authority; EMS Advisory Council; Stakeholders
REMSA	Yes	Telephone survey	Yes	Governmental oversight board
Richmond	Yes	Telephone survey	Yes	-
TRAA	Yes	Telephone survey	No	No

Note: All agencies report that customer satisfaction is measured by an external entity, except for MEMS that reports customer satisfaction is not measured.

Only agencies that answered the survey question(s) are included in the above table.

Table 31: Summary of Agency Accreditations and Awards

Agency Name	CAAS	IAED/ACE	Baldridge / EFQM	CAMTS	Other
EHS –Nova Scotia	Yes	Yes	No	Yes	
EMSA - (East) Tulsa	Yes	Yes	No	No	
EMSA - (West) OKC	Yes	Yes	No	No	
Mecklenburg	Yes	Yes	No	No	Mission Life Line Gold Award
Medic EMS	Yes	Yes			Mission Life Line Gold Award
MedStar	Yes	Yes	No	No	
MEMS-LRAA	Yes	Yes			
Niagara EMS		Yes			
Northwell EMS	Yes	Yes	No	No	
Pinellas/SunStar	Yes	Yes	In Progress	Yes	2009 Florida Sterling Award based upon Baldrige. New effort to repeat Florida Sterling Award and Baldrige Award.
REMSA	Yes	Yes		Yes	
Richmond	Yes	Yes			Virginia accredited dispatch center
TRAA	Yes	Yes	No	No	

Only agencies that answered the survey question(s) are included in the above table.

SECTION 5: FLEET STANDARDS

The operations and clinical efficacy of EMS systems are dependent upon sound procurement and vehicle specifications, as well as professionally managed repair and replacement programs. In addition, and perhaps as important, is the human element that must be accounted for through quality risk reduction and risk management strategies. These strategies may include driver training programs and the use of technology to monitor accountability.

This section of the survey captured the vehicle quantities and types, replacement schedules, the use of remounting modules, driving programs, vehicle operations recorders, and patient stretcher design.

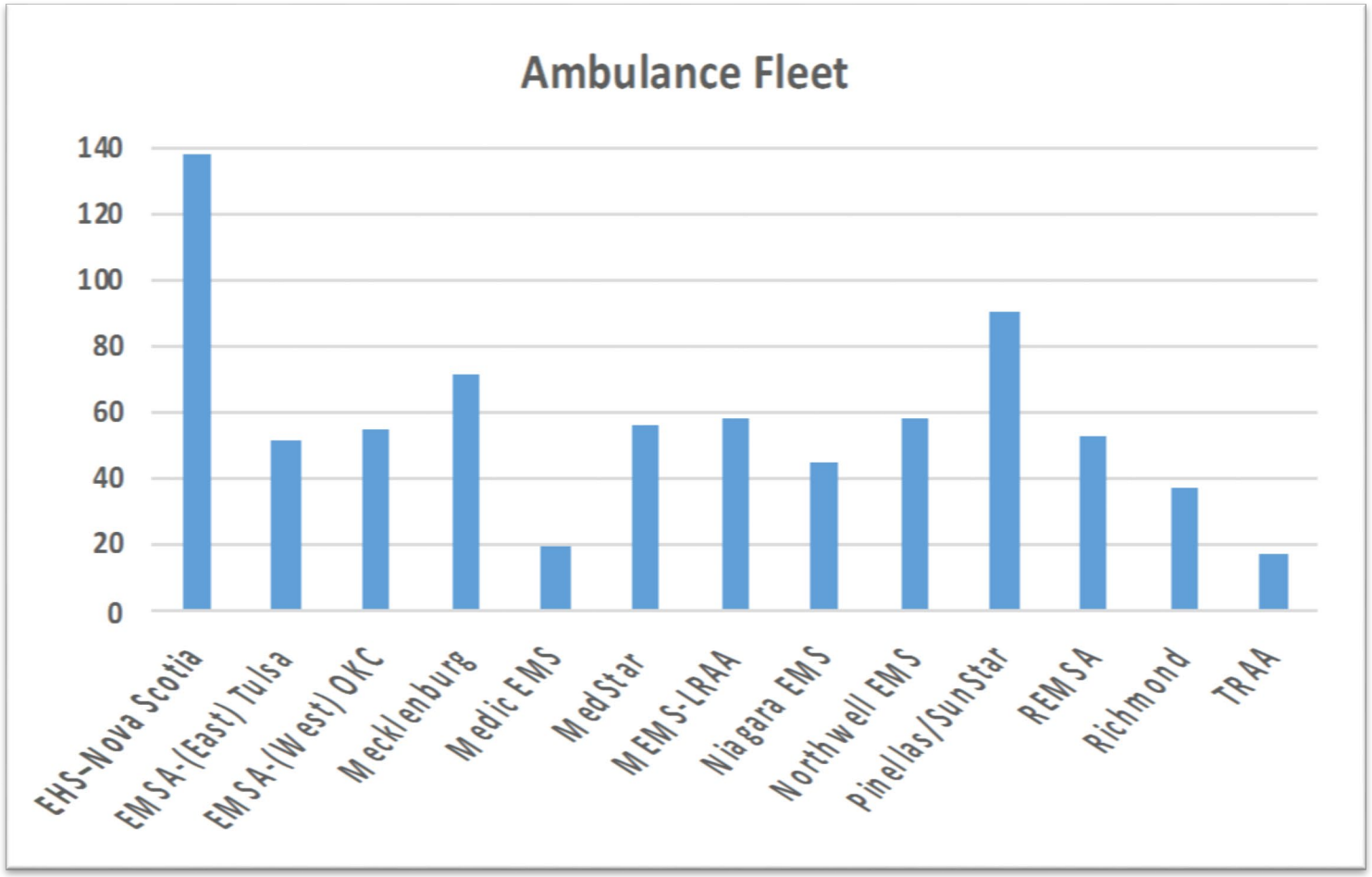
Table 32: Fleet Characteristics and Performance

Agency Name	Ambulance Fleet Size	Ambulance Replacement Distance	Ambulance Replacement Max Years	Vehicle Failures per 100,000 Miles	Vehicle Collisions per 100,000 Miles
EHS – Nova Scotia	138		4	1.60	0.82
EMSA - (East) Tulsa	52			5.76	1.86
EMSA - (West) OKC	55				
Mecklenburg	72	300,000 miles	n/a	1.42	1.10
Medic EMS	20	250,000 miles	6	2.5	1.20
MedStar	56	250,000 to 300,000 miles	5-6	0	1.15
MEMS-LRAA	58	200,000 miles	5		
Niagara EMS	45	217,480 miles	5		
Northwell EMS	59	200,000 miles	10	1	5
Pinellas/SunStar	91	n/a	6	3.10	3.49
REMSA	53	350,000 miles	5	-	-
Richmond	37	Cond/cost dependent	Same	3.70	2.1
TRAA	17		5		

Answers provided in kilometers have been converted to square miles.

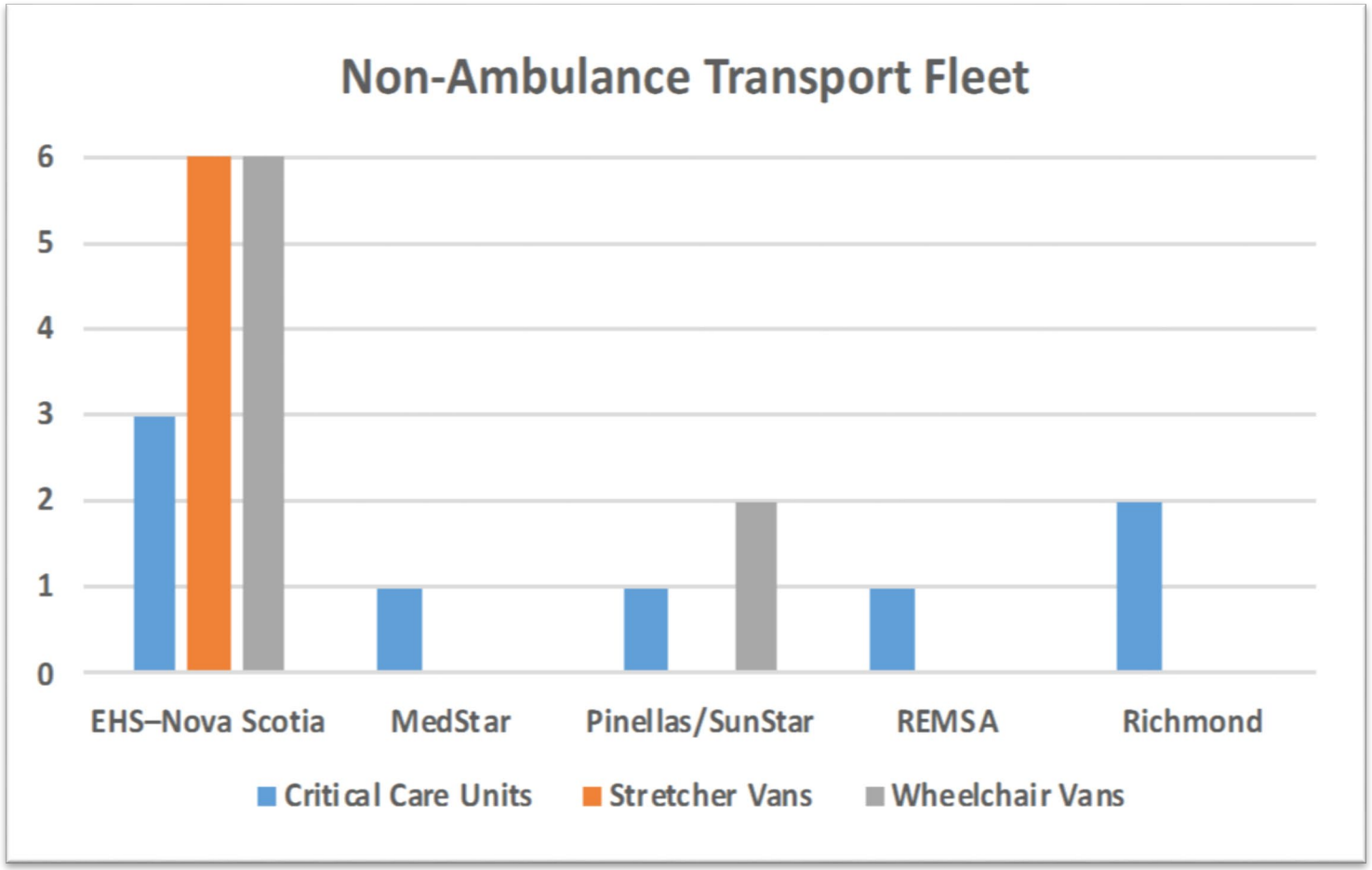
Only agencies that answered the survey question(s) are included in the above table.

Figure 40: Ambulance Fleet



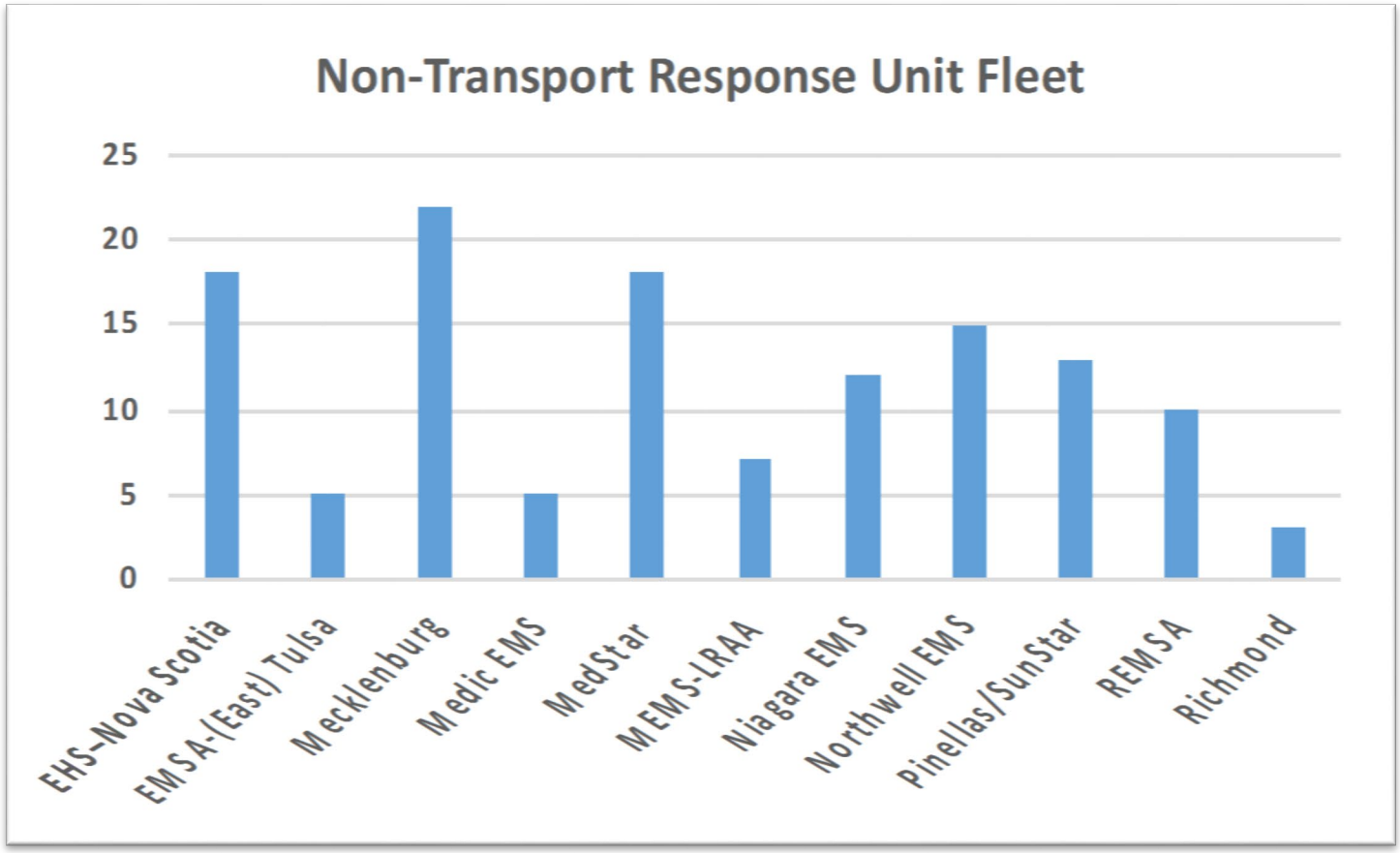
Only agencies that answered the survey question(s) are included in the above figure.

Figure 41. Non-Ambulance Transport Fleet



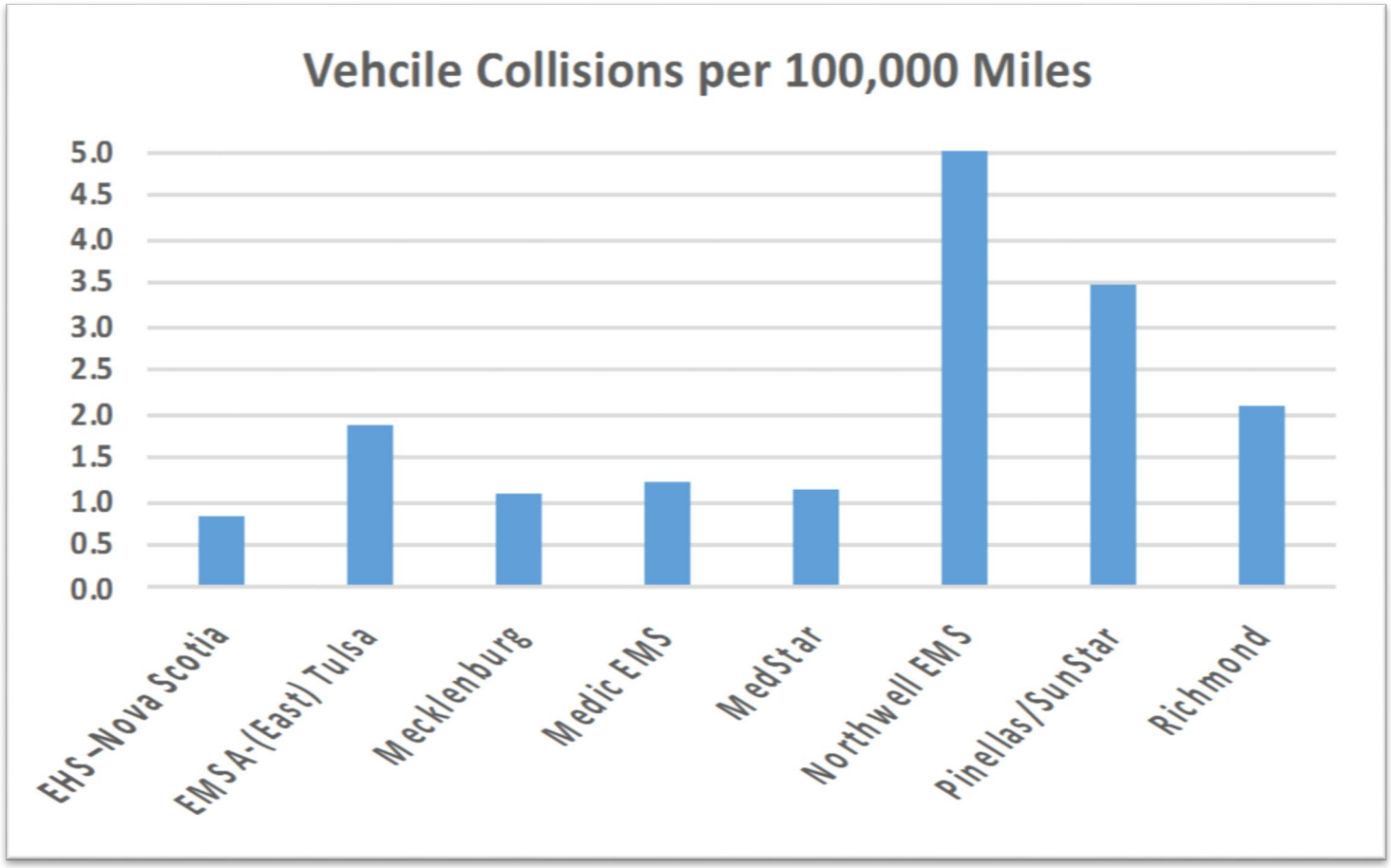
EHS-Nova Scotia's CCTs are air units.
Pinellas's Wheelchair vans are designated Mental Health Transport Vans.
Norwell EMS reports that CCT units vary by staffing availability.
Only agencies that answered the survey question(s) are included in the above figure.

Figure 42. Non-Transport Unit Fleet



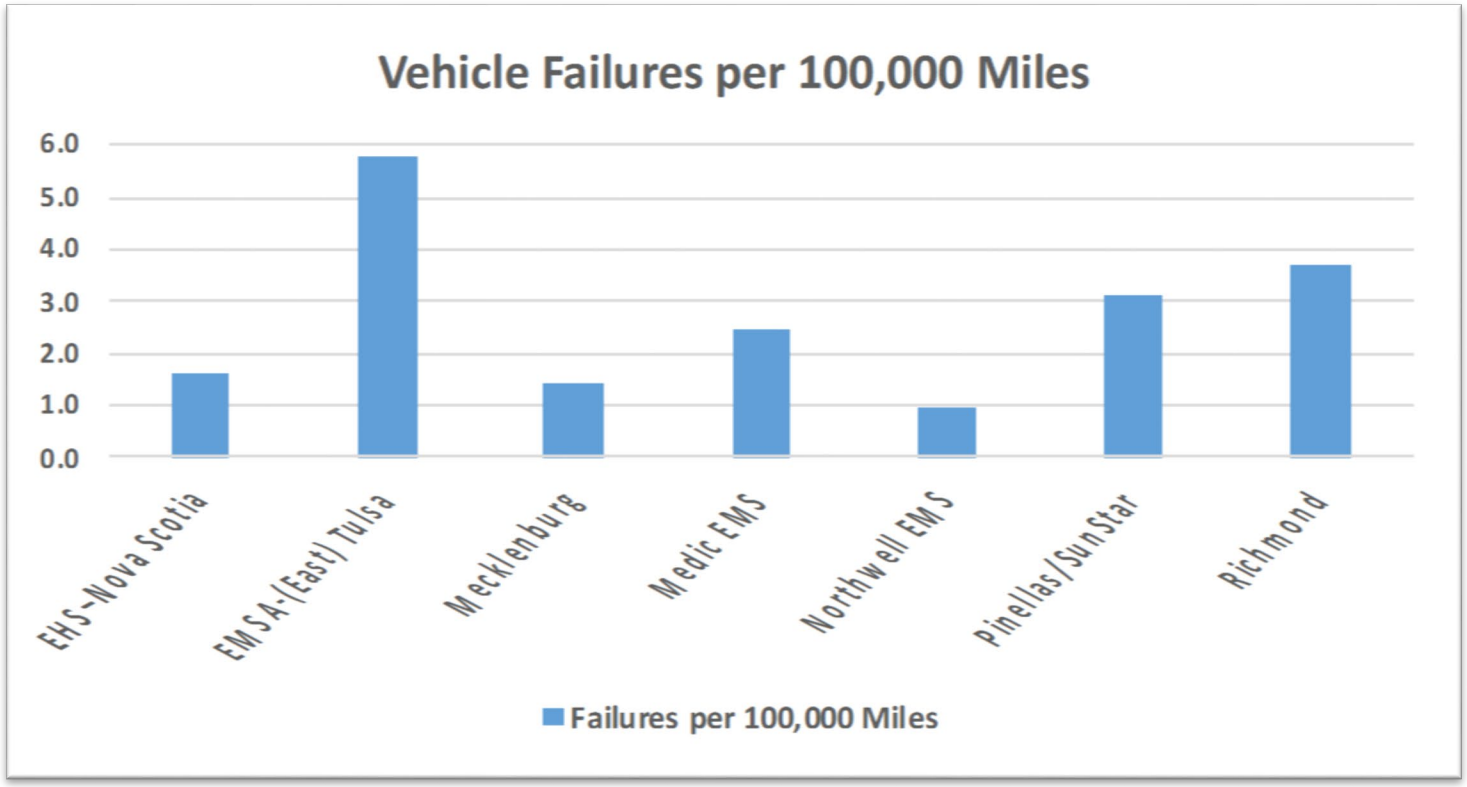
Only agencies that answered the survey question(s) are included in the above figure.

Figure 43: Vehicle Collisions per 100,000 Miles



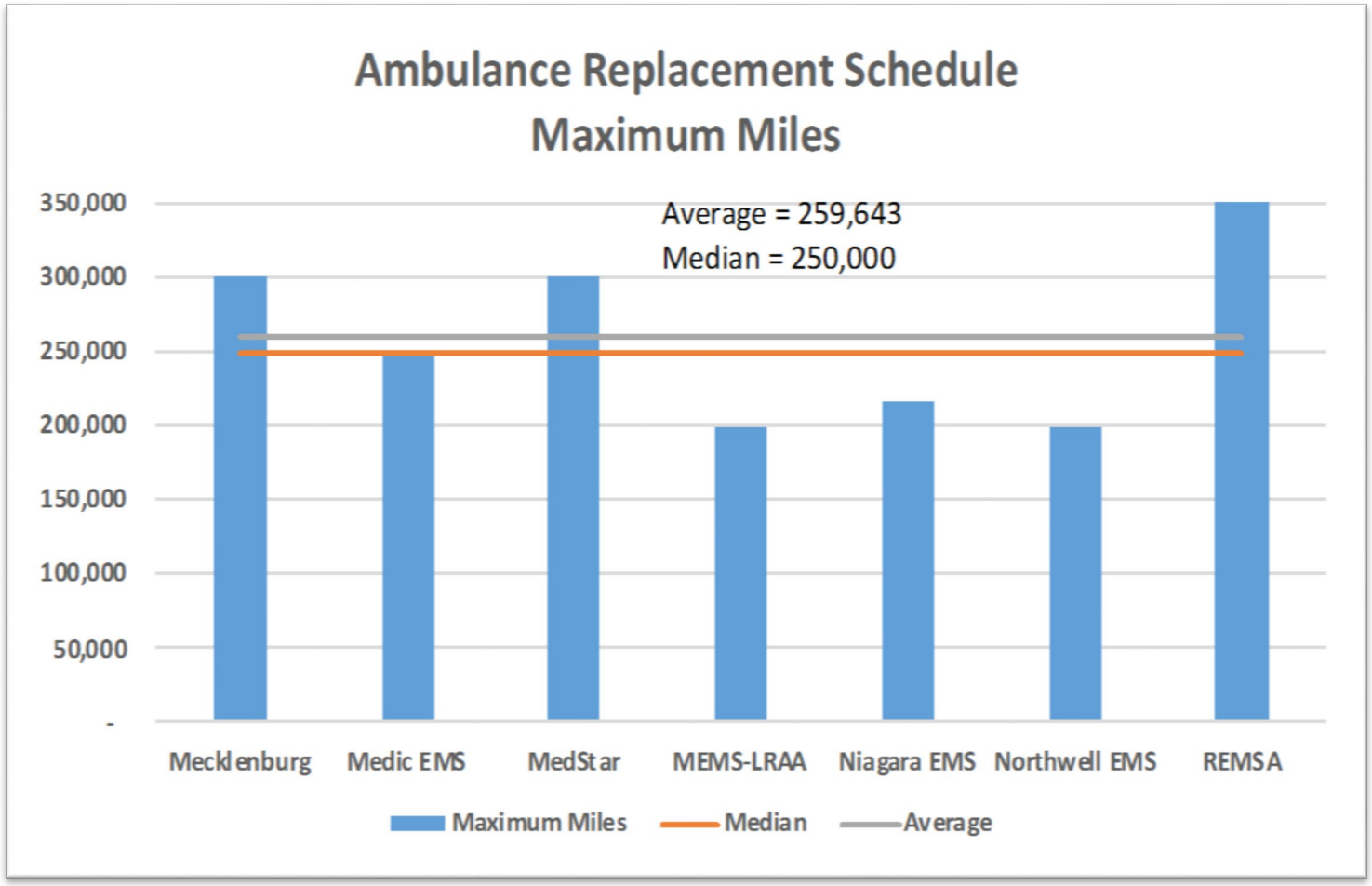
Only agencies that answered the survey question(s) are included in the above figure.

Figure 44. Vehicle Failures per 100,000 Miles



Only agencies that answered the survey question(s) are included in the above figure.

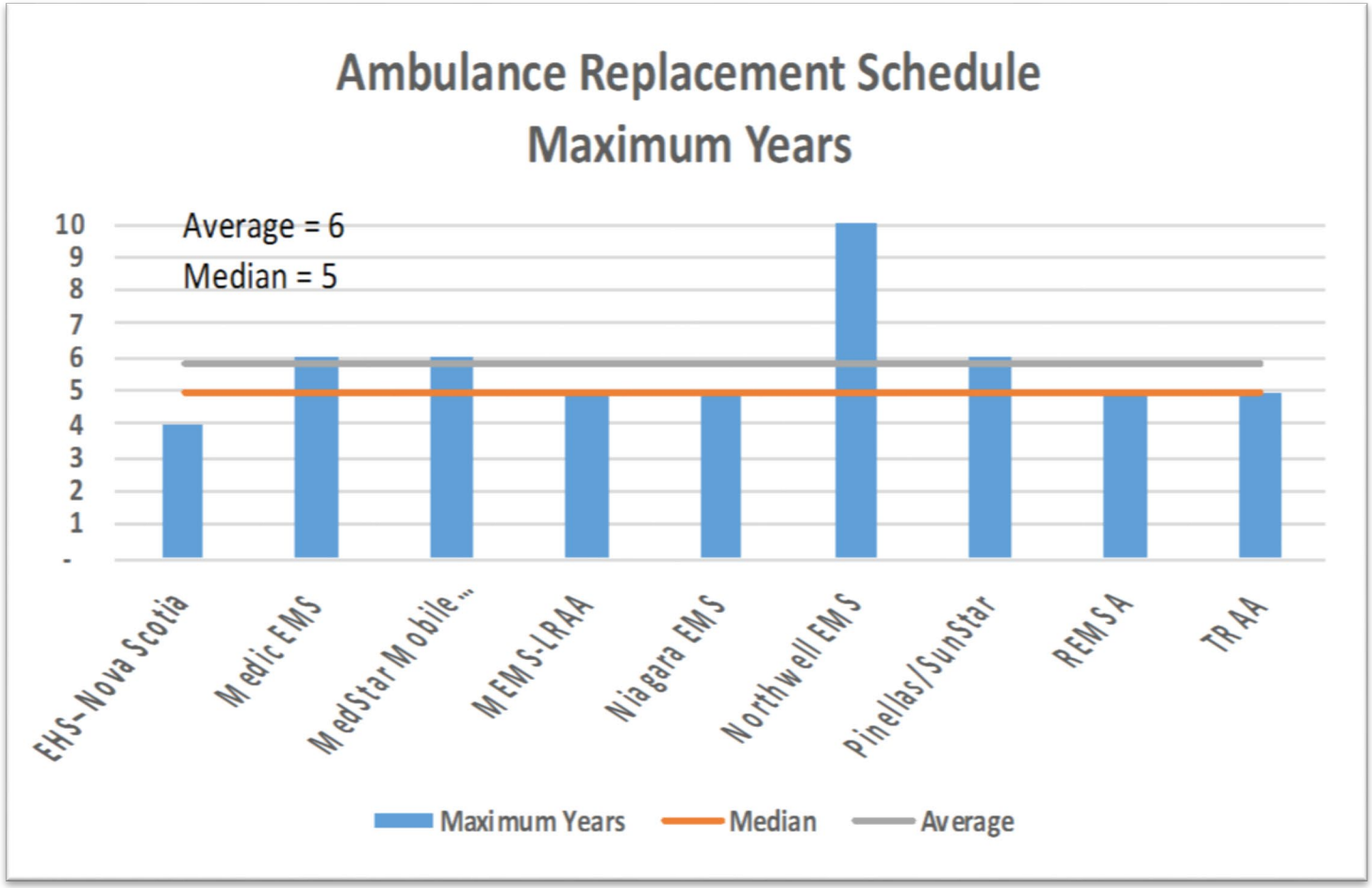
Figure 45: Ambulance Replacement Schedule – Maximum Miles



Answers provided in kilometers have been converted to square miles.

Only agencies that answered the survey question(s) are included in the above figure.

Figure 46. Ambulance Replacement Schedule - Maximum Years



Only agencies that answered the survey question(s) are included in the above figure.

Table 33: Ambulance Characteristics by Agency

Agency Name	Type 1	Remount & Max #	Type 2	Remount & Max #	Type 3	Remount & Max #
EHS – Nova Scotia	0		0		138	Yes
EMSA - (East) Tulsa	51	Yes	1	No	0	
EMSA - (West) OKC	51	Yes	4		0	
Mecklenburg	64	Yes: 2 max	8	No	0	
Medic EMS	2	Yes: 1 max	3		15	Yes: 3max
MedStar	0		2	No	55	Yes: 3 max
MEMS-LRAA	0		18	No	40	Yes: 20 max
Niagara EMS	0		0		45	Yes
Northwell EMS	11	No	0		48	No
Pinellas/SunStar	0		16	No	75	Yes: 2 max
REMSA	2	Yes: 2 max	1	No	50	Yes: 3 max
Richmond	2	Yes	8	No	29	Yes
TRAA	0		0		17	Yes: 2 max

Only agencies that answered the survey question(s) are included in the above table. Some included did not have responses to all items in the question.

Table 34: Description of Driver Programs and Safety Related Equipment

Agency Name	Formal Driving Program Required for Designated Drivers?	Which Program?	Vehicle Operations Recorder?	Which Vendor?	Brand of COT	Power Assisted?	Bariatric Unit	Power Lift on Vehicle
EHS – Nova Scotia	Yes	Internal	Yes	Ferno Acetech	Stryker	Some	Yes	Ramp
EMSA - (East) Tulsa	Yes		Yes	ZOLL / Digital Ally	Stryker	Yes	Yes	Yes
EMSA - (West) OKC	Yes		Yes	ZOLL / Digital Ally	Stryker	Yes	Yes	
Mecklenburg	Yes	Smith System	Yes	GeoTab	Stryker	No	Yes	No
Medic EMS	Yes	EVOC	Yes	ZOLL / Digital Ally	Stryker	Yes	Yes	Yes
MedStar	Yes	CEVO3	Yes	DriveCam	Stryker	Yes	Yes	Yes
MEMS-LRAA	Yes	EVOC	Yes	ZOLL Road Safety	Stryker	Yes	No	No
Niagara EMS	Yes	CEVO	Yes	Ferno Acetech	Stryker	Yes	Yes	Yes
Northwell EMS	Yes	CEVO	No		Stryker	Yes	No	Yes
Pinellas/SunStar	Yes	EVOC	Yes	In-thinc	Stryker	Yes	Yes	No
REMSA	Yes	-	Yes	DriveCam	Stryker	Yes	Yes	Yes CCT
Richmond	Yes	RAA EVOC (VA-OEMS)	Yes	ZOLL	Stryker	Yes	Yes	Yes
TRAA	Yes	-	Yes	ZOLL Road Safety	Stryker	Yes	No	No

Only agencies that answered the survey question(s) are included in the above table.

SECTION 6: HUMAN RESOURCE PERFORMANCE

In the Human Resource Performance section of the benchmarking survey, agencies were requested to provide information regarding the workforce, collective bargaining and labor representation, and data regarding injury and illnesses.

In addition, information was also obtained that was utilized to determine the attrition rate and the supervisor to employee ratios. Finally, data was furnished that demonstrates the breadth and depth of prevention and risk management programs in an effort to keep employees safe and free from injury. This information is presented below in Table 35.

Table 35: Agency Prevention and Risk Management Programs

Agency Name	Blood-borne and Air-borne Pathogens	Hazmat (OSHA or Equivalent)	PPE (Meets Level C)	WMD Awareness	EVOC	EVOC Course Name
EHS – Nova Scotia	Yes	No	Yes	Yes	Yes	In house contractor
EMSA - (East) Tulsa	Yes	Yes	Yes	Yes	Yes	EVOC
EMSA - (West) OKC	Yes	Yes	Yes	No	Yes	EVOC
Mecklenburg	Yes	Yes	Yes	No	Yes	EVOC
Medic EMS	Yes	Yes	No	Yes	Yes	EVOC
MedStar	Yes	Yes	Yes	Yes	Yes	CEVO3
MEMS-LRAA	Yes	Yes	Yes	No	Yes	EVOC
Niagara EMS	Yes	Yes	Yes	No	No	-
Northwell EMS	Yes	Yes	Yes	Yes	Yes	CEVO
Pinellas/SunStar	Yes	Yes	Yes	Yes	Yes	EVOC
REMSA	Yes	Yes	Yes	Yes	Yes	EVOC
Richmond	Yes	Yes	No	No	Yes	RAA EVOC
TRAA	Yes	Yes	Yes	Yes	Yes	CEVO

Only agencies that answered the survey question(s) are included in the above table.

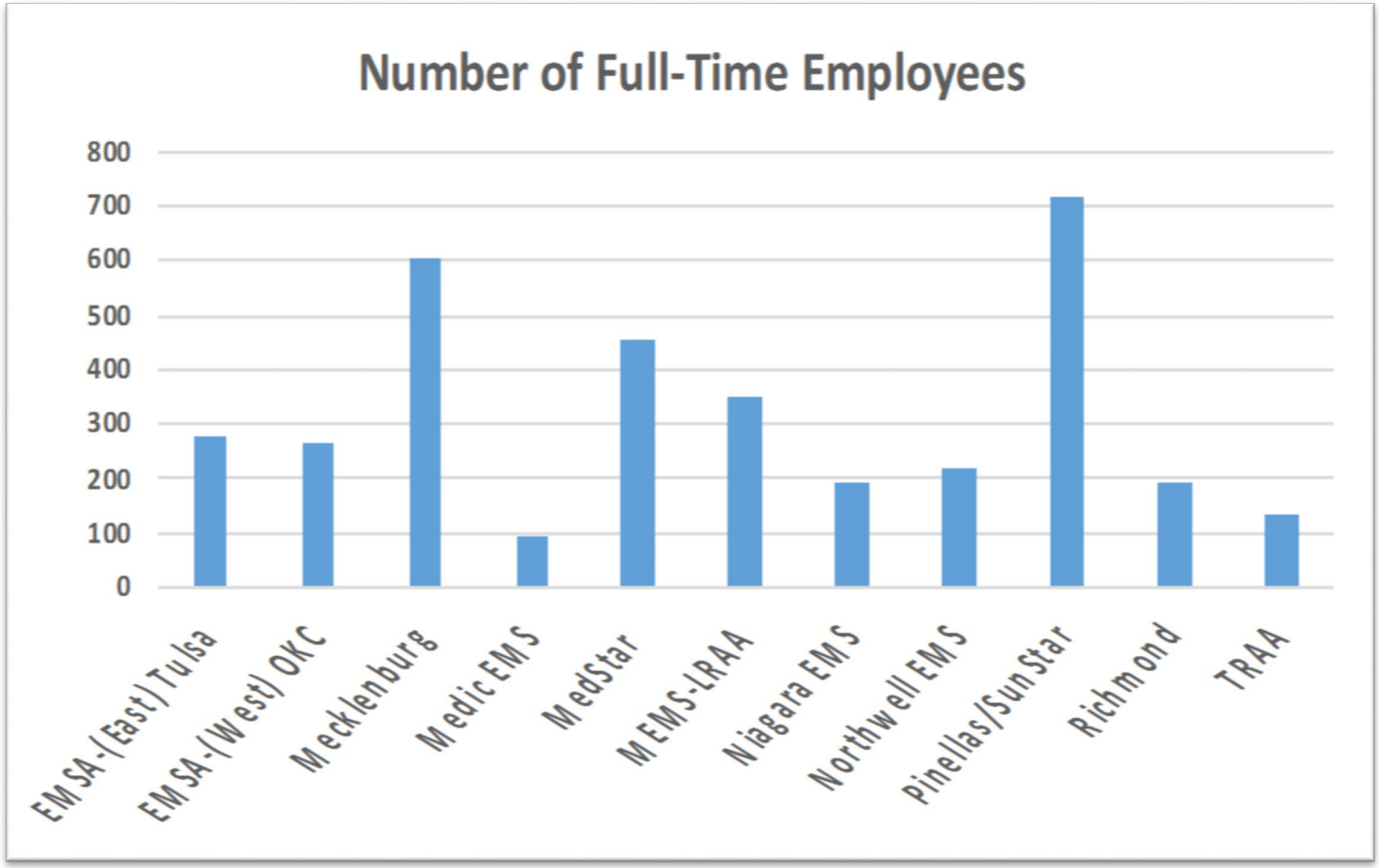
Table 36: Description of Labor Representation Across Personnel Groups

Agency	Field Staff Covered by Collective Agreement/Union Contract?	Dispatch Staff Covered by Collective Bargaining Unit?	Office Staff Covered by Collective Bargaining Unit?
EHS – Nova Scotia	Yes IUOE	Yes CUPW	No
EMSA - (East) Tulsa	No	No	No
EMSA - (West) OKC	Yes IAEP	No	No
Mecklenburg	No	No	No
Medic EMS	No	No	No
MedStar	No	No	No
MEMS-LRAA	No	No	No
Niagara EMS	Yes CUPE 1019	Yes CUPE 1019	No
Northwell EMS	No	No	No
Pinellas/SunStar	Yes IAEP	Yes IAEP	No
REMSA	No	No	No
Richmond	No	No	No
TRAA	Yes IAEP R-7 525	Yes IAEP R-7 525	No

Only agencies that answered the survey question(s) are included in the above table.

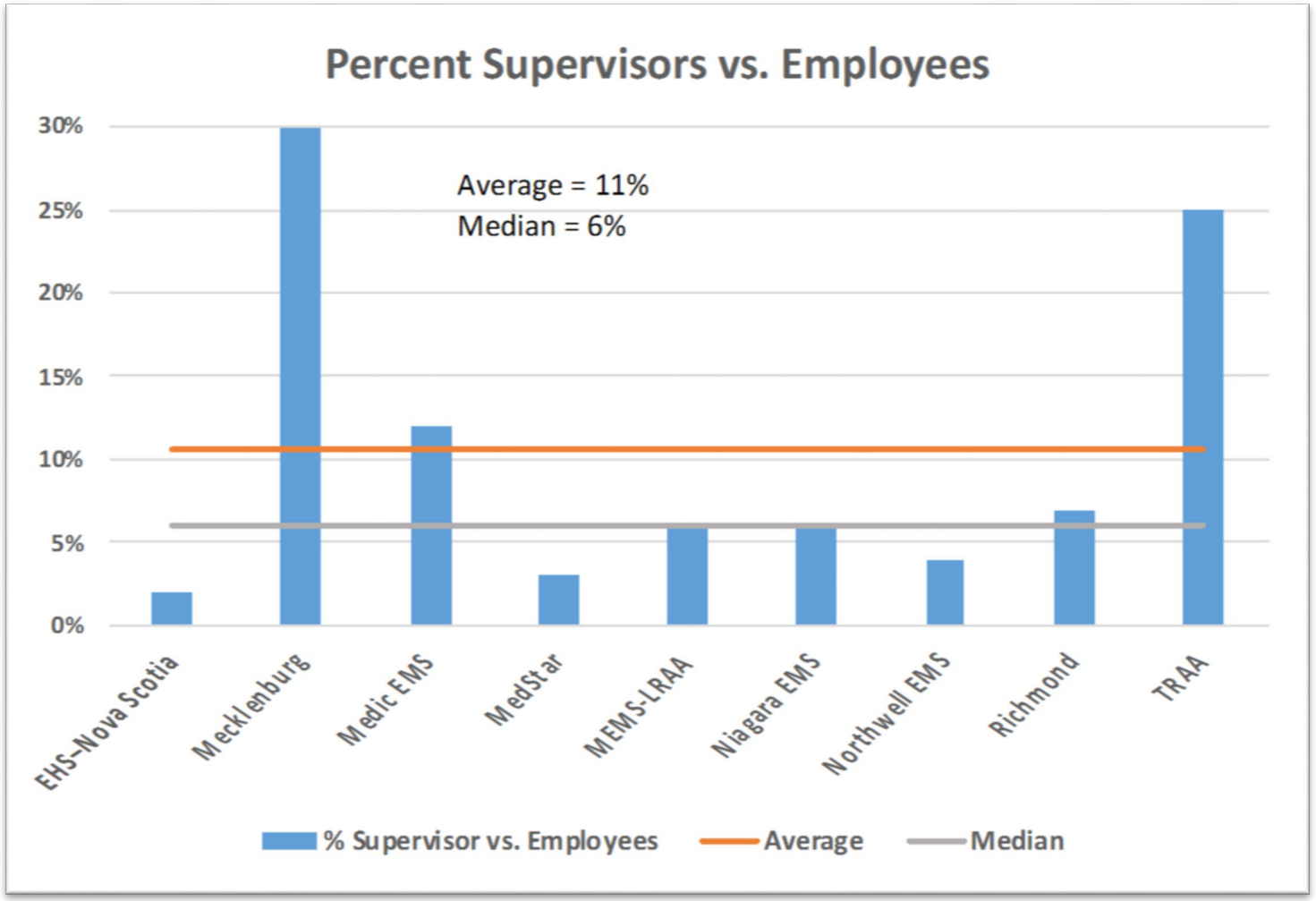
It is worth mentioning that all agencies (100%) report having internal management training programs, up from 77% in the 2014 survey.

Figure 47: Number of Full-Time Employees at FY End



Only agencies that answered the survey question(s) are included in the above figure.

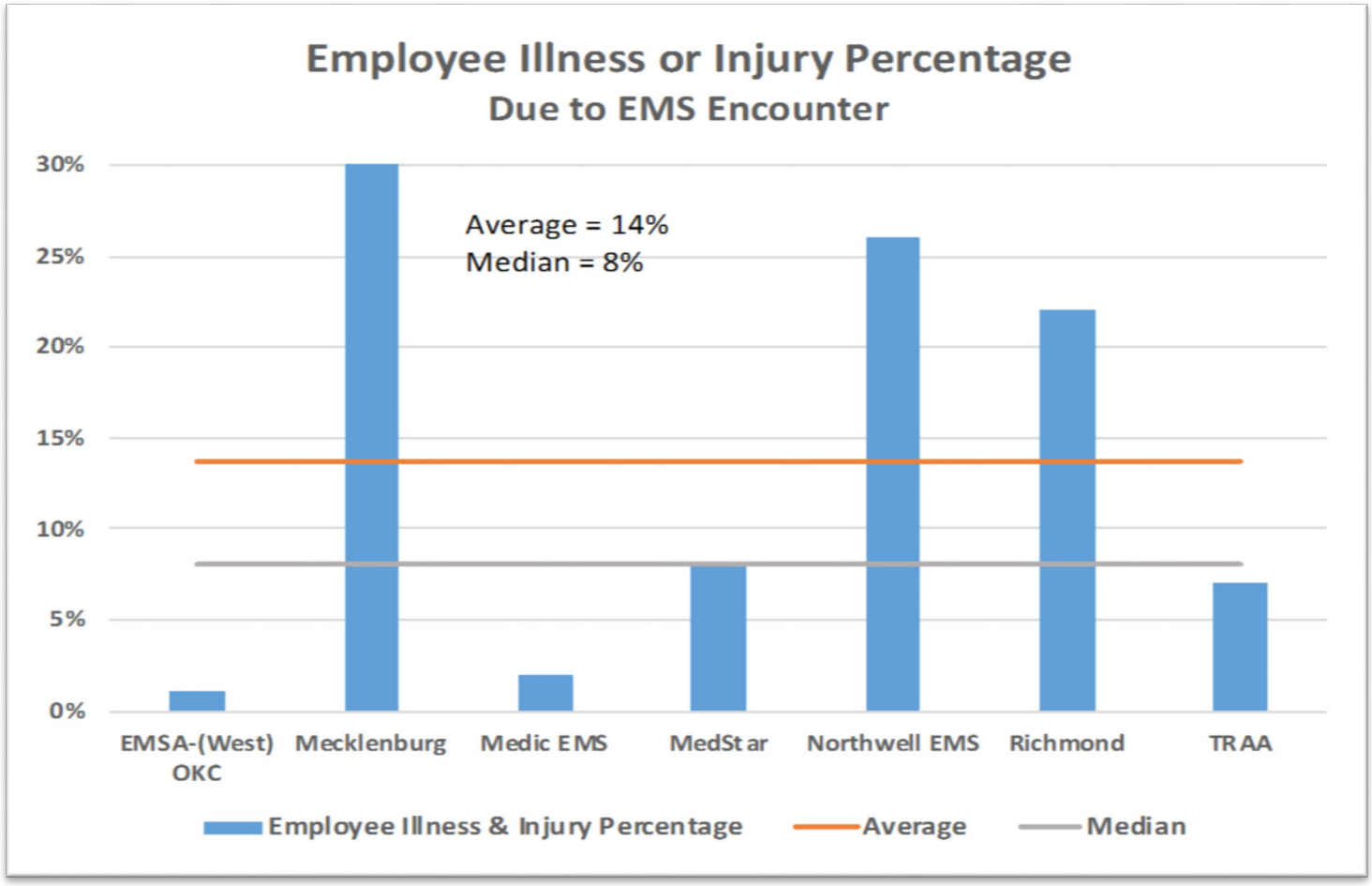
Figure 48: Percent Supervisors vs. Employees



Note: Data is based on field operations personnel only.

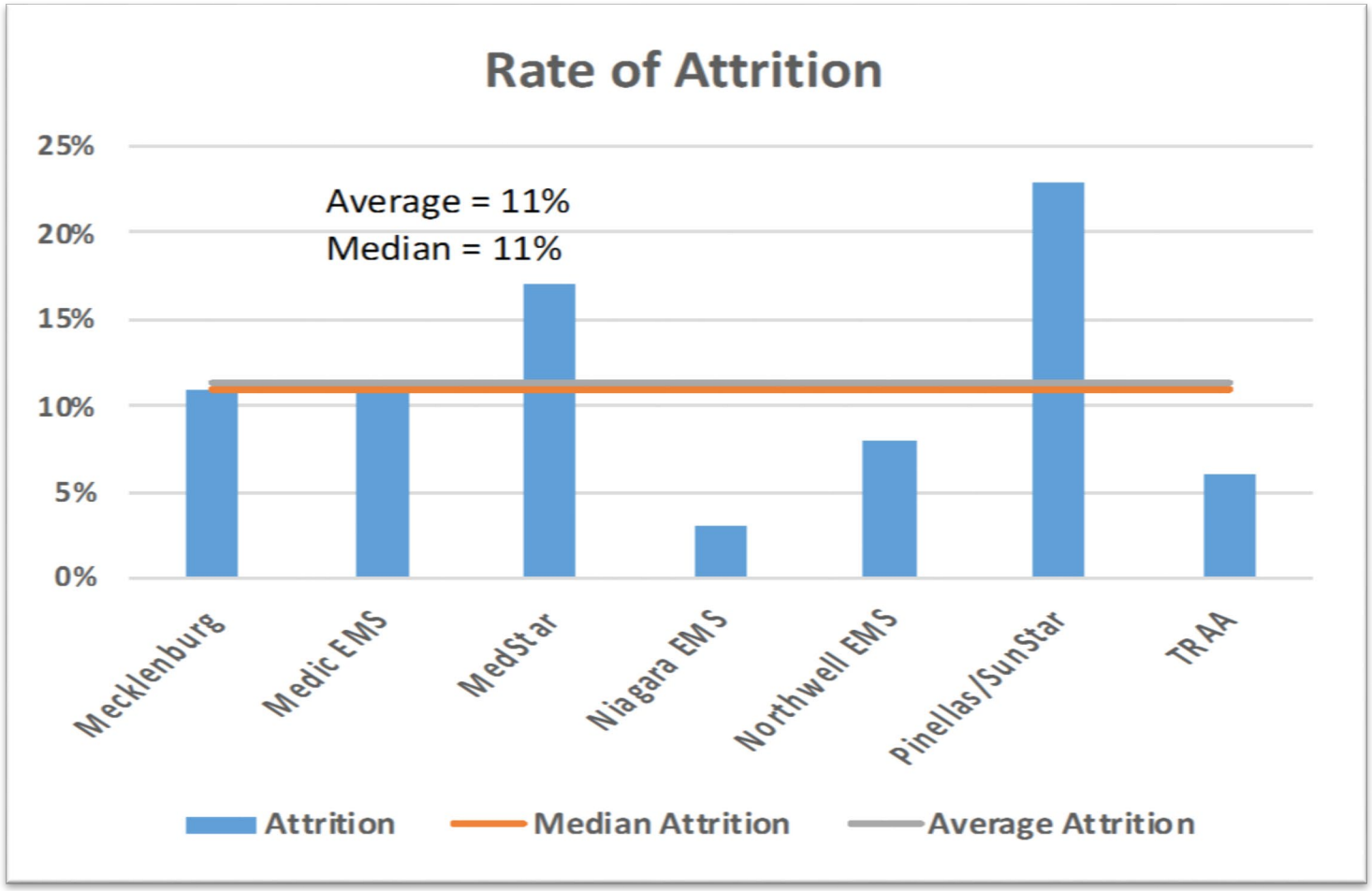
Only agencies that answered the survey question(s) are included in the above figure.

Figure 49: Employee Illness or Injury Percentage



Only agencies that answered the survey question(s) are included in the above figure.

Figure 50: Rate of Attrition



Note: Rate of attrition was a calculation based on reported number of employees at fiscal year-end and reported number who left during that fiscal year, expressed as a percentage.

Only agencies that answered the survey question(s) are included in the above figure.

SECTION 7: ECONOMIC EFFICIENCY AND COSTS

The information reported in the three sections, General Information, Response-time Standards, and Clinical Performance, establish a comprehensive foundation from which to benchmark the cost-efficiency of the participating HPEMS systems. Maintaining response-time reliability, or the cost of the system's ability to be prepared to meet the response-time standard, is the primary determinant of EMS system cost. Two economic measures that furnish the basis for a fair and meaningful comparison of system costs and productivity are as follows:[21, 22]

- Total system cost per patient transported
- Total system cost per capita

The first step in determining cost-effectiveness, or economic efficiency, is to include all system costs in the analysis. The system design itself may pose another barrier to comprehensive cost analysis. In systems without exclusivity, two or more organizations may be competing for the non-emergent patients in that community and their costs may not be reported or even available. Not only does this make cost-comparison difficult, there is also evidence that the system may be less productive and the cost per transport may increase for the primary emergency provider as a result of the existence of multiple providers in the same market.[23] The majority of HPEMS participants in this study have exclusivity of the marketplace, meaning that all emergency and non-emergency transports are performed by the same organization in the system. This allows for more efficient production and also provides for meaningful comparisons of total system costs.

The efficiency of all-ALS systems is measured by Unit Hour Utilization (UHU), Cost per Transport, and Cost per Capita. These measurements are provided as follows:

- **UHU:** To determine a system's UHU, the number of transports performed in a given period of time is divided by the number of unit hours produced during the same time period.
- **Cost per transport:** This is determined by dividing the cost per unit hour by the system's UHU. All system costs must be included in the unit hour costs to ensure accuracy and comparability between systems.
- **Cost per capita:** This is defined by total system cost divided by the total population.

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[21] Stout, J.L. (1994). System Financing. In W.R. Roush (ed.). *Principles of EMS Systems,* (2nd Ed.). Dallas, TX: American College of Emergency Physicians.
[22] National Highway Traffic Safety Administration. (1996). *EMS agenda for the future.* Washington, DC: NHTSA.
[23] Overton, J., & Stout, J. (2002). In A.E. Kuehl (ed.), *Prehospital systems and medical oversight,* (3rd ed.). Dubuque, IA: Kendall Hunt Publishing.

The results are shown in Tables 37 – 39 and through graphical representations in Figures 51 to 63, providing comparisons between systems.

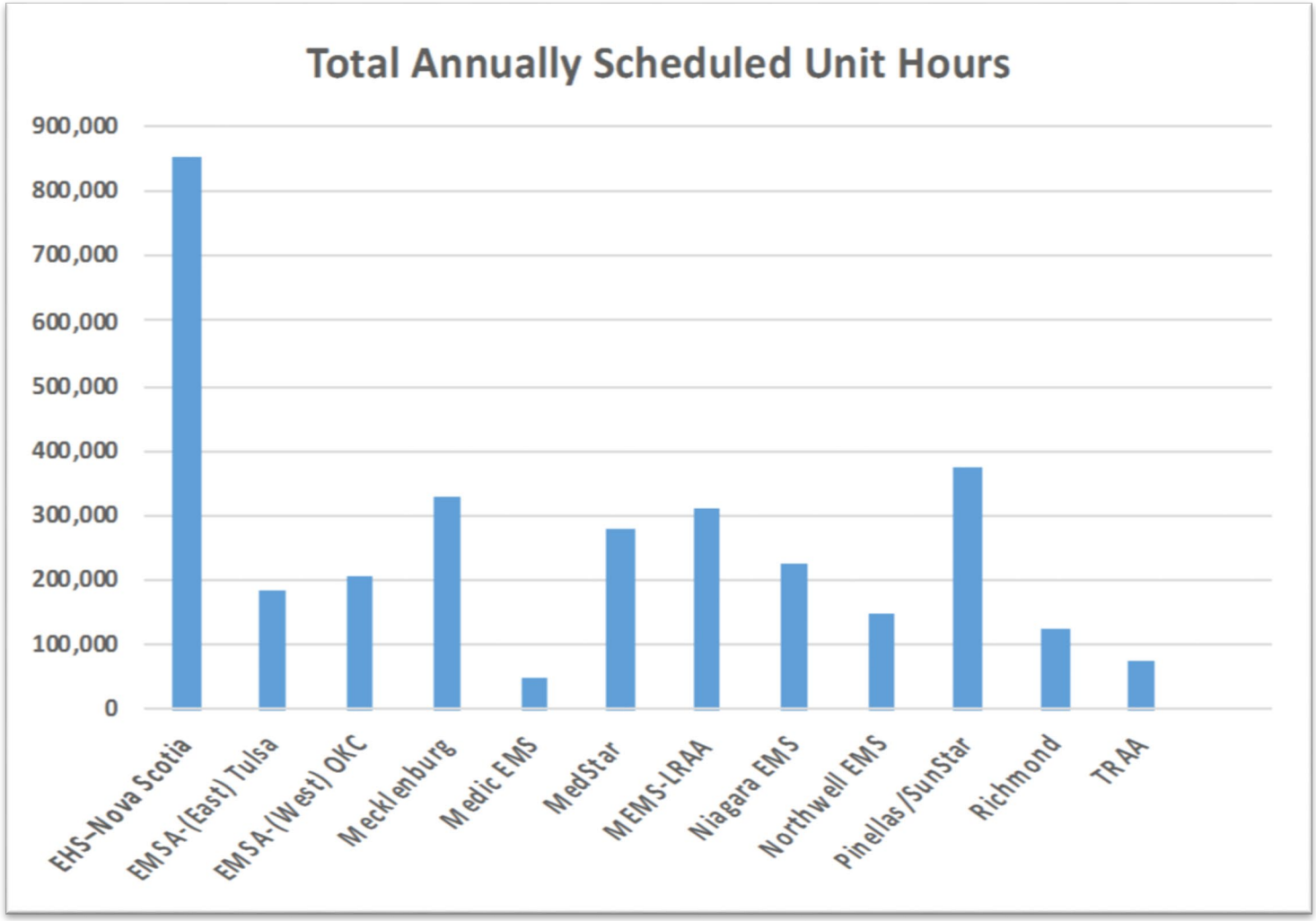
Table 37: Description of Selected Measures of Economic Efficiency

Agency Name	Annually Scheduled Unit Hours	Total System Costs	Unit Hour Utilization (UHU)	Total Cost per Unit Hour	Total Cost per Transport	Total Costs per Capita
EHS – Nova Scotia	852,840					
EMSA - (East) Tulsa	184,925	$29,695,300	0.418	$161	$384	$63
EMSA - (West) OKC	206,858	$33,546,950	0.392	$162	$414	$42
Mecklenburg	328,078	$58,756,657	0.342	$179	$523	$56
Medic EMS	50,084	$10,339,285	0.476	$206	$434	$59
MedStar	279,925	$47,177,224	0.361	$169	$467	$46
MEMS-LRAA	310,891	$43,467,578	0.228	$140	$613	$58
Niagara EMS	225,870	$70,447,436	0.196	$312	$1,591	$157
Northwell EMS	149,028	$31,468,030	0.339	$211	$622	$3
Pinellas/SunStar	374,000		0.490			
REMSA		$41,650,000				$93
Richmond	123,829	$19,705,727	0.408	$159	$390	$89
TRAA	76,992	$12,437,260	0.360	$162	$448	$47

Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.

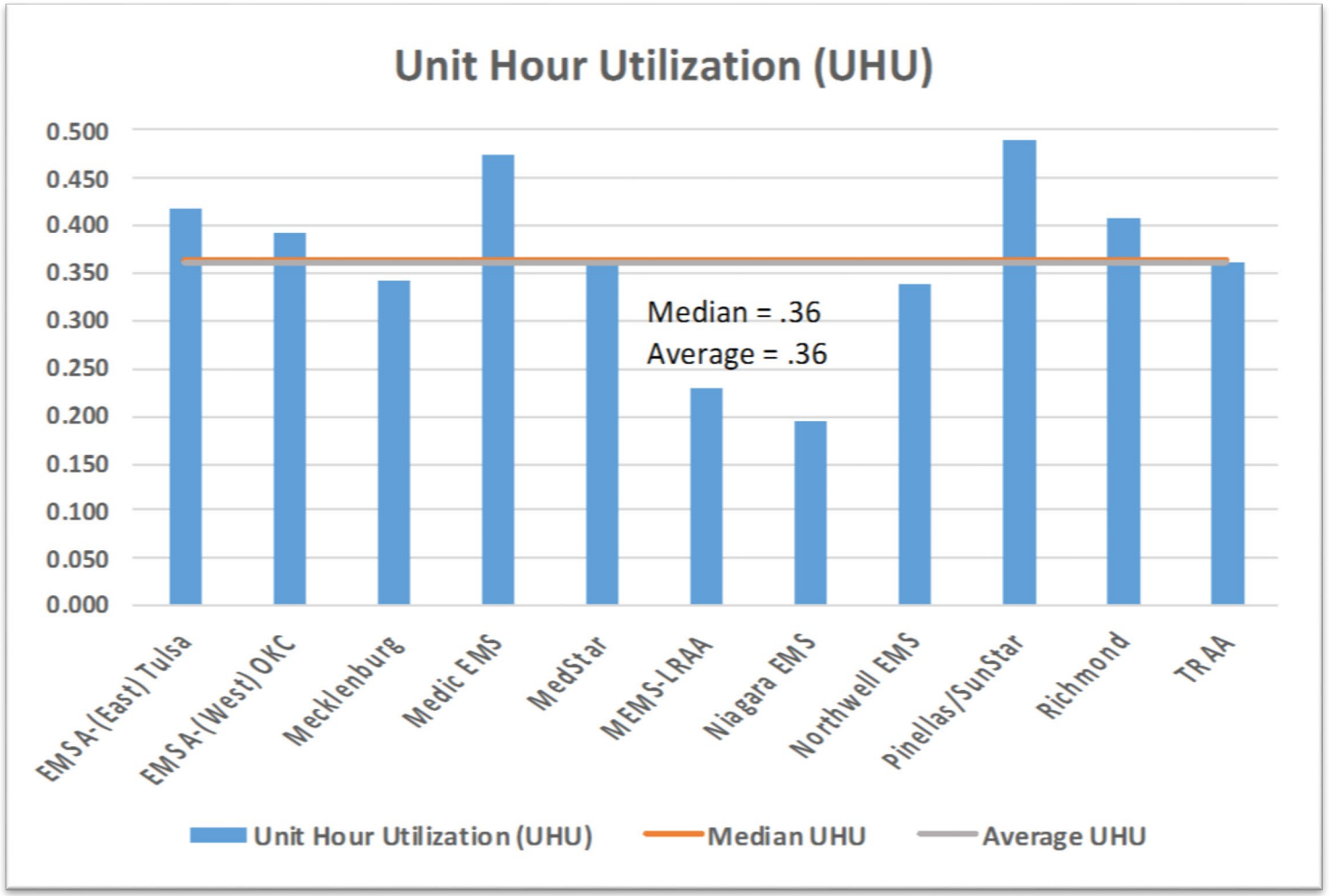
Only agencies that answered the survey question(s) are included in the above table.

Figure 51: Total Annually Scheduled Unit Hours



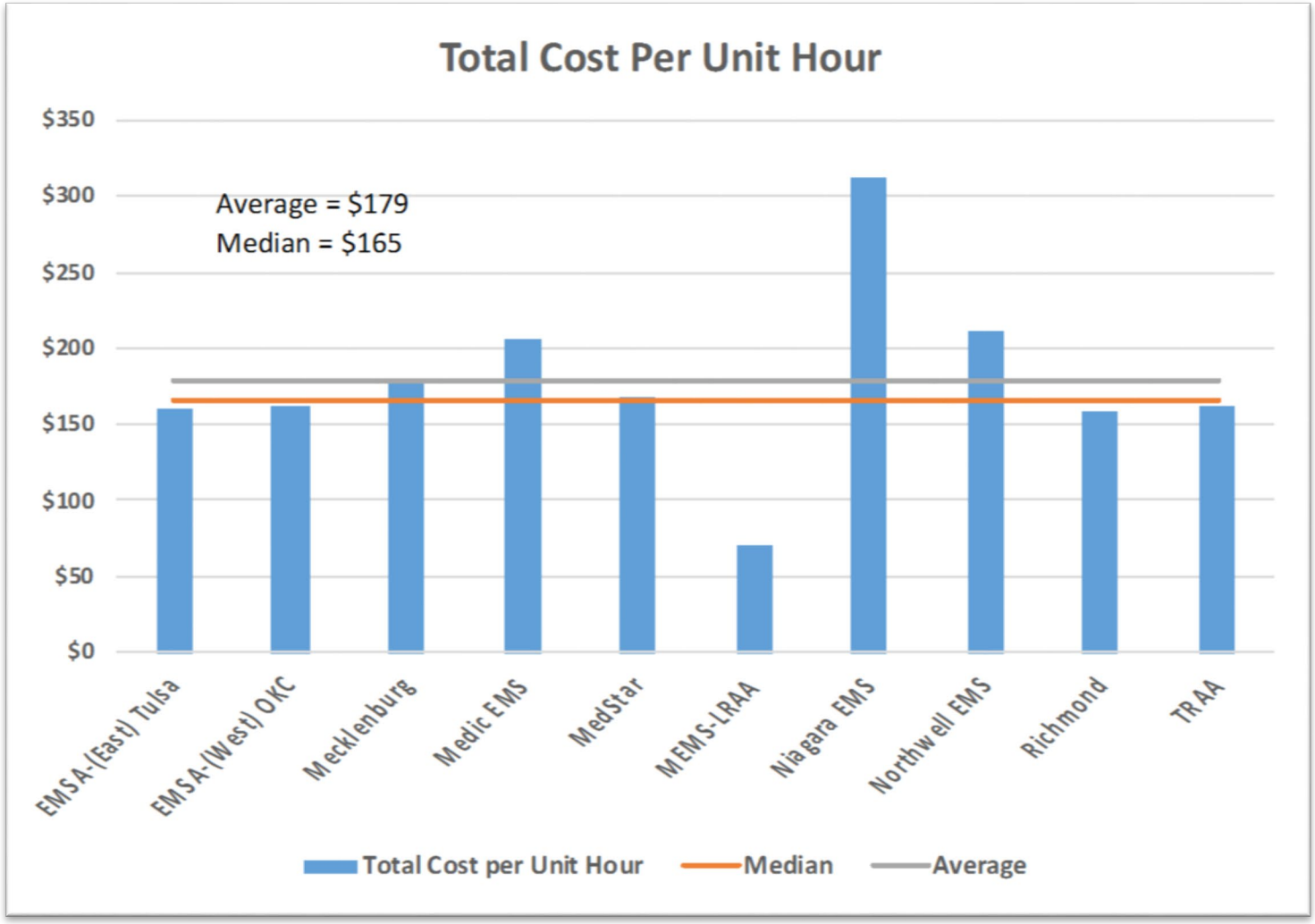
Only agencies that answered the survey question(s) are included in the above figure.

Figure 52: Unit Hour Utilization (UHU)



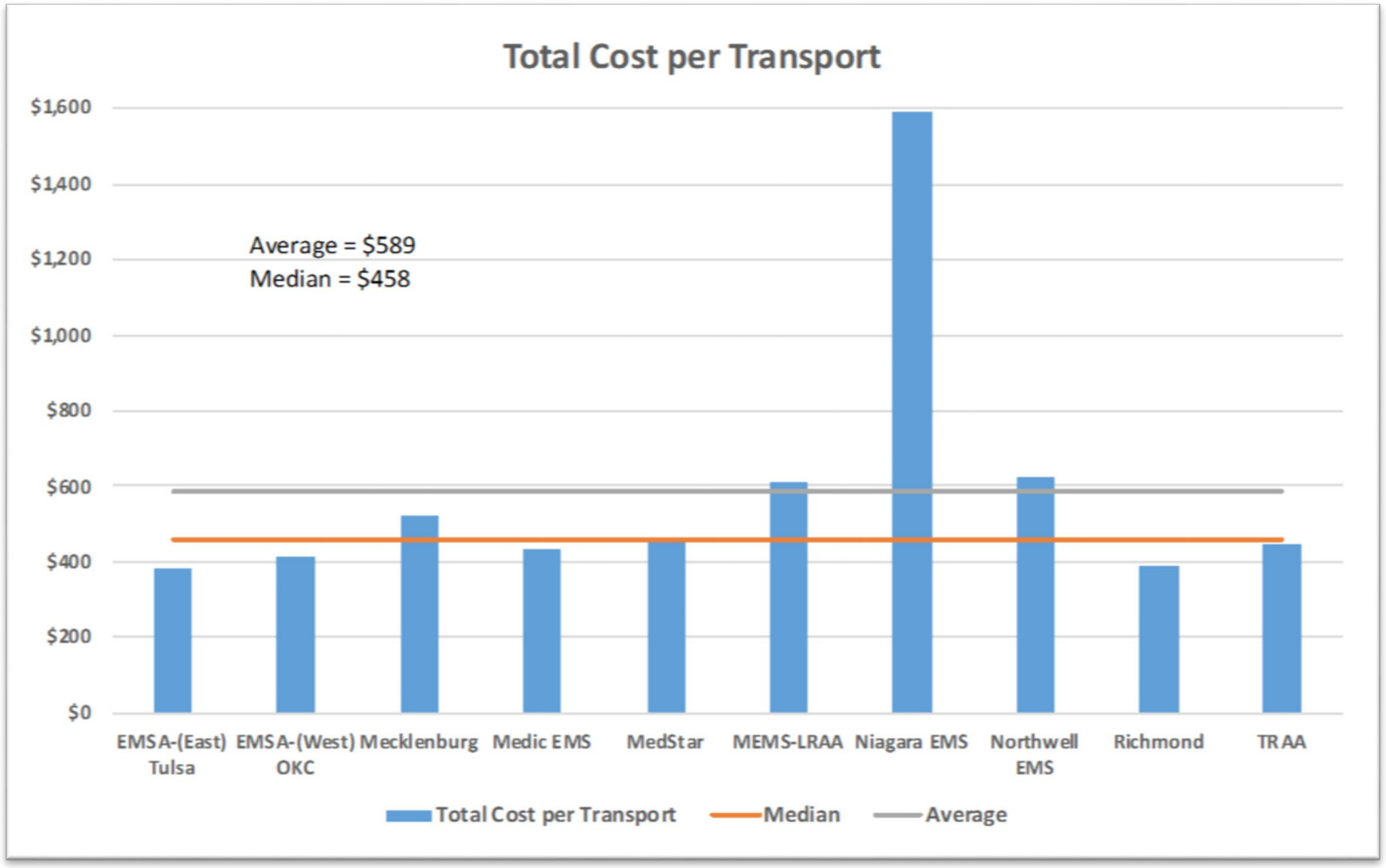
Only agencies that answered the survey question(s) are included in the above figure.

Figure 53: Total Cost Per Unit Hour by Agency



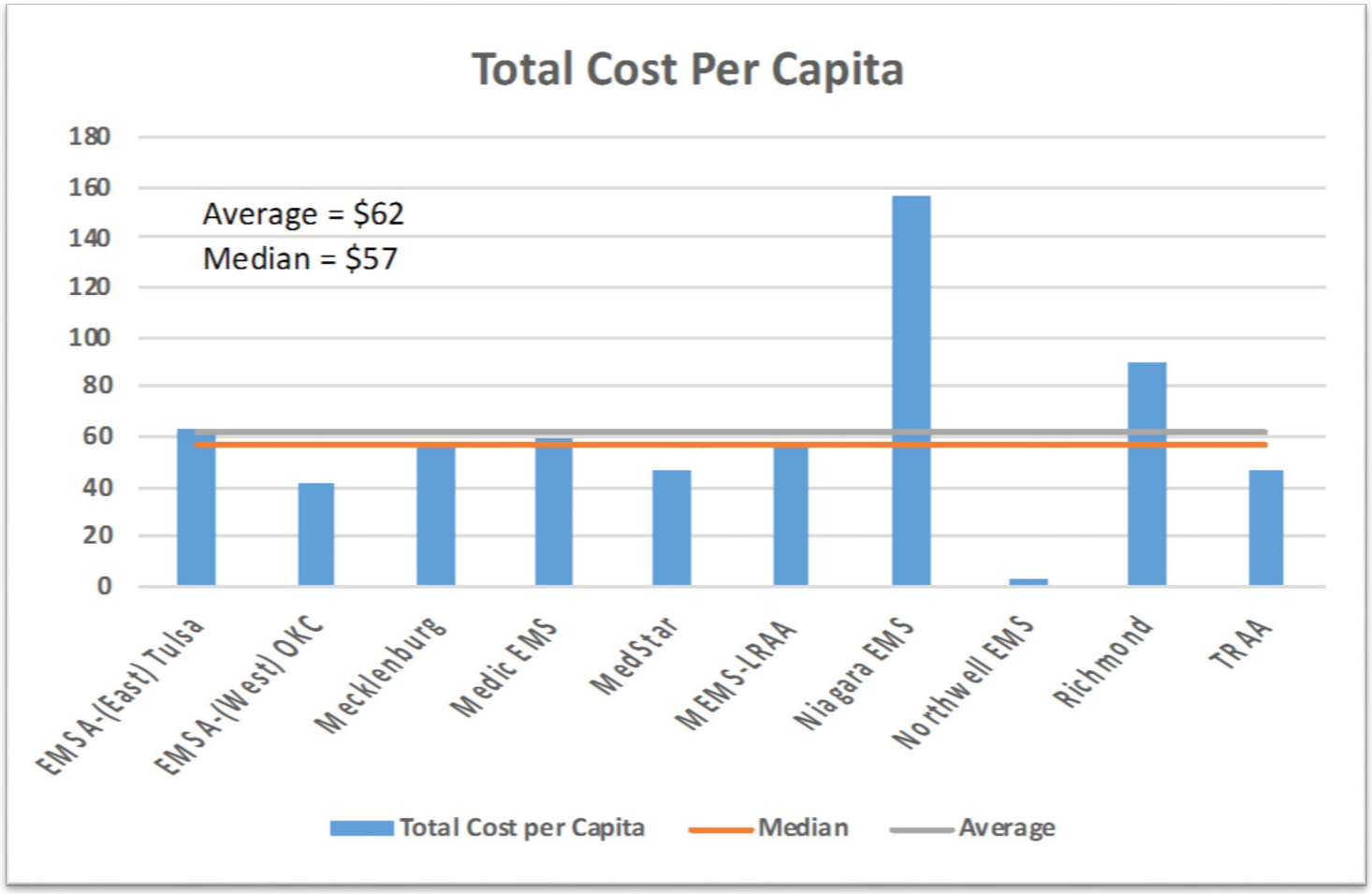
Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

Figure 54: Total Cost per Transport



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

Figure 55: Total Cost per Capita



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.

Only agencies that answered the survey question(s) are included in the above figure.

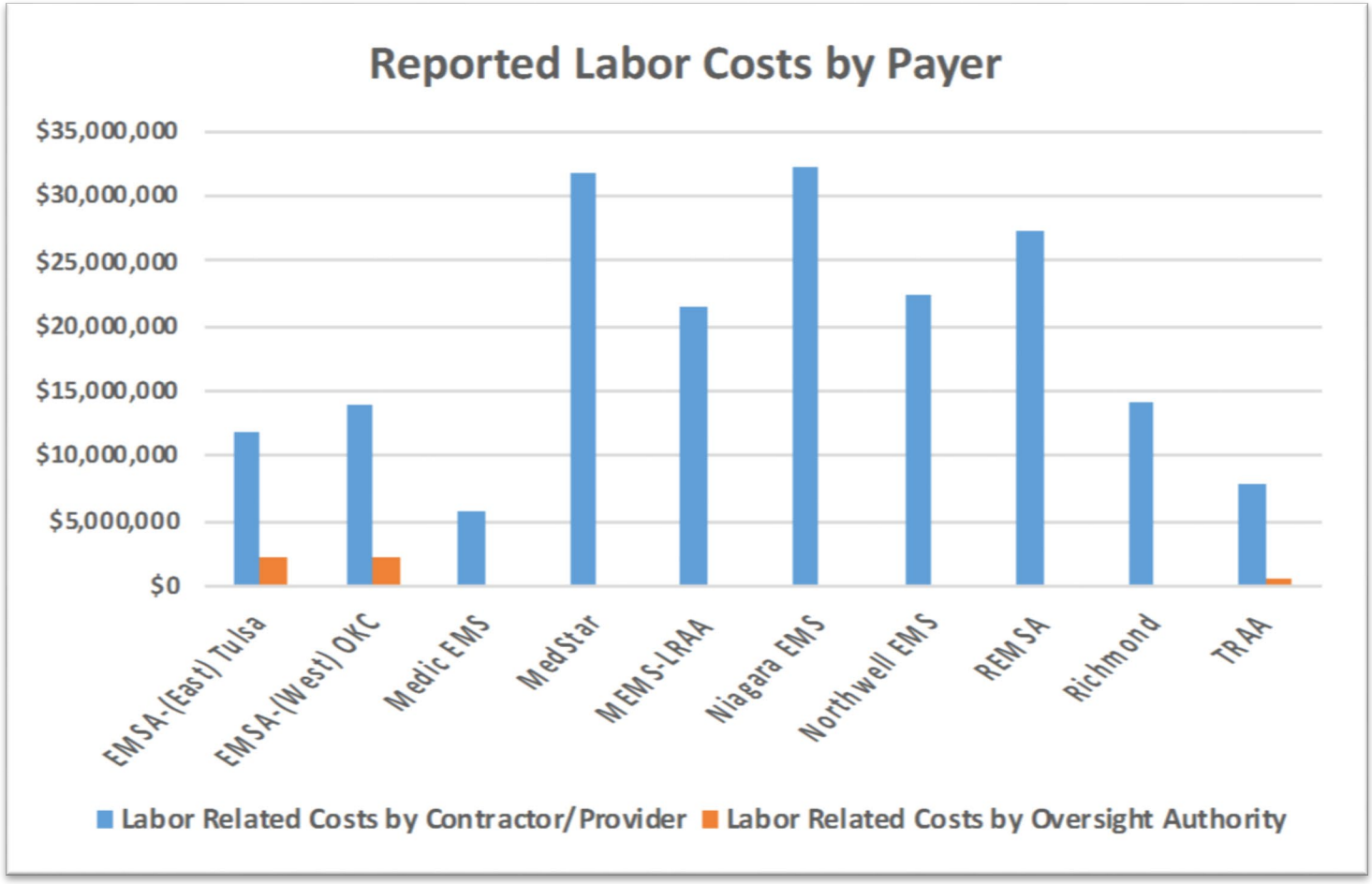
Table 38: Comparison of System Cost Centers by Agency

Agency Name	Labor Related by Contractor /Provider	Labor Related by Oversight Authority	Operating Costs by Contractor /Provider	Operating Costs by Oversight Authority	Capital by Contractor/ Provider	Capital by Oversight Authority
EMSA - (East) Tulsa	$11,822,720	$2,089,000	$9,289,280	$3,711,300		$2,783,000
EMSA - (West) OKC	$13,888,000	$2,263,000	$10,912,000	$4,403,450		$2,080,500
Medic EMS	$5,675,830		$3,864,496		$798,959	
MedStar	$31,689,481		$11,469,474		$4,018,269	
MEMS-LRAA	$21,359,902		$7,316,849		$14,790,827	
Niagara EMS	$32,313,933		$36,219,171		$1,914,333	
Northwell EMS	$22,403,520		$6,091,000		$2,973,510	
REMSA	$27,350,000		$13,300,000		$1,000,000	
Richmond	$14,212,980		$5,157,953		$334,794	
TRAA	$7,736,324	$673,590	$1,758,712	$1,564,533	$600,000	$104,101

Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.

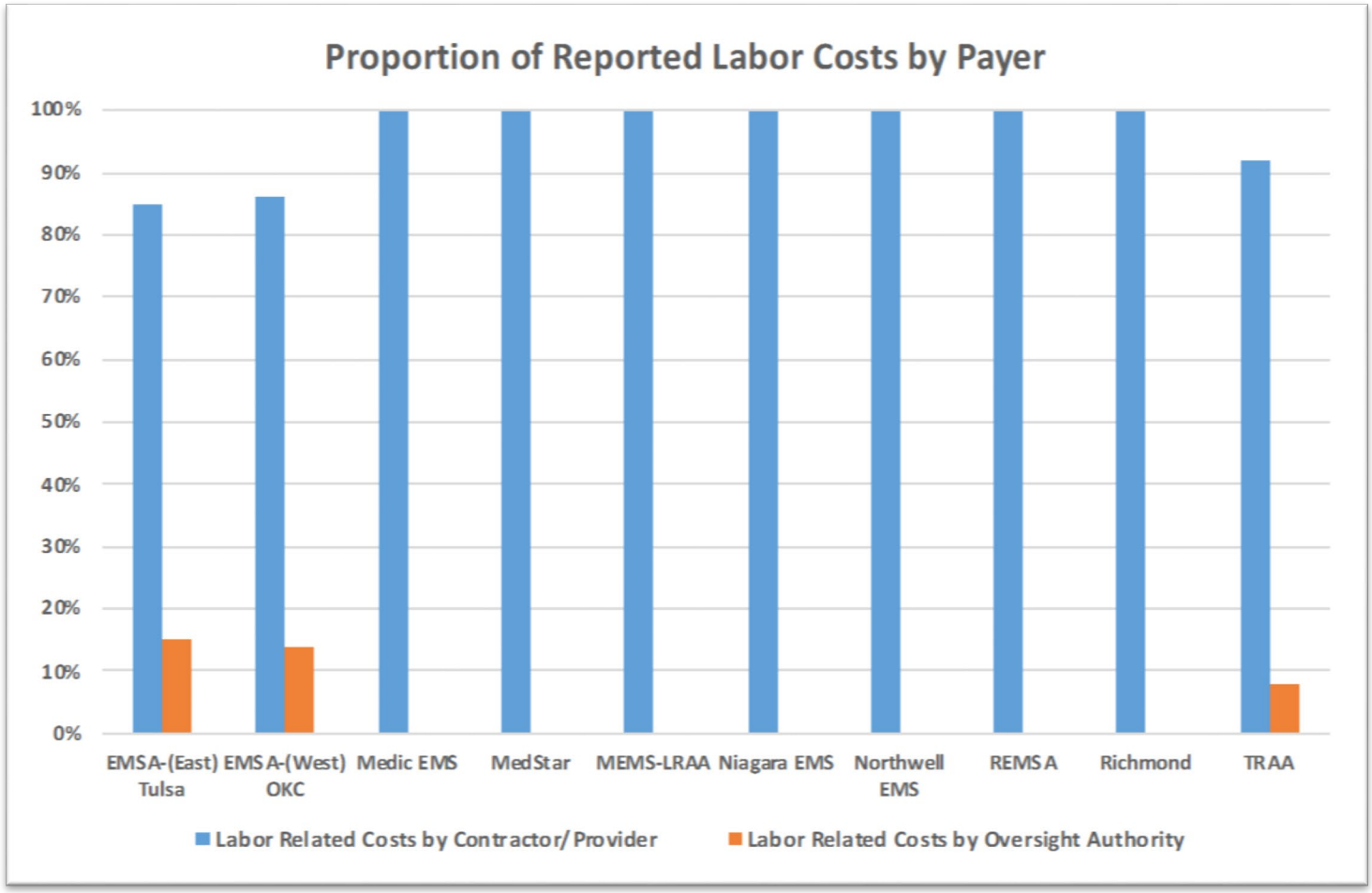
Only agencies that answered the survey question(s) are included in the above table.

Figure 56: Reported Labor Costs by Payer



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

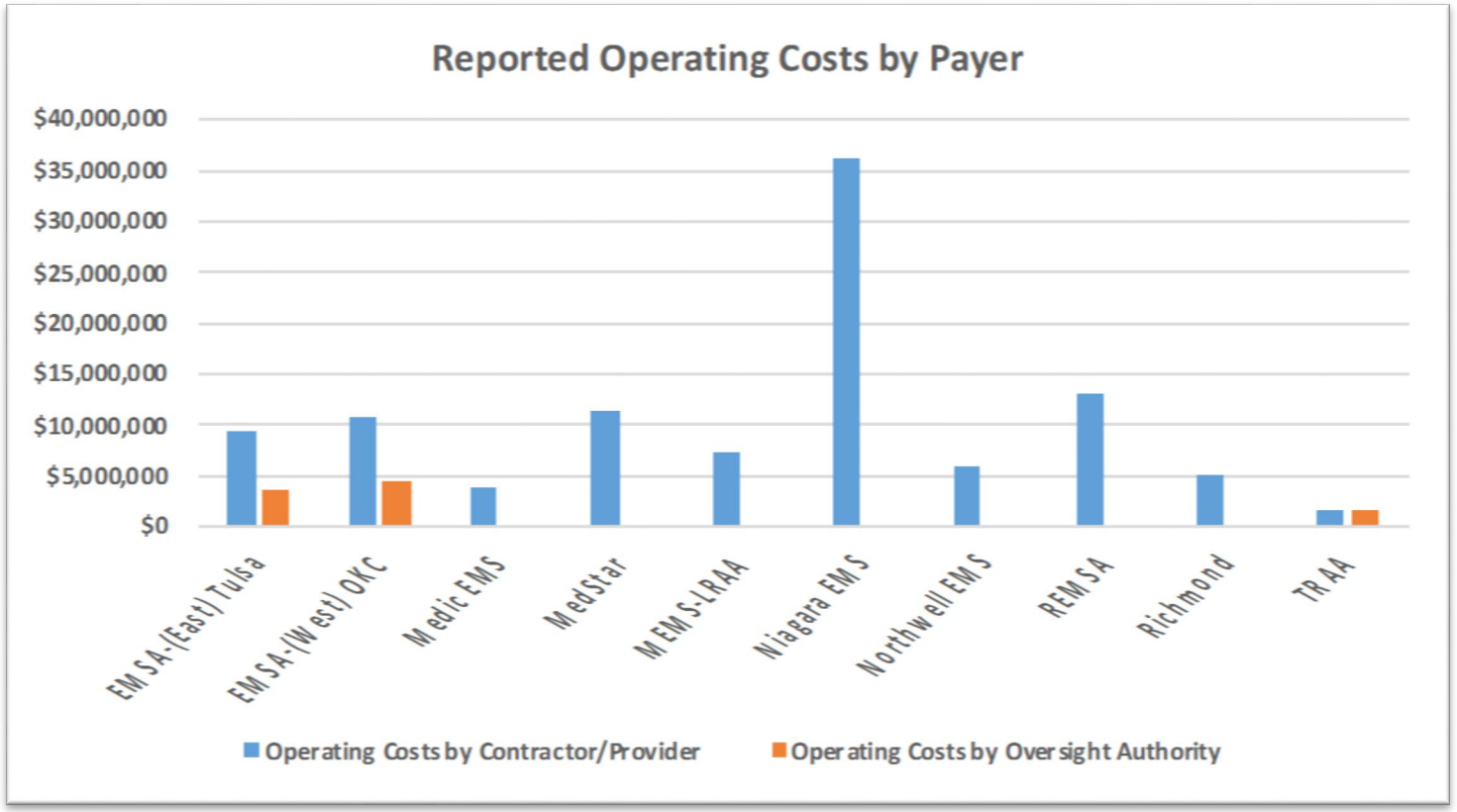
Figure 57: Proportion of Reported Labor Costs by Payer



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.

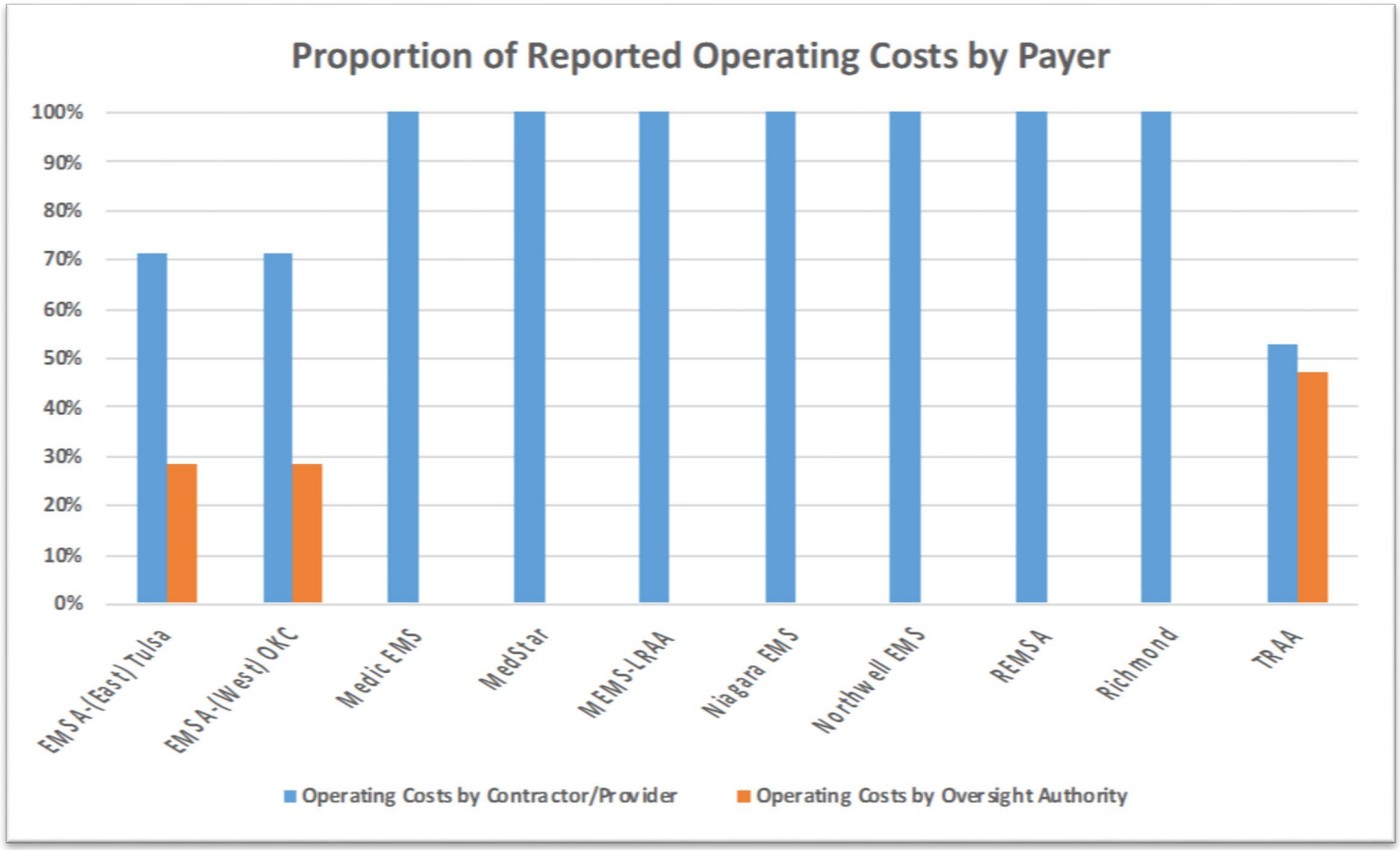
Only agencies that answered the survey question(s) are included in the above figure.

Figure 58: Reported Operating Costs by Payer



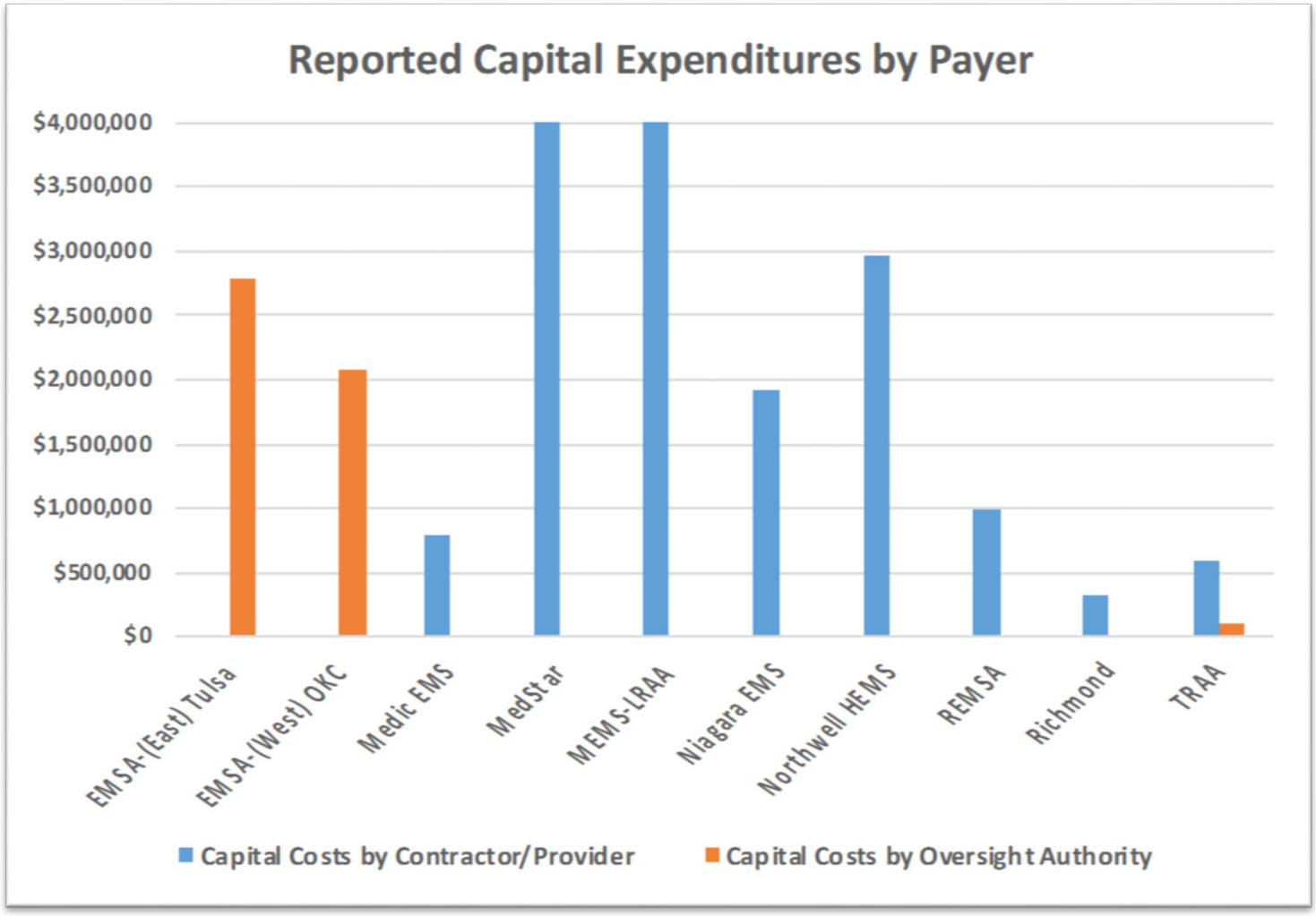
Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

Figure 59: Proportion of Reported Operating Costs by Payer



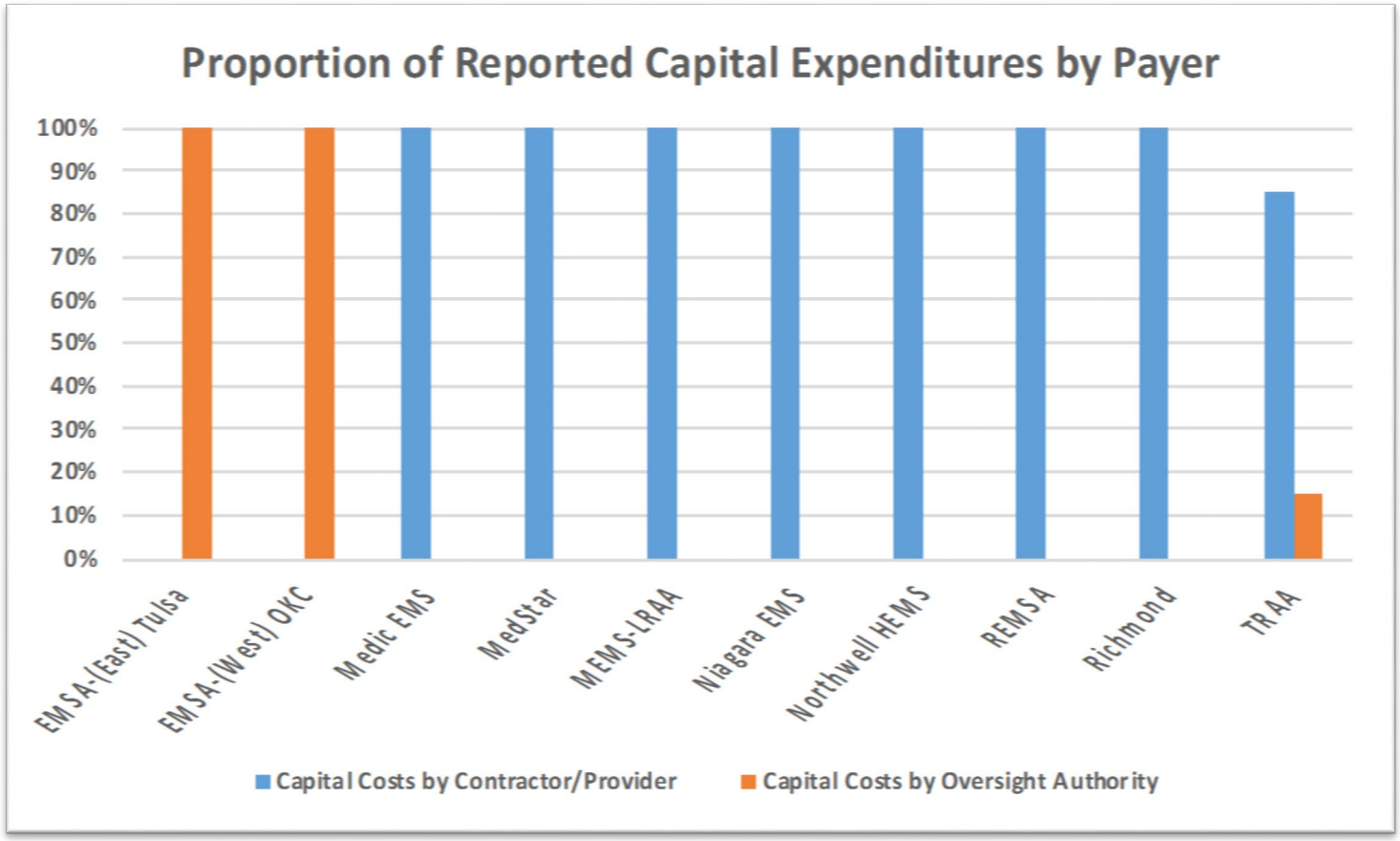
Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

Figure 60: Reported Capital Expenditures by Payer



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

Figure 61: Proportion of Reported Capital Expenditures by Payer



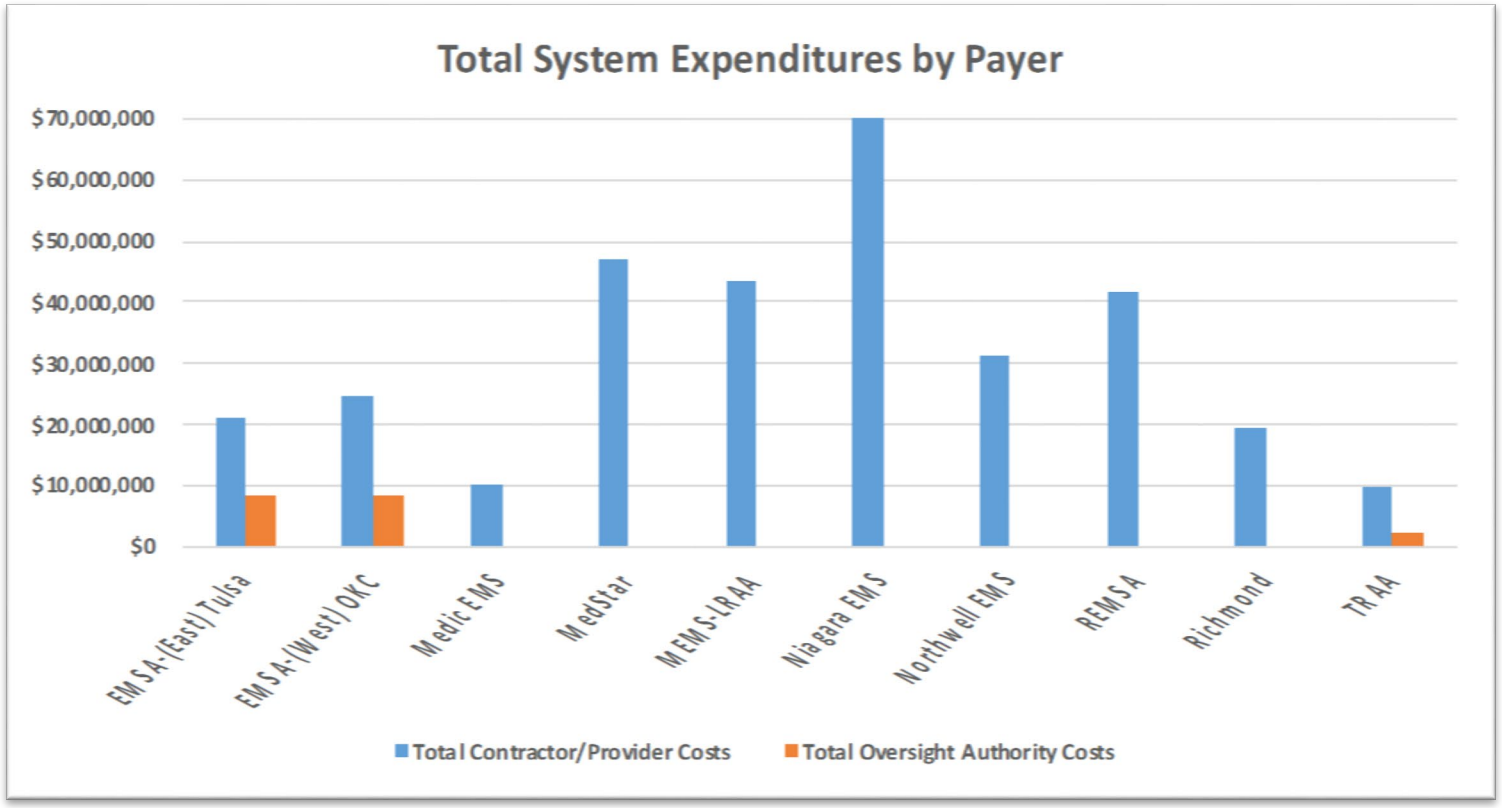
Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

Table 39: Description of Shared Costs Between the Provider/Contractor and Authority

Agency Name	Total Contractor or Provider Costs	Total Authority Costs	Total Costs
EMSA - (East) Tulsa	$21,112,000	$8,583,300	$29,695,300
EMSA - (West) OKC	$24,800,000	$8,746,950	$33,546,950
Medic EMS	$10,339,285		$10,339,285
MedStar	$47,177,224		$47,177,224
MEMS – LRAA	$43,467,578		$43,467,578
Niagara EMS	$70,447,436		$70,447,436
Northwell - EMS	$31,468,030		$31,468,030
REMSA	$41,650,000		$41,650,000
Richmond	$19,705,727		$19,705,727
TRAA	$10,095,036	$2,342,224	$12,437,260

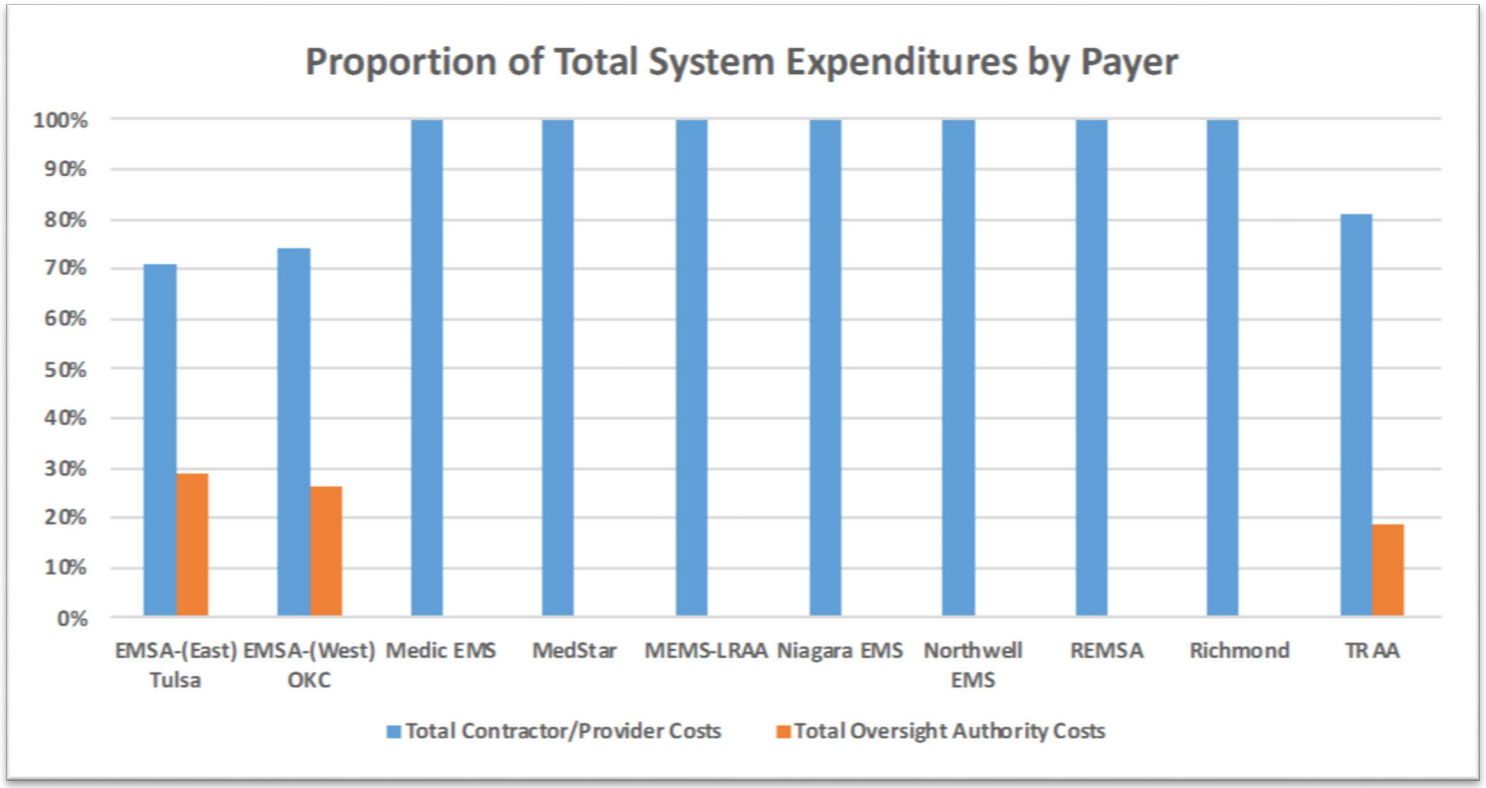
Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above table.

Figure 62: Total System Expenditures by Payer



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

Figure 63: Proportion of Total System Expenditures by Payer



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

SECTION 8: REVENUE

Any analysis or attempt to benchmark financial information, rate structures, or local government subsidization levels is difficult, if not impossible, because of the diverse variables of each system's demographics. Past prevailing Medicare rates, Medicaid rates, and alternative transportation policies combine with the system's payer mix to create each local collection rate. The revised survey format allowed for the specification and capture of all costs, including fixed assets and contributed services, which are included in the unit hour costs for the participating HPEMS systems. This data is provided only as an informational tool.[24]

Because the HPEMS systems are the most efficient in EMS, the systems have potentially experienced the greatest impact of the revised Medicare Fee Schedule and are limited in how they have been able to adapt to the new reimbursement level.[25] However, as the population ages, an increasing percentage will be Medicare eligible. This means that Medicare will continue to be relevant for the foreseeable future as the largest portion of the EMS payor mix.[26] Medicare is the primary payer for the HPEMS systems, and the accurate completion of this section provides the HPEMS systems with a foundation FOR COMPARISON,

Maximization of revenues and diversification of revenue sources will be a challenge for all EMS systems, however, HPEMS systems appear to have fostered a culture that facilitates innovation. An example of such being that several AIMHI members have implemented MIH programs and alternate payment models for an expanded role in the changing healthcare landscape. This strategic method of preparedness assists not only the organizations with financial sustainability, but also provides alternate solutions and potential economic advantages for the payers and the communities served.

The information in the tables and figures to the end of this section provide a representative and comparative look at the organizations surveyed for this report. This information is public knowledge and therefore does not constitute collusion.

[24] EHS-Nova Scotia and Niagara EMS are not included in the revenue review as Canadian EMS systems are funded by the federal government through the provincial health care systems. As such, their revenue sources do not compare to US systems in a meaningful way.

[25] Overton, J. (2002). Reimbursement in emergency medical services: How to adapt in a changing environment. *Prehospital Emergency Care,* 6, 137-140.

[26] Chartbook on Long-Term Trends in Health: Population Characteristics. *Health, United States, 2016.* National Center for Health Statistics (US) 2017 May. https://www.ncbi.nim.nih.gov/books/NBK453383/.

Table 40: Comparison of Selected Retail Base Billing Rates by Agency

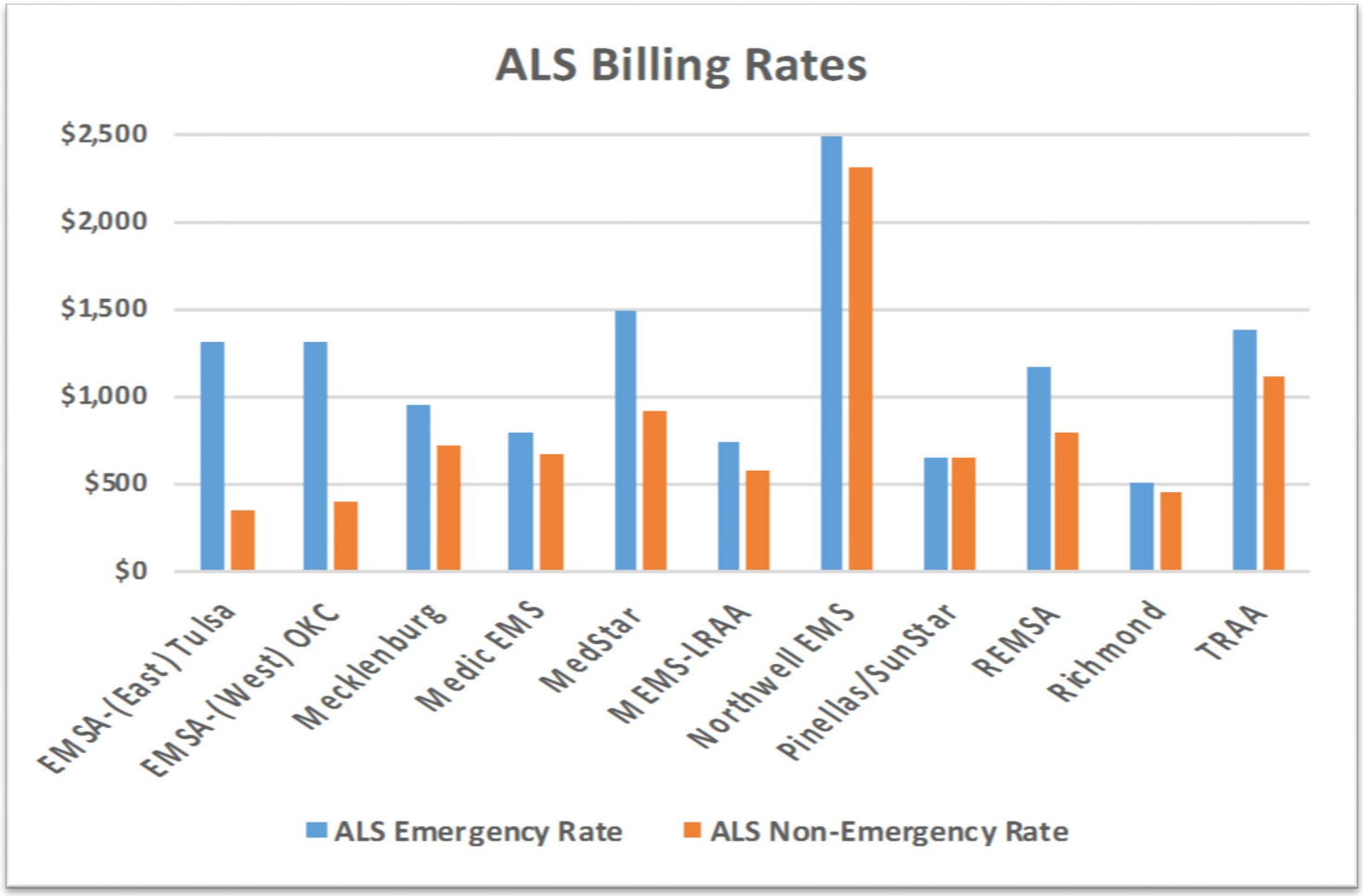
Agency Name	ALS Emergency	BLS Emergency	ALS Non-Emergency	BLS Non-Emergency	ALS Transfer	BLS Transfer	Critical Care Transport	Treat/No-Transport	Emergency & Non - Emergency Mileage	Long Distance Mileage	Bundled Billing?
EMSA - (East) Tulsa	$1,300	$1,300	$345	$345	$345	$345	$1,300		$12	$9	Yes
EMSA - (West) OKC	$1,300	$1,300	$393	$393	$393	$393	$1,300		$12	$9	Yes
Mecklenburg	$949	$949	$709	$709	$709	$709	$1,144		$23	$23	Yes
Medic EMS	$795	$650	$660	$505			$1,200		$16	$16	Yes
MedStar	$1,485	$1,485	$911	$911	$911	$911	$2,540	$127	$10	$11	Yes
MEMS – LRAA	$740	$670	$565	$515	$565	$515	$865	-	$19	$11	No
Northwell - EMS	$2,480	$1,515	$2,300	$1,375			$4,585		$20	$20	Yes
Pinellas/SunStar	$640	$640	$640	$600	$640	$600	$1,008	-	$13	$13	Yes
REMSA	$1,164	$1,164	$795	$795	$1,164	$795	$2,385	$-	$22	$34	Yes
Richmond	$500	$500	$450	$450			$1,000		$10	$20	Yes
TRAA	$1,382	$1,382	$1,108	$1,108	$1,108	$1,108	n/a	$394	$16	$16	Yes

Richmond noted ALS and BLS non-emergency charges are $450 in town and $525 for out of town.

Only agencies that answered the survey question(s) are included in the above table.

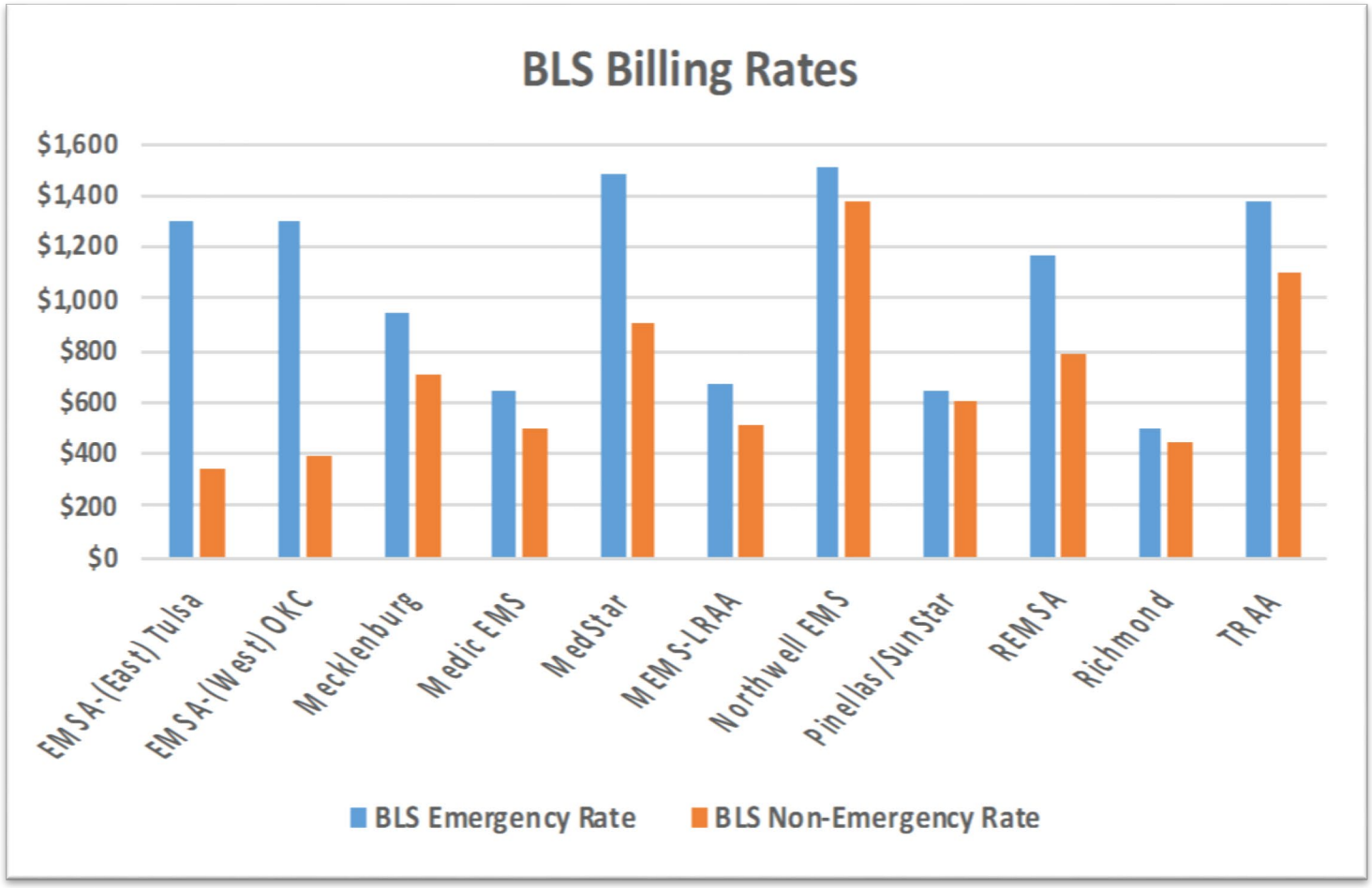
All agencies indicated bundled billing except for MEMS-LRAA that bills for oxygen, EKG Defib, supplies, disposables, IV supplies, IO needles, and airway management. Five agencies indicated billing for response with no transport as follows: EMSA-(East) Tulsa $200; EMSA-(West) OKC $200; MedStar $127; MEMS-LRAA $310; TRAA $394.

Figure 64: ALS Billing Rates



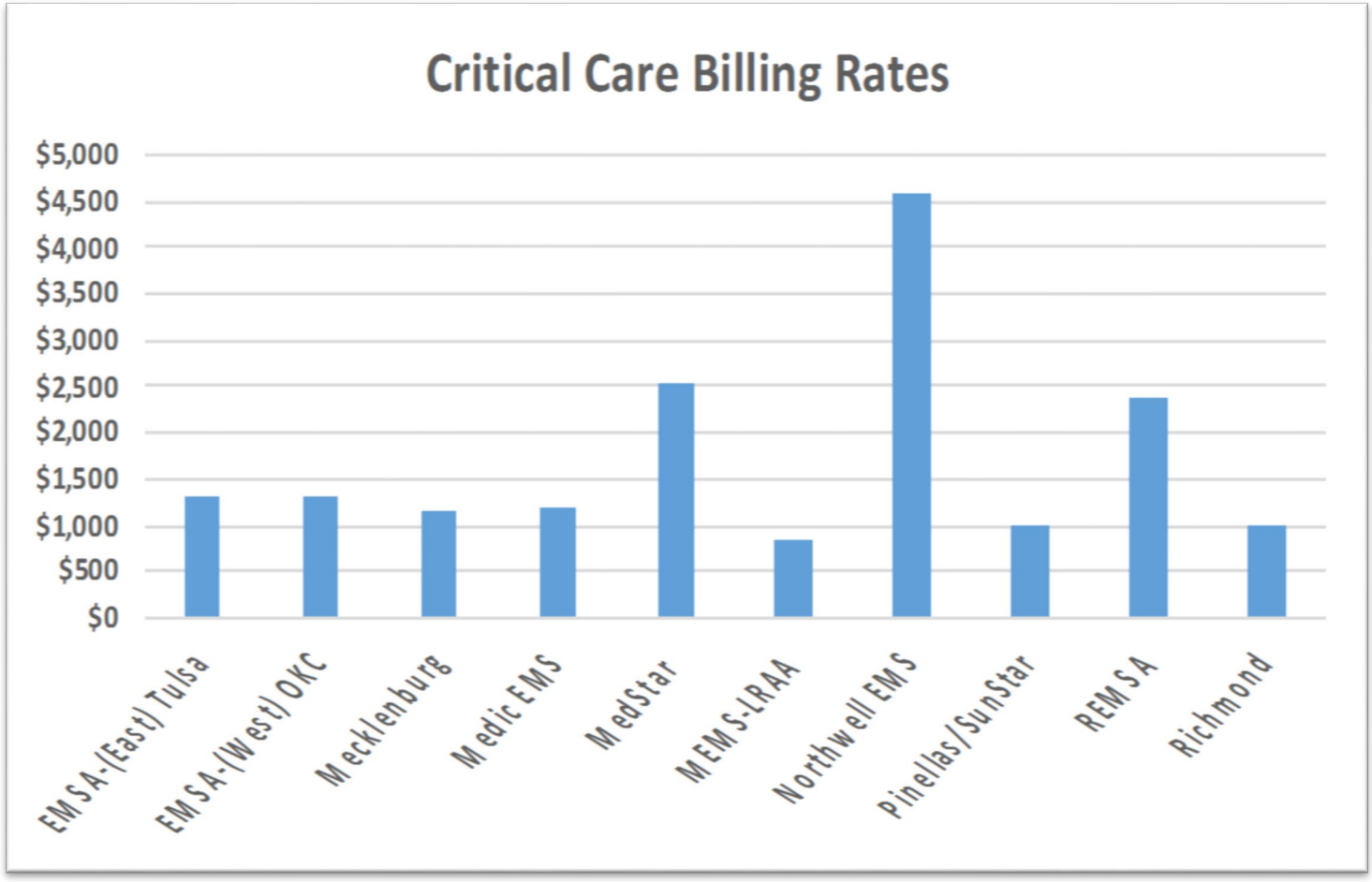
Only agencies that answered the survey question(s) are included in the above figure.

Figure 65: BLS Billing Rates



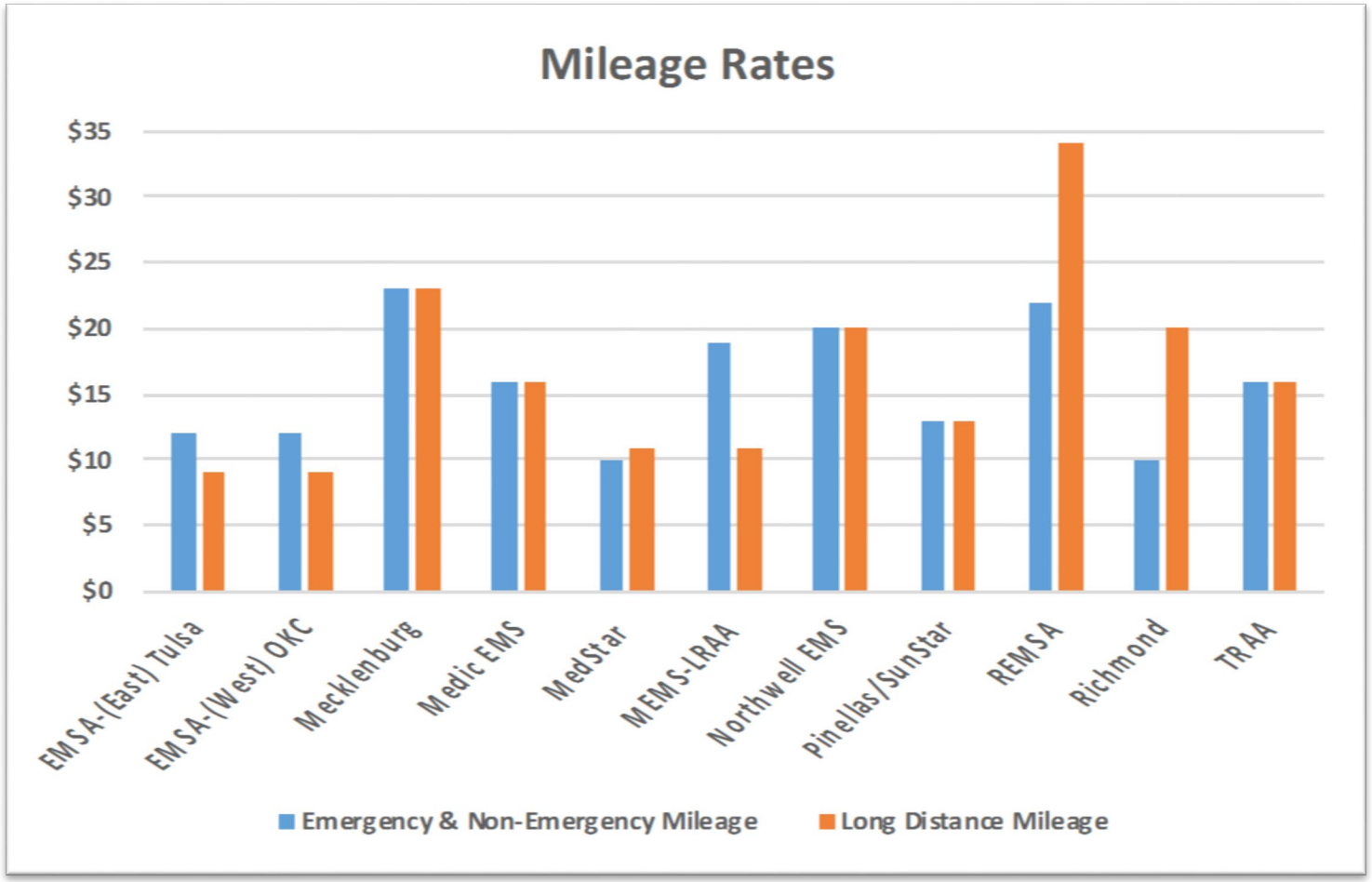
Only agencies that answered the survey question(s) are included in the above figure.

Figure 66: Critical Care Billing Rates



Only agencies that answered the survey question(s) are included in the above figure.

Figure 67: Mileage Billing Rates



Only agencies that answered the survey question(s) are included in the above figure.

Table 41: Description of Special Event Billing Rates by Agency

Agency Name	Special Event (w/unit)	Special Event (without unit)	Bike Medic Team	Golf Cart Medic Team	Single Medic	AED Team	Command Post Team	Other
EMSA - (East) Tulsa	$33.75/ 15 min	$21.25/ 15 min	$45/hr	$33.75/ 15 min	$21.25/ 15 min			
EMSA - (West) OKC	$33.75/ 15 min	$21.25/ 15 min	$45/hr	$33.75/ 15 min	$21.25/ 15 min			
Mecklenburg	$309/1st hr-then $206							
Medic EMS	$100	$75	$80		$50	$25 /person		
MedStar	$47/hr	$47/hr	$77/hr	$77/hr	$77/hr	$60/hr	$55/hr	All special event rates have a four-hour minimum.
MEMS – LRAA	$100/hr	$85/hr	$90/hr	$100/hr	$65/hr		$50/hr	Note 1
Northwell - EMS	$200/hr							
Pinellas/SunStar	$135/ hr							Waiting time/half hour $65.32 Non-Dedicated Standby/Hour $59.05
Richmond	$150/hr	$75/hr-walking team	$100/hr	$125/hr	N/A	N/A	$150/hr	College football game-$360/game, HS football game-$270/game
TRAA	$75/UH 3 hr min		$30/hr/ bike 3 hr min					

Note 1: MEMS-LRAA reported Command Center 1hr $50.00; BLS crew with unit 1hr $85; Crew on bikes $90; Crew on Gator 1hr $100; Crew on Husky 1hr $100; Crew without unit 1hr $85; Crew with unit 1hr $100; EMT on bike 1hr $55; EMT on Gator 1hr $60; EMT on Husky 1hr $60; EMT with pack 1hr $50; HazMat crew with unit 1hr $120; Paramedic on Gator 1hr $75; Paramedic on Husky 1hr $75; Paramedic with pack 1hr $65; Sort truck with crew 1hr $225; Special event late scheduling fee 1hr $20; Supervisor rate 1hr $70; SWAT truck with crew 1hr $225.

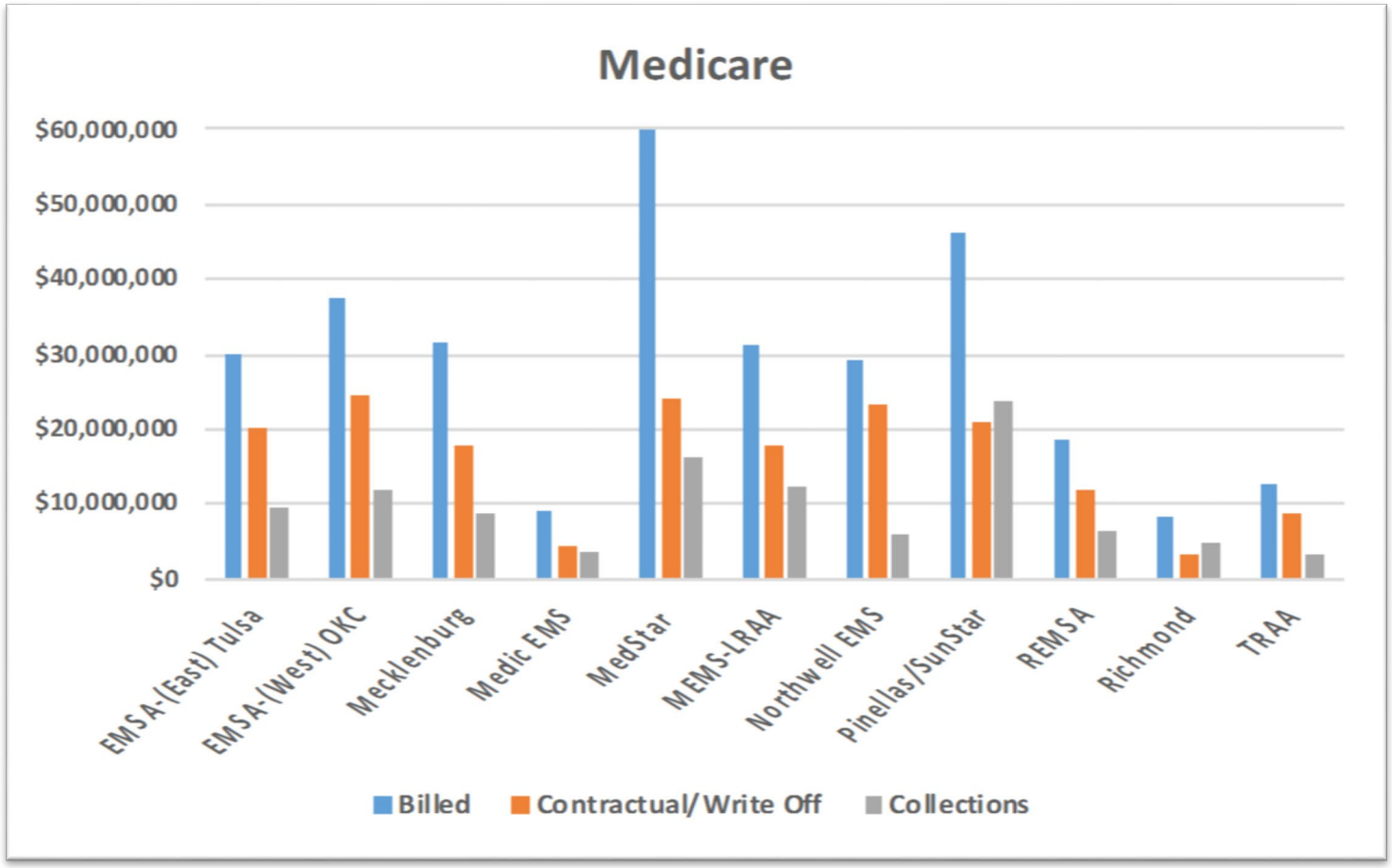
Only agencies that answered the survey question(s) are included in the above table.

Table 42: Characteristics of Medicare Revenue

Agency Name	Number of Invoices: Medicare	Total Billed: Medicare	Contractual Allowance / Write-Off: Medicare	Total Collected: Medicare
EMSA - (East) Tulsa	26,142	$29,926,627	$20,037,255	$9,586,606
EMSA - (West) OKC	29,362	$37,499,357	$24,581,634	$11,863,334
Mecklenburg	30,127	$31,795,181	$17,693,189	$8,639,184
Medic EMS	10,396	$9,150,938	$4,320,423	$3,776,415
MedStar	42,792	$59,834,107	$23,946,721	$16,337,301
MEMS-LRAA	31,091	$31,019,757	$17,674,267	$12,315,955
Northwell EMS	11,479	$29,248,213	$23,219,164	$6,029,049
Pinellas/SunStar	65,591	$46,200,000	$21,000,000	$23,700,000
REMSA	15,600	$18,500,000	$12,000,000	$6,200,000
Richmond	14,267	$8,363,477	$3,321,225	$4,976,347
TRAA	8,626	$12,748,561	$8,720,600	$3,063,504

Only agencies that answered the survey question(s) are included in the above table.

Figure 68: Characteristics of Medicare Revenue



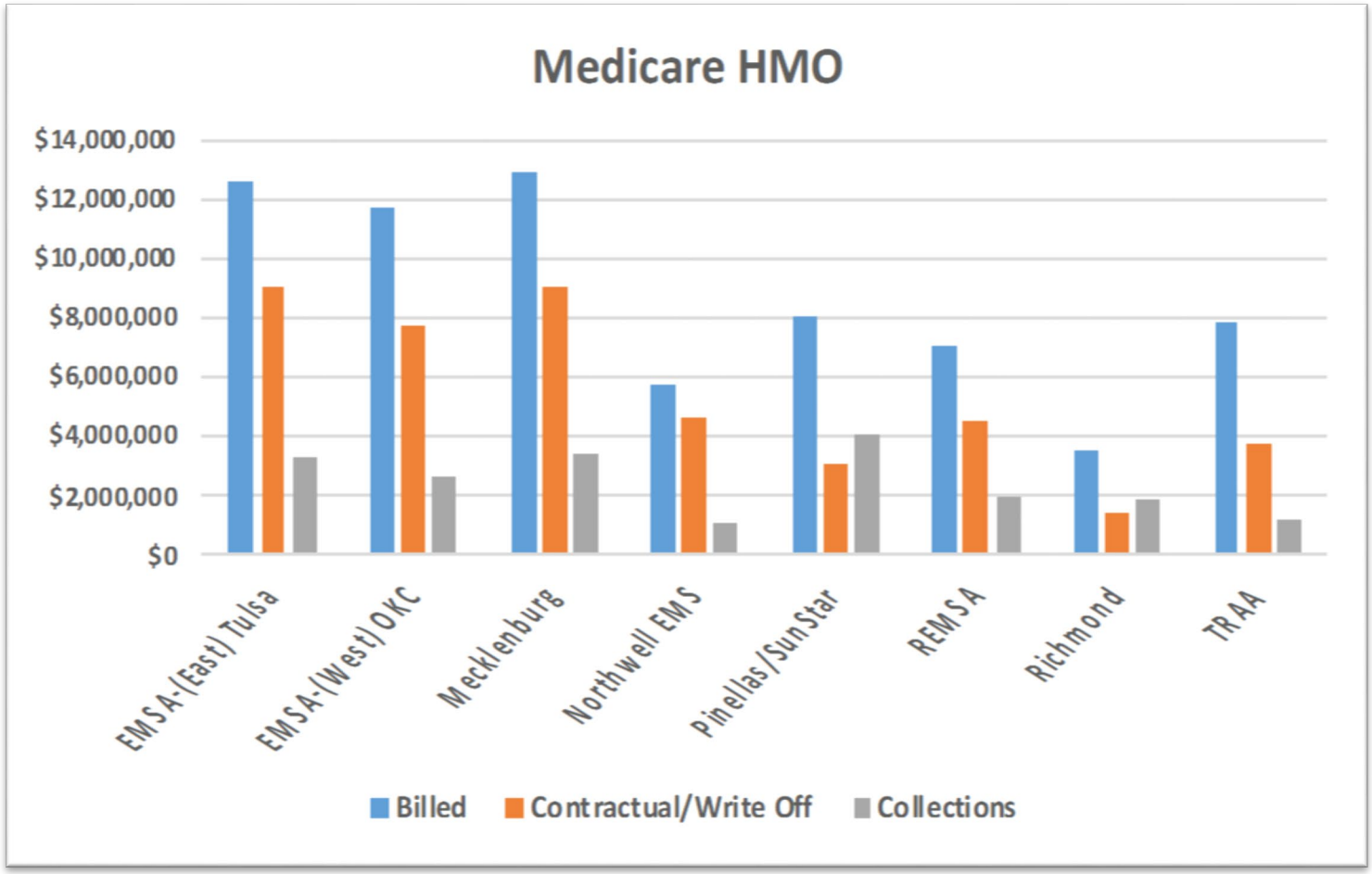
Only agencies that answered the survey question(s) are included in the above figure.

Table 43: Characteristics of Medicare HMO Revenue

Agency Name	Number of Invoices: Medicare HMO	Total Billed: Medicare HMO	Contractual Allowance / Write-Off: Medicare HMO	Total Collected: Medicare HMO
EMSA - (East) Tulsa	10,398	$12,551,672	$9,067,937	$3,291,697
EMSA - (West) OKC	8,818	$11,666,171	$7,764,890	$2,626,597
Mecklenburg	12,274	$12,951,188	$9,000,176	$3,389,972
Northwell - EMS	2,221	$5,764,297	$4,674,195	$1,090,102
Pinellas/SunStar	31,389	$8,000,000	$3,100,000	$4,100,000
REMSA	6,000	$7,100,000	$4,500,000	$1,960,000
Richmond	6,276	$3,561,225	$1,393,098	$1,845,070
TRAA	5,332	$7,868,914	$3,741,433	$1,169,391

Only agencies that answered the survey question(s) are included in the above table.

Figure 69: Characteristics of Medicare HMO Revenue



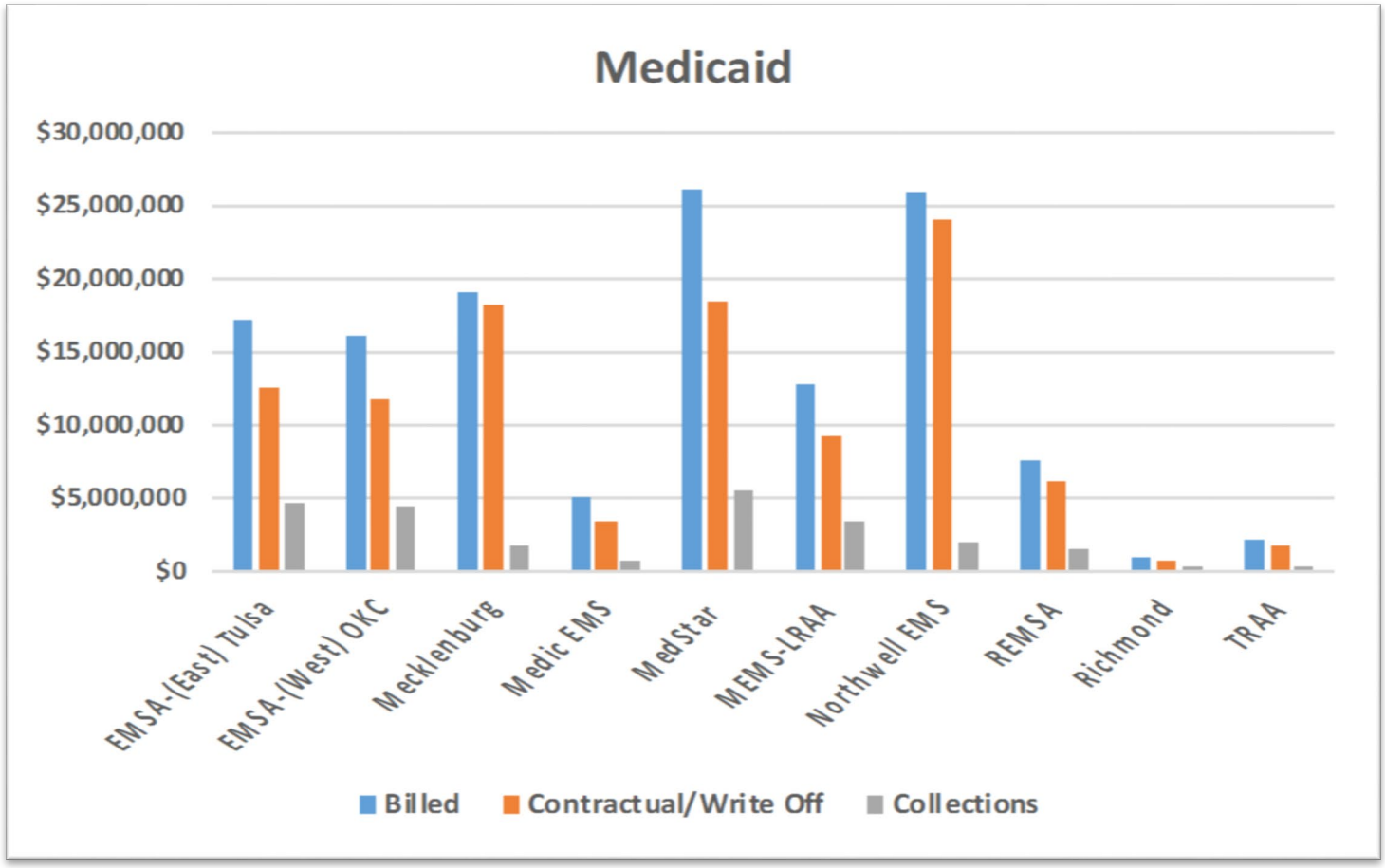
Only agencies that answered the survey question(s) are included in the above figure.

Table 44: Characteristics of Medicaid Revenue

Agency Name	Number of Invoices: Medicaid	Total Billed: Medicaid	Contractual Allowance / Write-Off: Medicaid	Total Collected: Medicaid
EMSA - (East) Tulsa	13,545	$17,276,208	$12,606,443	$4,641,819
EMSA - (West) OKC	12,699	$16,169,109	$11,758,979	$4,380,751
Mecklenburg	20,397	$19,082,053	$18,157,355	$1,774,980
Medic EMS	4,434	$5,167,679	$3,467,954	$761,258
MedStar	18,956	$26,237,111	$18,555,009	$5,424,489
MEMS-LRAA	13,214	$12,831,714	$9,226,837	$3,524,039
Northwell - EMS	9,758	$26,034,196	$24,085,321	$1,948,875
REMSA	6,750	$7,700,000	$6,150,000	$1,500,000
Richmond	1,639	$908,669	$683,350	$300,494
TRAA	1,469	$2,093,000	$1,704,357	$193,672

Only agencies that answered the survey question(s) are included in the above table.

Figure 70: Characteristics of Medicaid Revenue



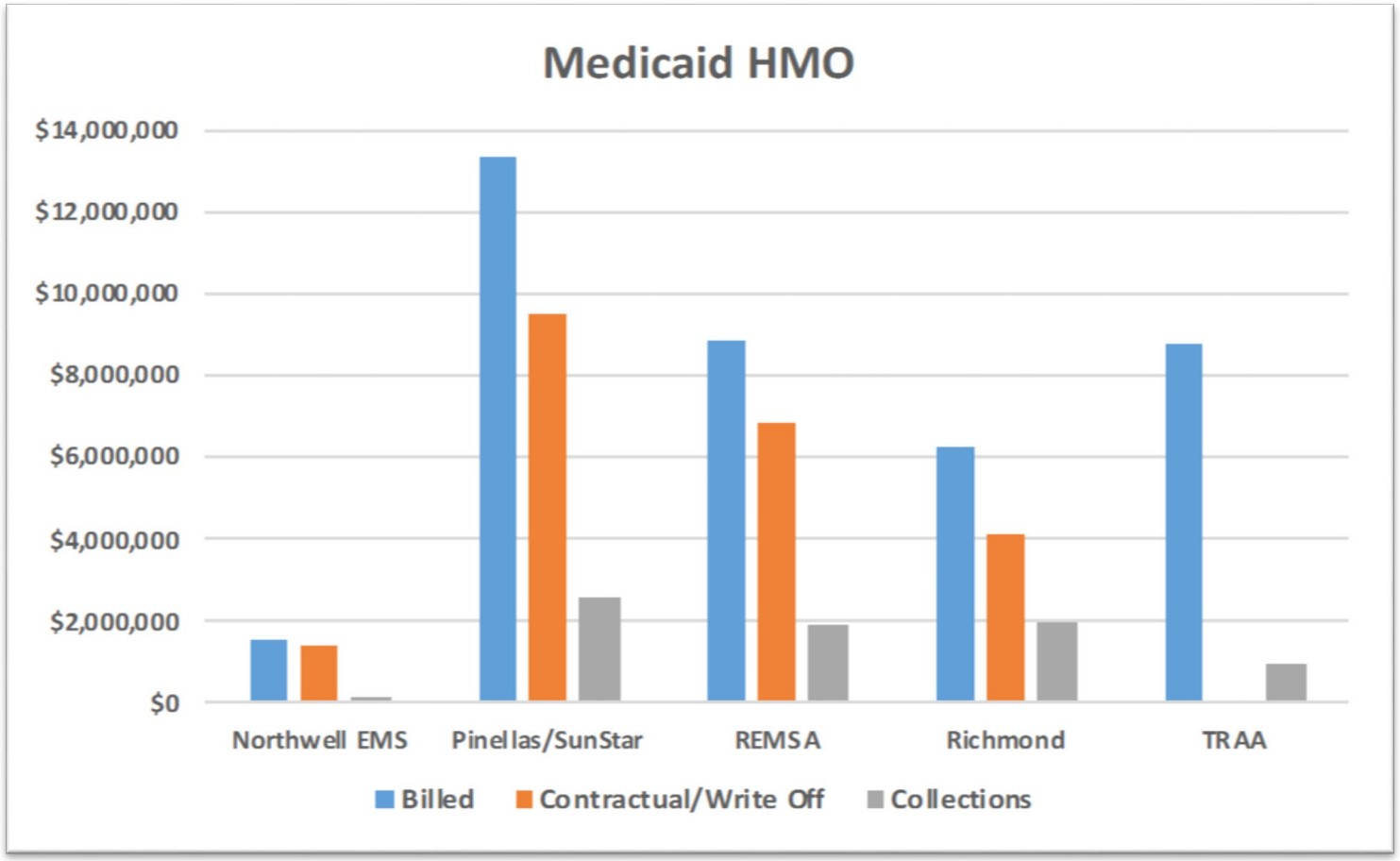
Only agencies that answered the survey question(s) are included in the above figure.

Table 45: Characteristics of Medicaid HMO Revenue

Agency Name	Number of Invoices: Medicaid HMO	Total Billed: Medicaid HMO	Contractual Allowance / Write-Off: Medicaid HMO	Total Collected: Medicaid HMO
Northwell - EMS	557	$1,524,913	$1,413,153	$111,760
Pinellas/SunStar	21,017	$13,400,000	$9,500,000	$2,600,000
REMSA	7,750	$8,850,000	$6,900,000	$1,950,000
Richmond	11,120	$6,292,708	$4,150,141	$2,026,594
TRAA	5,903	$8,805,969	$12,704	$972,739

TRAA reported $3.3 million outstanding from two Medicaid HMOs at the end of 2017 and anticipated writing off approximately $2.9 million in these accounts TRAA also noted anticipated collections from two Medicaid HMOs estimated at $401,600. Both of these amounts are in addition to what is reported in the above table.
Only agencies that answered the survey question(s) are included in the above table.

Figure 71: Characteristics of Medicaid HMO Revenue



Only agencies that answered the survey question(s) are included in the above figure.

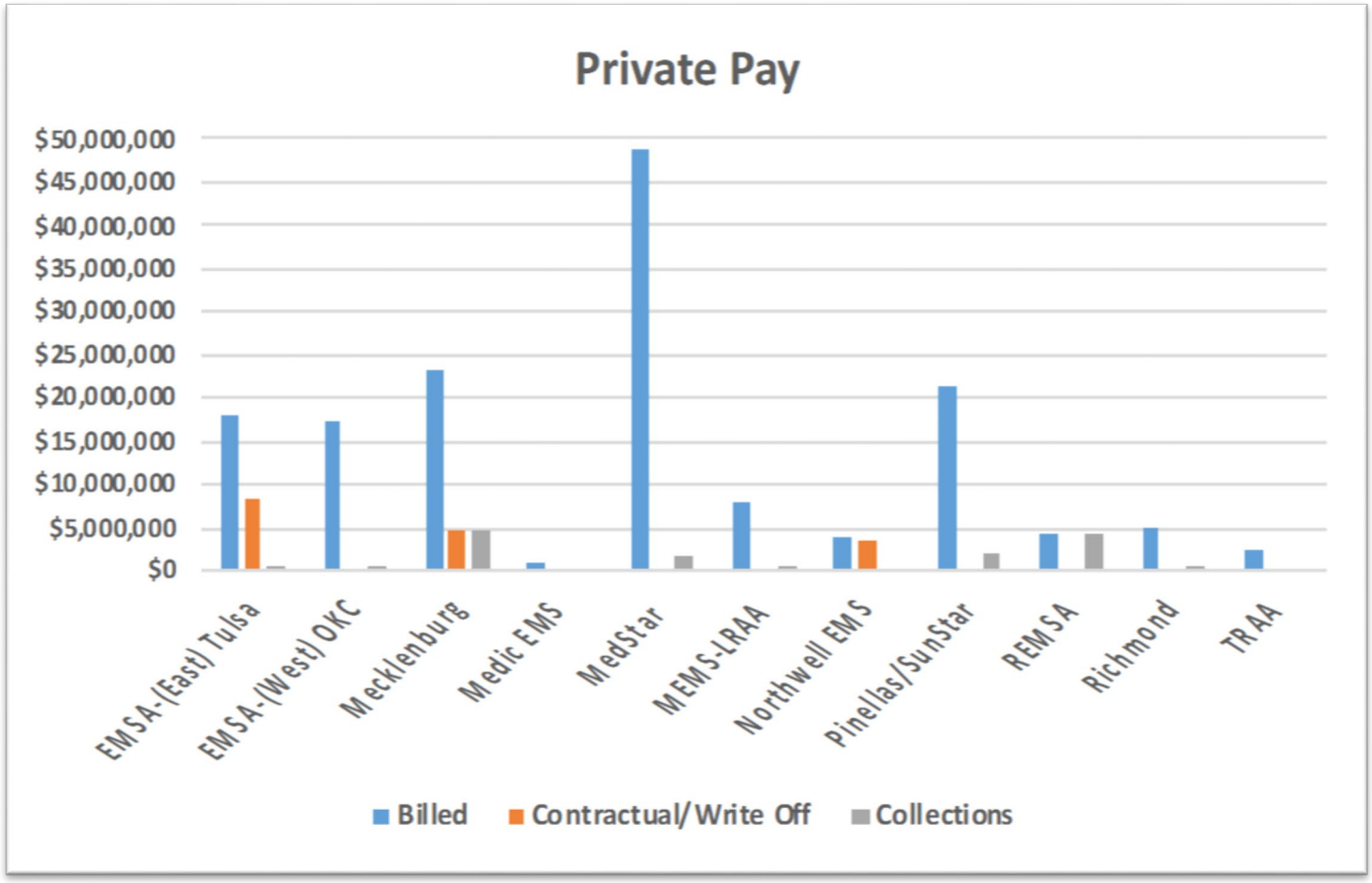
Table 46: Characteristics of Private Pay Revenue

Agency Name	Number of Invoices: Private Pay	Total Billed: Private Pay	Contractual Allowance / Write-Off: Private Pay	Total Collected: Private Pay
EHS – Nova Scotia	339	$190,262		$137,568
EMSA -(East) Tulsa	13,826	$18,080,123	$8,360,452	$436,470
EMSA - (West) OKC	13,106	$17,210,359	$17,640	$472,937
Mecklenburg	21,557	$23,280,937	$4,618,596	$4,699,345
Medic EMS	237	$812,727	$159,731	$32,069
MedStar	19,335	$48,758,240		$1,723,086
MEMS-LRAA	8,319	$7,876,578	$23,548	$737,416
Northwell EMS	1,454	$3,757,939	$3,726,441	$31,495
Pinellas/SunStar	30,819	$21,300,000		$2,000,000
REMSA	3,650	$4,250,000	$60,000	$4,200,000
Richmond	9,382	$5,134,393	$14,910	$715,821
TRAA	1,744	$2,536,424		

Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.

Only agencies that answered the survey question(s) are included in the above table.

Figure 72: Characteristics of Private Pay Revenue



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
EHS-Nova Scotia reported $190,262 billed and $137,568 collected and as an outlier is not included in the above figure.
Only agencies that answered the survey question(s) are included in the above figure.

Table 47: Characteristics of Commercial Insurance Revenue

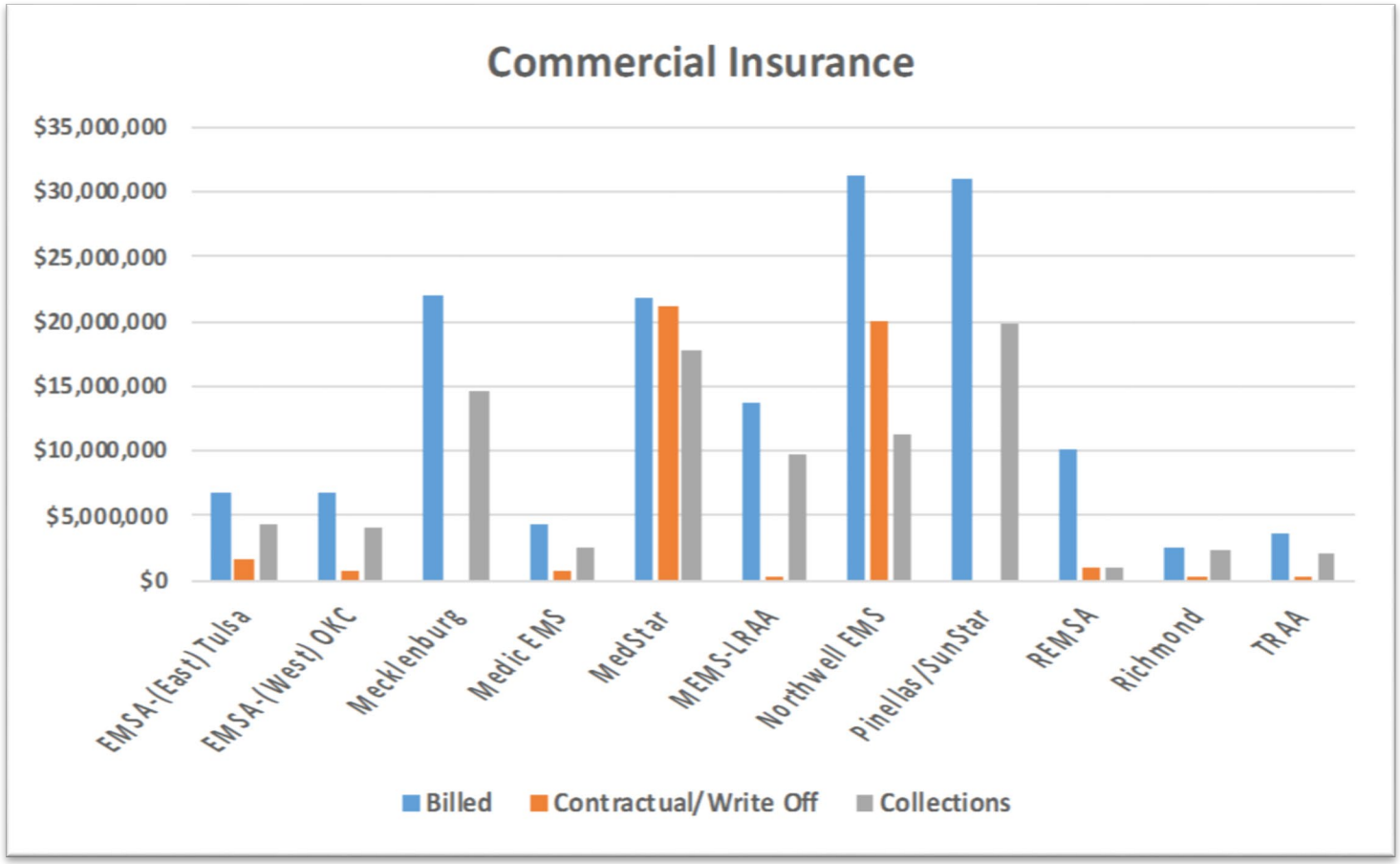
Agency Name	Number of Invoices: Commercial Insurance	Total Billed: Commercial Insurance	Contractual Allowance / Write-Off: Commercial Insurance	Total Collected: Commercial Insurance
EMSA - (East) Tulsa	5,369	$6,824,726	$1,696,850	$4,368,549
EMSA - (West) OKC	5,348	$6,854,443	$583,300	$4,121,472
Mecklenburg	20,212	$21,990,010		$14,682,364
Medic EMS	2,661	$4,208,291	$635,049	$2,514,480
MedStar	18,723	$21,917,831	$21,084,864	$17,887,771
MEMS-LRAA	13,790	$13,709,007	$182,960	$9,576,036
Northwell EMS	11,798	$31,247,135	$20,028,360	$11,218,757
Pinellas/SunStar	25,554	$31,100,000		$19,800,000
REMSA	8,400	$10,100,000	$820,000	$930,000
Richmond	4,664	$2,579,458	$320,254	$2,193,768
TRAA	2,422	$3,716,644	$47,762	$2,085,214

Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.

TRAA added that the agency writes off commercial or self-pay claims only after two years of no activity.

Only agencies that answered the survey question(s) are included in the above table.

Figure 73: Characteristics of Commercial Insurance Revenue



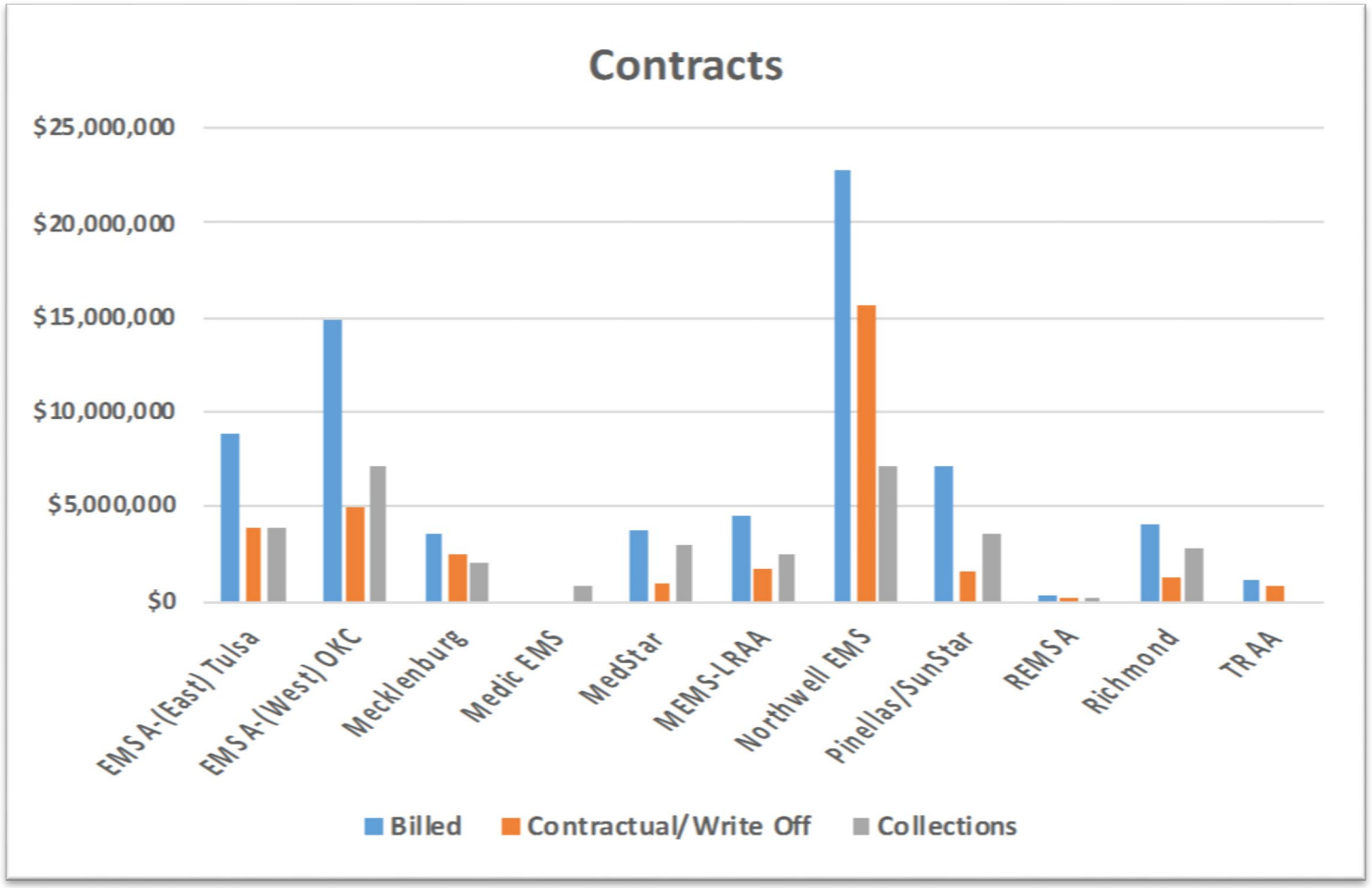
Only agencies that answered the survey question(s) are included in the above figure.

Table 48: Characteristics of Revenue from Contracts

Agency Name	Number of Invoices: Contracts	Total Billed: Contracts	Contractual Allowance / Write-Off: Contracts	Total Collected: Contracts
EMSA-(East) Tulsa	7,463	$8,869,643	$3,948,050	$3,889,451
EMSA-(West) OKC	11,693	$14,828,327	$4,973,058	$7,084,403
Mecklenburg	6,569	$3,625,764	$2,421,801	$1,959,449
Medic EMS				$841,172
MedStar	2,537	$3,749,830	$937,458	$2,902,047
MEMS-LRAA	4,991	$4,533,683	$1,770,724	$2,442,625
Northwell EMS	10,058	$22,811,979	$15,689,595	$7,122,384
Pinellas/SunStar	10,531	$7,200,000	$1,500,000	$3,600,000
REMSA	240	$300,000	$60,000	$235,000
Richmond	5,258	$4,062,314	$1,306,451	$2,751,973
TRAA	1,001	$1,168,701	$720,624	

Only agencies that answered the survey question(s) are included in the above table.

Figure 74: Characteristics of Contract Revenue



Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
Only agencies that answered the survey question(s) are included in the above figure.

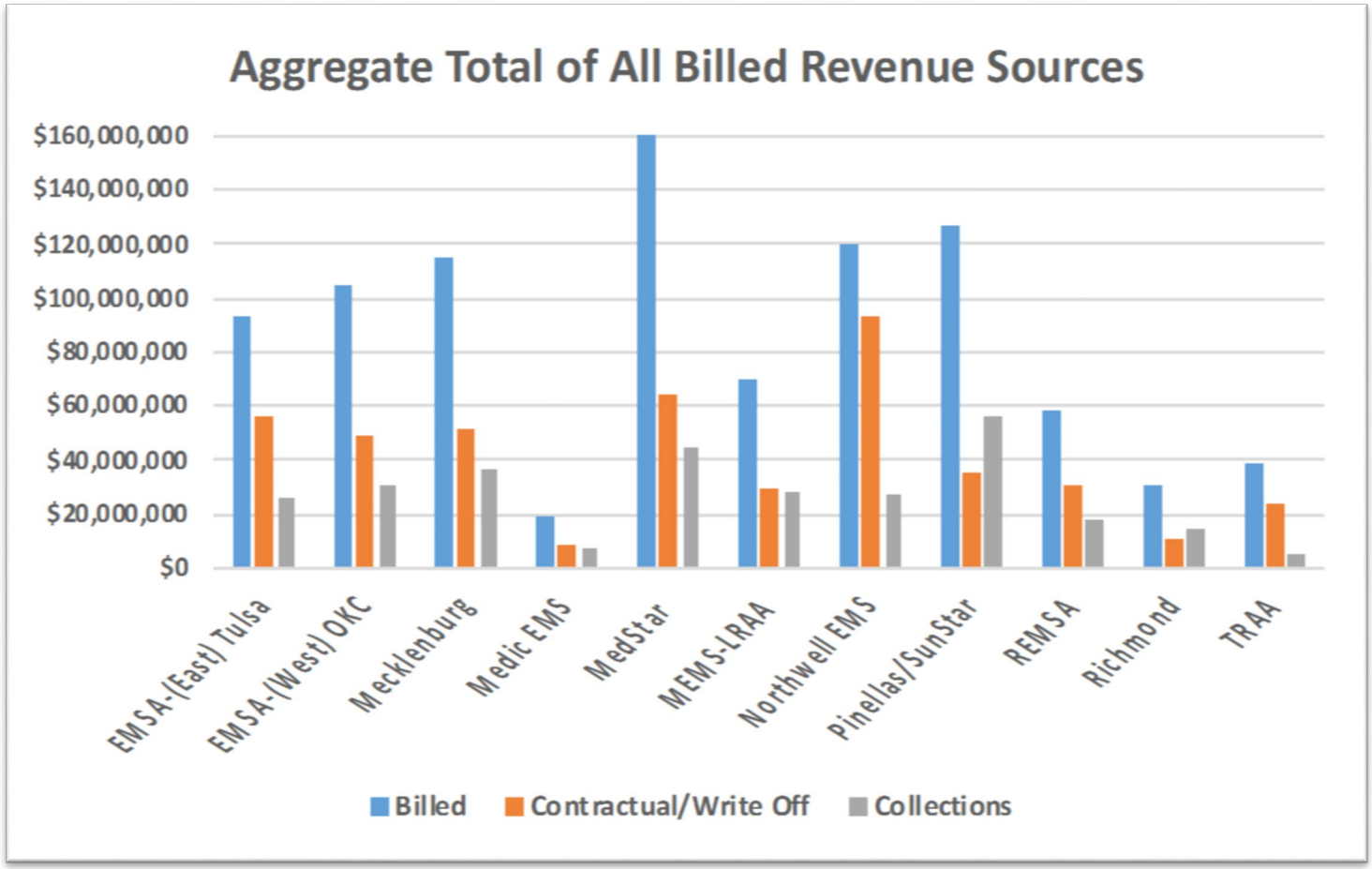
Table 49: Characteristics of Aggregated Revenue Sources

Agency Name	Number of Invoices	Total Billed	Contractual Allowance / Write-Off	Total Collected
EHS – Nova Scotia	339	$190,262		$137,568
EMSA - (East) Tulsa	76,743	$93,528,998	$55,716,986	$26,214,592
EMSA - (West) OKC	81,026	$104,227,766	$49,679,499	$30,549,493
Mecklenburg	113,349	$115,056,613	$51,891,118	$36,025,437
Medic EMS	17,728	$19,339,635	$8,583,157	$7,925,394
MedStar	102,343	$160,497,119	$64,524,052	$44,274,694
MEMS-LRAA	71,405	$69,970,739	$28,878,336	$28,596,071
Northwell EMS	47,325	$120,388,672	$92,836,229	$27,552,422
Pinellas/SunStar	184,901	$127,200,000	$35,100,000	$55,800,000
REMSA	49,590	$58,200,000	$30,520,000	$18,365,000
Richmond	52,606	$30,902,244	$11,189,428	$14,810,067
TRAA	26,497	$38,925,572	$23,297,072	$5,334,543

Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.

Only agencies that answered the survey question(s) are included in the above table.

Figure 75: Characteristics of Aggregate Total of All Revenue Sources



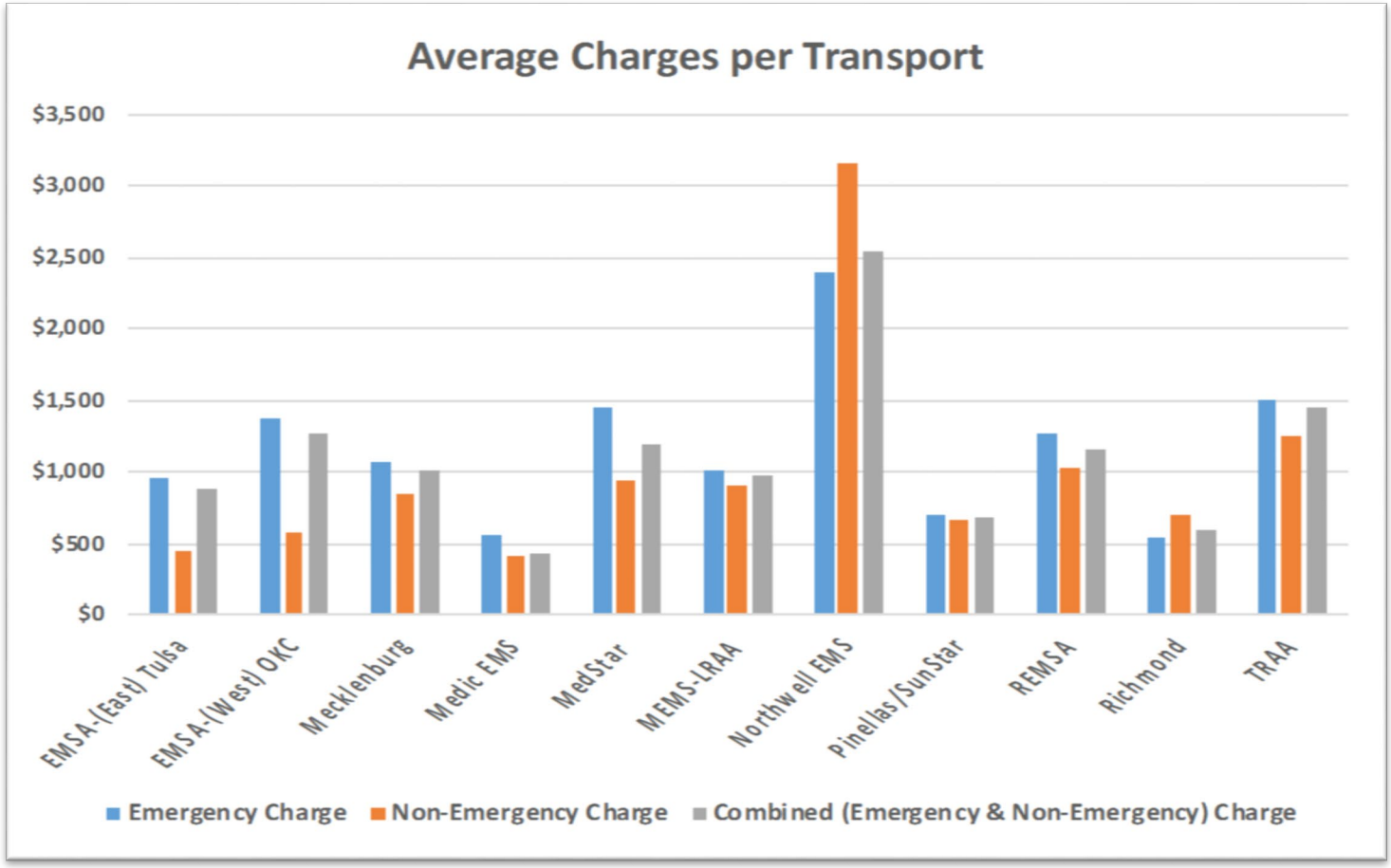
Canadian dollars were converted to US dollars at average annual conversion rate of 0.765733.
EHS-Nova Scotia is not included in the above figure as the revenue billed is relatively small and as such is an outlier.
Only agencies that answered the survey question(s) are included in the above figure.

Table 50: Average Total Charges and Collections per Transport

Agency Name	Emergency	Non-Emergency	Combined (Emergency & Non-emergency)	Unadjusted Collection Rate	Average Revenue per Transport
EMSA - (East) Tulsa	$947	$442	$878	28%	$345
EMSA - (West) OKC	$1,373	$576	$1,271	29%	$372
Mecklenburg	$1,056	$843	$1,016	31%	$318
Medic EMS	$561	$415	$427	37%	$324
MedStar	$1,440	$931	$1,186	28%	$397
MEMS-LRAA	$1,002	$897	$980	41%	$400
Northwell EMS	$2,398	$3,154	$2,543	25%	$625
Pinellas/SunStar	$707	$667	$687	44%	$303
REMSA	$1,265	$1,026	$1,150	36%	$430
Richmond	$542	$703	$587	48%	$282
TRAA	$1,498	$1,254	$1,445	26%	$381

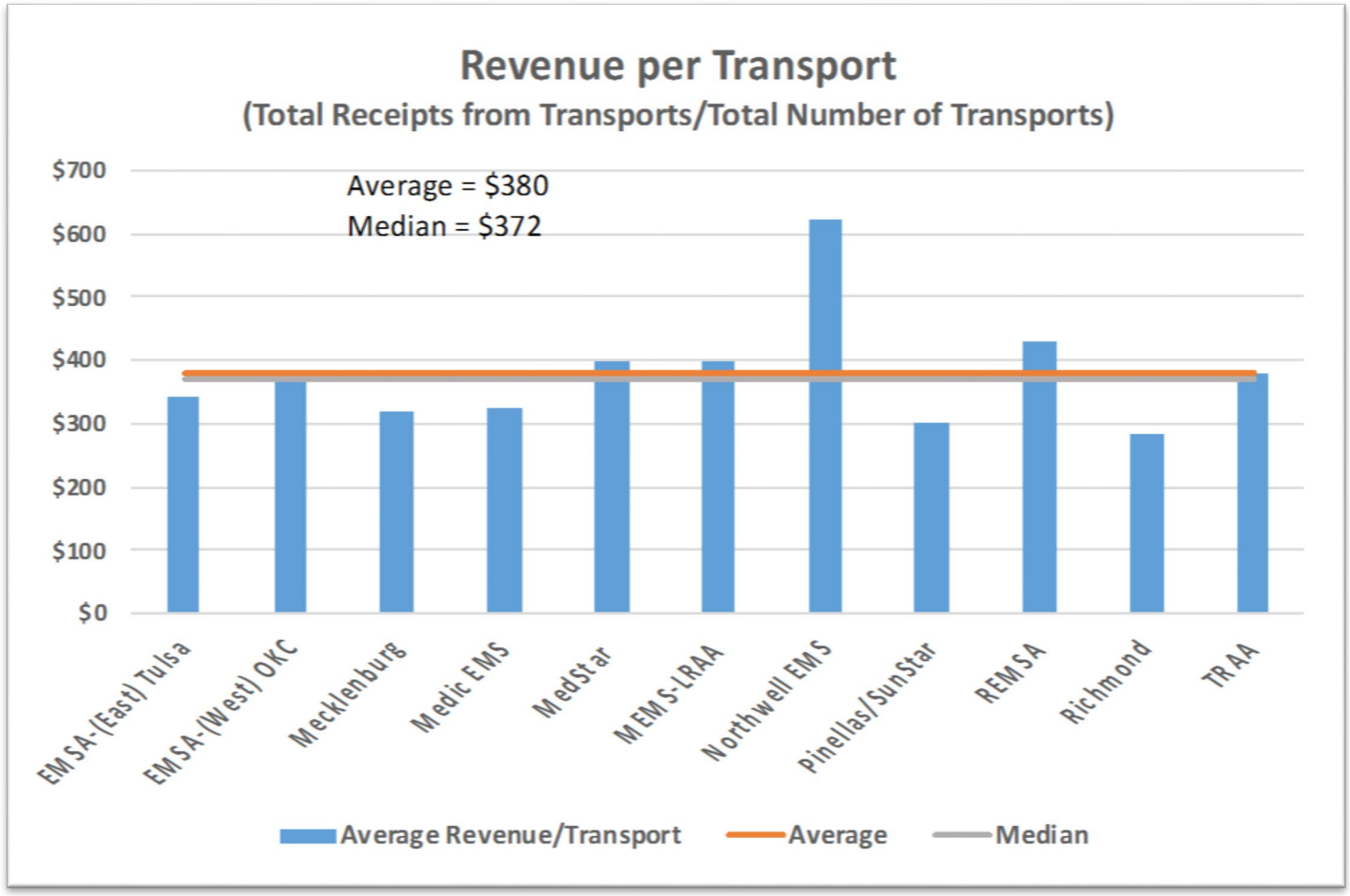
Only agencies that answered the survey question(s) are included in the above table.

Figure 76. Average Charges per Transport (Including Mileage)



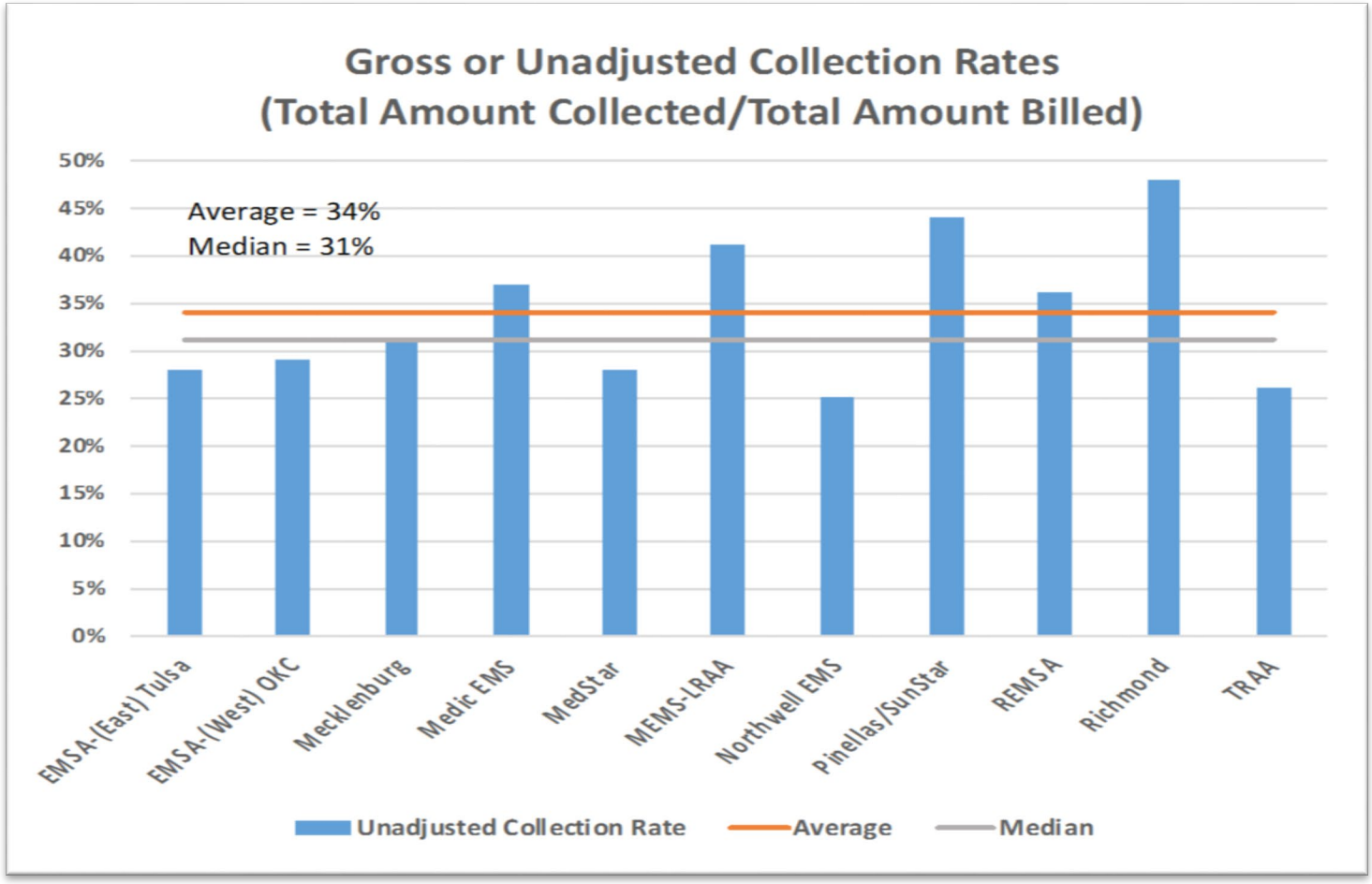
Only agencies that answered the survey question(s) are included in the above figure.

Figure 77. Revenue per Transport



Only agencies that answered the survey question(s) are included in the above figure.

Figure 78. Gross or Unadjusted Collection Rates



Only agencies that answered the survey question(s) are included in the above figure.

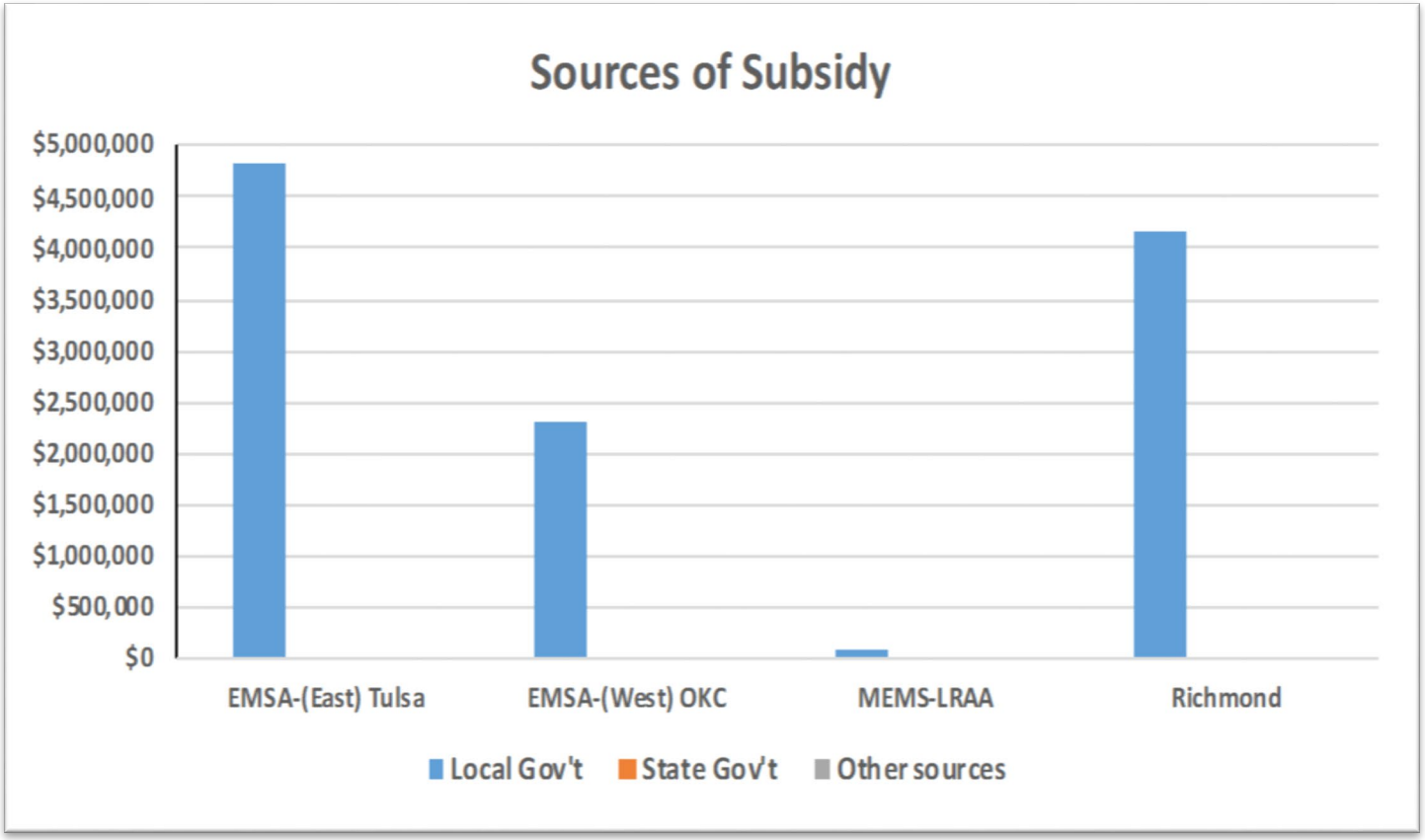
Table 51: Comparison of Subsidies by Agency*

Agency Name	Local Government	State Government	Other	Total Subsidies
EHS – Nova Scotia		$99,545,290	-	$99,545,290
EMSA - (East) Tulsa	$4,825,000			$4,825,000
EMSA - (West) OKC	$2,311,450			$2,311,450
Mecklenburg	$10,900,000	$0	$0	$10,900,000
Medic EMS	$8,844			$8,844
MedStar	$21,852	$0	$0	$21,852
MEMS-LRAA	$93,759			$93,759
Niagara EMS	50%	-	50% Provincial	50% Local/50% Provincial
Pinellas/SunStar	$0	$0	$0	$0
REMSA	$0	$0	$0	$0
Richmond	$4,155,500	$0	$0	$4,155,500
TRAA	$0	$0	$0	$0

Only agencies that answered the survey question(s) are included in the above table.

**In some systems, subsidies may be characterized as a "retail bill buydown".*

Figure 79: Description of Sources of Subsidy



Nova Scotia reports $99.5 million (US dollars) as State Gov't source. As a significant outlier, it is not included in the above figure.
Mecklenburg reports local government subsidy of $10.9 million and, as an outlier, is not included in the above figure.
Medic EMS and MedStar are also outliers due to the small amounts reported and are not included in the above figure.
Only agencies that answered the survey question(s) are included in the above figure.

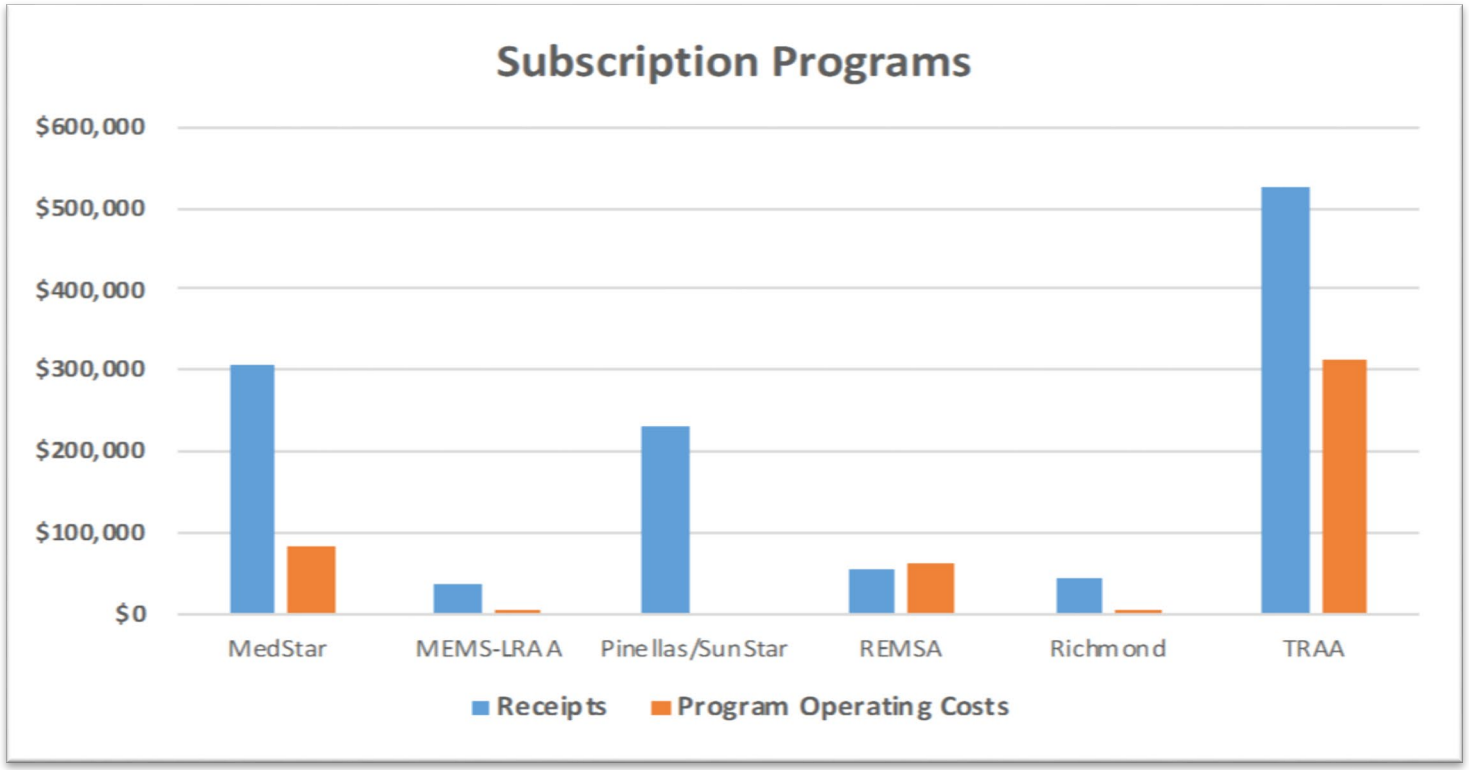
Table 52: Description and Comparison of Subscription Programs

Agency Name	Does a Subscription Program Exist?	Number of Members	Subscription Receipts	Program Costs	Single Rate	Family Rate	Other
EHS – Nova Scotia	No						
EMSA - (East) Tulsa	Yes						
EMSA - (West) OKC	Yes						
Mecklenburg	No						
Medic EMS	No						
MedStar	Yes	5,185	$305,442	$85,000	$69	$69	$110 w/o insurance
MEMS-LRAA	Yes	585	$37,422	$1000	Prim & Sec Ins $60	Prim Ins Only $70	No Insurance $80
Niagara EMS	No						
Northwell EMS	No						
Pinellas/SunStar	Yes	3,133	$229,934		63	98	
REMSA	Yes	5,000	$55,000	$60,000	$65	$65	$65
Richmond	Yes	688	$43,781	$3,964	$49	$79	N/A
TRAA	Yes	9,426 house holds	$525,540	$313,008	$59	$59	

Only agencies that answered the survey question(s) are included in the above table.

Future survey tools should be more specific regarding Subscription Program costs to identify administration, advertising, waived deductibles, co-insurance and/or discounts.

Figure 80: Characteristics of Subscription Programs



Note: Program costs were defined in the survey tool as costs "to the organization to have the program."
Only agencies that answered the survey question(s) are included in the above figure.

SECTION 9: MOBILE INTEGRATED HEALTHCARE

Mobile Integrated Healthcare (MIH) has proven to be a value-added component for EMS in the changing health care environment subsequent to the Affordable Care Act.

Several AIMHI agencies are on the forefront of understanding how MIH integrates with the current pay-for-service model that drives EMS and patient transportation services. For example, some agencies are successfully integrating with the hospital systems, third party payers, and Accountable Care Organizations (ACO) to improve patient outcomes, enhance the experience of care, and reduce healthcare expenditures.

This section provides a summary of MIH initiatives by AIMHI agencies.

Table 53. Current State of Agencies' MIH Programs

Agency Name	Describe the state of your Community Paramedic (CP) program.
EHS – Nova Scotia	Currently have a special patient program that includes palliative patients - paramedics can treat these people at home to avoid transports/ED visits/disruption to the patient. Also have Extended Care Paramedic Program (ECP) to treat patients in LTCs and Police Cell calls. Looking at further expansion of MIH in the near future.
Medic EMS	information gathering
MedStar	We currently have an economically sustainable MIH program that includes 16 different projects and agreements.
MEMS) – LRAA	Active with slow steady growth. Covering 560,000 population area.
Niagara EMS	Actively involved in a System Transformation Project that will change the model of service delivery built upon an MIH foundation. The shift will be away from isolated response times except for the ~10% of all patients where time to medical intervention has measurable clinical outcome and more towards bundled care and community health/social resource access and treatment as measurements of clinical outcome.
Northwell - EMS	Program running since fall 2013
Pinellas/SunStar	Information gathering.
REMSA	Active
Richmond	N/A (for the reporting year, FY2017)
TRAA	Looking for opportunities that could be self-funding

Only agencies that answered the survey question(s) are included in the above table.

Table 54. Description of Existing and Desired MIH Programs

Agency Name	What types of CP programs does your agency have or desire?
EHS – Nova Scotia	Currently have a special patient program that includes palliative patients - paramedics can treat these people at home to avoid transports /ED visits/disruption to the patient. Also have Extended Care Paramedic Program (ECP) to treat patients in LTCs and Police Cell calls.
MedStar	1. High Utilizer Group (HUG) program: a. 90-day enrollment proactively visiting HUG patients referred by hospitals, physician groups and 3rd party payers. b. Paid for through enrollment fees and Per Member/Per Month economic models c. 200+ patients enrolled annually, with an average contact rate of 12 contacts per enrollee d. FTEs: Total of 12 field providers, 1 RN Case Manager, 1 Admin Assistant, 1 Manager and 1 working supervisor shared between programs 1 – 5. 2. Admission/Readmission Avoidance: a. 30-day enrollment to avoid preventable admissions/readmission referred by hospitals, physician groups and 3rd party payers. b. Paid for through enrollment fees and Per Member/Per Month economic models c. 200+ patients enrolled annually, with an average contact rate of 9 visits over 30 days 3. Support to Hospice Agencies: a. Hospice agencies enroll either patient at-risk for a 9-1-1 activation and potential ambulance transport to an ED for a hospice related plan of care issue b. Paid for on a PM/PM fee for either high risk enrollees, or all hospice agency patients in our service area c. 200+ patients enrolled annually 4.Support to Home Care Agencies: a. Home health agencies enroll their patients with us to notify them in the event the patient calls 9-1-1 and respond a community paramedic to assist with care coordination on scene. We also provide after-hours back up response at the request of the home health agency b. Paid for on a patient contact fee and a PM/PM fee for all clients in our service area c. 500+ patients enrolled annually 5.Support to Woman and Children's Shelter: a. Women's shelter staff calls us directly to respond an MHP to assess an arriving shelter for any necessary medical care b. Paid for on a patient contact fee c. Average 30 patient contacts annually
MEMS-LRAA	Mostly self-funded with one client paying fee for service on a per client basis. They refer 10-15 visits a week to us. The program has 2 clinical FTE positions, and one Coordinator position. Call volume is 4-8 a day. Referrals from area hospitals (transition nurses and case managers), our field medics, fire department, and internal records.
Niagara EMS	Mental Health and Addictions Response Team - 4 FTE - 2 paramedics, 2 mental health nurses Falls Response Team - 4 FTE - 2 paramedics, 2 Occupational Therapists Health Integration Team - 4 FTE - 2 paramedics, 2 health brokers/SDOH nurses Secondary Telephone Triage (ECNS) - 3 FTE - 3 nurses
Northwell EMS	Our programs are currently focused on helping to manage Advanced Illness Management populations that we are at risk for and keeping them out of the hospital in alignment with their goals of care. We are reimbursed on a FFS basis by a provider within our organization that we are partnered with in the program. The program is a collaboration between: House Calls (AIM group of providers managing the primary care of these patients), Clinical Call Center (our ECNS resource) and our Center for EMS. We currently have about 50 FTEs in our program which include Supervisors, CCT Paramedics and experienced field Paramedics. All have gone through our own 40-hour training program. Our operations model follows the HPEMS / SSM mantra and we provide resources on-demand to calls for service. All of our calls are currently unscheduled / urgent in nature and we marginally respond with credentialed resources 24x7 when requested by the program. Our volume since inception is running approximately 750 visit per year / 1050 ADS population or 0.71 visits pp/year.
Pinellas /SunStar	We are very interested in MIH initiatives. Our community has a very robust and competitive Healthcare System that has very few gaps that aren't already being addressed. Finding our niche that would benefit the community/patients, be financially sustainable and not a distraction from our core services is our area of study.
REMSA	Community Paramedic, Nurse Health Line

Only agencies that answered the survey question(s) are included in the above table.

Table 55. Description of RN Telephonic Programs

Agency Name	Do you currently or plan on offering telephonic RN advice programs? If so, what software do you use for RN advice?
EHS – Nova Scotia	Currently looking at ECNS for possible implementation
Mecklenburg	No
Medic EMS	Possibly
MedStar	Yes, 9-1-1 Nurse Triage, Priority Solutions Low Code software
MEMS – LRAA	Future plans include a Nursing Resource Line in dispatch to do telephone triage, as well as direct calling to health assistance line.
Niagara EMS	ECNS
Northwell - EMS	Yes, we are an ACE Accredited ECNS Center
Pinellas/SunStar	No
REMSA	Yes, LowCode (Priority Solutions)
Richmond	N/A (for the reporting year, FY2017)
TRAA	No

Only agencies that answered the survey question(s) are included in the above table.

Table 56. Description of Clinical or Operational Indicators for MIH Program

Agency Name	What are your clinical or operational indicators for use of each of your programs?
Medic EMS	1. Cardiac arrest 2. Trauma 3. Stroke; dispatcher activated stroke alert time saved
MedStar	Many of the measures developed by the National MIH Measures Group and agreed to by the payer. Change in acute care utilization, patient experience, self-perception of health status and expenditure savings based on change in utilization.
MEMS–LRAA	• High Utilizers (up to 90 day engagement if progress is being realized) • 30 day readmission avoidance for multiple diagnoses (usually no home health services) • Requests must fall within our scope of practice and capabilities, after review
Niagara EMS	In development
Northwell EMS	We are called into the scene when RN navigation and provider assessment fail to achieve a risk tolerant solution to the patient's situation. Our CP is sent in for in-home diagnostics and treatments when a patient complains of a change in clinical condition / is symptomatic, and the provider needs additional high fidelity clinical assessment and treatment options. We keep patient's home 85% of the time and provide actual clinical interventions 30% of the time with the rest of our visits being diagnostic only in nature.
REMSA	Community Paramedic - CHF, COPD, Post MI, Evaluate & Refer

Only agencies that answered the survey question(s) are included in the above table.

Future survey tools should be specific about indicators vs. outcomes for this question.

Table 57. Description of Existing or Planned Partnerships

Agency Name	Please list program partnerships (existing or planned).
MedStar	Contract agreements: • 5 hospitals • 3 home care agencies • 3 hospice agencies • 1 Community – Based organization • 1 Independent Practice Association • 1 Post Acute Care provider • 1 large commercial payers
MEMS–LRAA	• Pilot partnership with one large insurance provider currently • Informal partnership with 6 hospitals who call with difficult patients (formalizing those relationships very soon)
Niagara EMS	Hospitals, Local Health Integration Network, Primary Care FHT's, Community Care, Public Health Social Services, Mental Health service providers, Long Term Care providers, Hospice Care
Northwell - EMS	House Calls / Advanced Illness Management Hospice 30 Day Readmission Avoidance Mental Health Care Navigation SNF/Nursing Home/Assisted Living Alternative Response
Pinellas/SunStar	Our primary effort now is agreements with transportation brokers to ensure pre-authorization of non-emergencies.
REMSA	Hospital, Insurance Plans, Hospice

Only agencies that answered the survey question(s) are included in the above table.

Table 58: Description of Agency Participation MIH Sub-committee Work

Agency Name	Would you join/lead a subcommittee to develop specific measure for MIH reporting?
Medic EMS	Join!
MedStar	Yes, Matt Zavadsky is already on two of them.
Metro EMS (MEMS) – LRAA	Yes. Already working with State group developing data collection system.
Niagara EMS	Yes
Northwell EMS	Yes
Pinellas/SunStar	Wouldn't be the best person for this effort.
REMSA	Already Participating
Richmond	Yes

Only agencies that answered the survey question(s) are included in the above table.

APPENDIX A

2018 EMS BENCHMARKING SURVEY TOOL

2018 HIGH PERFORMANCE SYSTEM ANALISYS

A Comparison of System Design and Performance

2018 EMS Benchmarking Survey Tool

A Comparison of System Design and Performance

Thank you in advance for participating in this survey. The Academy of International Mobile Healthcare Integration (AIMHI), formerly CAEMS, is a professional association of North America's preeminent emergency healthcare providers. Member organizations are high-performance systems that employ business practices from both the public and private sectors.

The AIMHI benchmarking studies perform a fundamental service to EMS by providing tools through which we can continue to learn about the strengths and weaknesses of today's emergency care system, ensure its progress and growth, and work to expand the reputation and efficiency of EMS nationally and around the world. The 2018 study is the latest attempt to add to the body of knowledge required for effective benchmarking and improvement.

The first study was conducted in 1997 and published in 1998 at the request of the Metropolitan Ambulance Services Trust (MAST) and the City of Kansas City, Missouri. CAEMS members conducted subsequent studies in 2000, 2002, 2004, 2005, 2006, 2009, 2014 and now again in 2018. The AIMHI benchmarking studies have become valuable evidenced-based studies to share clinical, response-time and economic data across diverse EMS systems. It is our ultimate aim to provide members with a tool, data, and outcomes to continue research that shows the value of EMS as the gatekeeper of the healthcare continuum, as well as insight on improving their systems.

Josef Penner, Executive Director
Mecklenburg Emergency Medical Services Agency

DEFINITIONS

Average Response Time – Total number of minutes of on-scene responses, for which the ambulance arrived on scene (measured from clock start to clock end), divided by the total number of on-scene responses

Capital Expenditures – Costs for equipment, facility, etc. that meet your accounting practices as capitalized expenditures.

Contractor/Provider – Costs for services delivered by entity other than oversight agency.

Emergency Response – Immediate response with lights and siren from designed emergency telephone number (9-1-1) or non-emergency number on calls prioritized as emergencies.

Equipment/Supplies – For purposes of this survey, it is recognition of all costs including: equipment and supplies (maps, books, publications, medical and non-medical supplies, medical and non-medical equipment, small tools, computer supplies, vehicles, fuel, equipment replacement, etc.), insurance and building depreciation related to the direct and indirect provision of ambulance operations.

Exclusive Market Rights – The provider has exclusive or all requests for ambulance service from the primary service area including all requests from the designated emergency telephone number(s) (e.g., 9-1-1) and non-emergency number(s).

Fractile Response Time – A percentile compliance for a given response time standard that's determined by the cumulative number of on-scene responses for each given minute divided by the total number of on- scene responses. For example, if the standard is 8 minutes, and the cumulative on-scene responses less than 8 minutes equaled 90 divided by the total on-scene responses at 100. The percentile compliance at 8 minutes would equal 90%.

Labor Related Expenditures – All salaries, wages, benefits, taxes, etc. associated with employee costs.

Non-Emergency Response – Immediate response without lights and siren from designated emergency telephone number (9-1-1) or non-emergency number on calls prioritized as non-emergencies.

Non-Exclusive Market Rights – The provider has only designated emergency telephone number (e.g., 9-1-1) market rights for ambulance service. Non-emergency requests for ambulance service is shared or provided by other ambulance providers.

Operating Expenditures – All expenditures not included in labor related or capital expenditures.

Oversight Authority – Entity organized to purchase and/or otherwise design and oversee EMS delivery.

Primary Service Area – When filling out the survey, information is to be based on your primary services area that is defined as the geographic area your EMS agency has responsibility for emergency medical response and transports received from a publicly designated emergency access number.

Services - For purposes of this survey, its full cost recognition for all services (HR, insurance, professional services, building lease/payments, maintenance, telephone, tuition, training, etc.) related to the direct and indirect provision of ambulance operations.

Transfer Scheduled – A request for ambulance transport from a medical facility (hospital, medical clinic, nursing home) for a pre-set time of pick up and scheduled in advance (pre-defined number of hours) of requested time of pick up. The response time is measures from scheduled pick up to actual arrival on scene.

Transfer Unscheduled – A request for ambulance transport from a medical facility (hospital, medical clinic, nursing home) without being scheduled in advance (pre-defined number of hours).

Travel - For purposes of this survey, its full cost recognition for all services (airfare, lodging, meals, etc.) related to the direct and indirect provision of ambulance operations.

Unit Hours - One hour of service by a fully equipped and staffed ambulance assigned to a call or available for dispatch.

Unit Hour Utilization – Calculated by dividing the total number of transports by the total number of unit hours.

Wages/Benefits - For purposes of this survey, it's full cost recognition for all wages and benefits (wages, salaries, overtime, paid leave, health insurance, retirement, disability, unemployment and disability insurance, etc.) related to the direct and indirect provision of ambulance operations.

Zone Response Time Standard – Service areas divided into specific area types that have other response time requirements.

AGENCY INFORMATION

1. Agency name:_____

2. Agency information:

a. Person completing survey:_____
b. Address 1:_____
c. Address 2: _____
d. City/Town:_____
e. State/Province:_____
f. Zip/Postal Code:_____
g. Country:_____
h. Email Address:_____

3. Reporting period: Start date_____

4. Reporting period: End date_____

GENERAL INFORMATION

5. Organizational structure: (Select one option)

- Public Utility Model (PUM)
- Franchise
- Government 3rd Service
- Fire Based
- Hospital Based
- Other (please specify)_____

6. If PUM, are you with a: (Select one option)

- Contractor
- Self-Operated

7. Primary service area population:_____

8. Primary service area square miles/kilometers:_____

9. Primary service area covers single or multiple jurisdictions: (Select one option)

- Single
- Multiple

10. Ambulance market rights: (Select one option)

- Exclusive
- Non exclusive

11. Responses:

a. Total annual emergency responses (9-1-1 and/or prioritized as requiring lights and siren responses):_____

b. Total annual non-emergency responses (9-1-1 and/or prioritized as not requiring lights and siren res:_____

c. Total annual transfers (7-digit transfers scheduled or unscheduled calls):_____

12. Transports:

a. Total annual emergency transports (9-1-1 and/or prioritized as requiring lights and siren responses):_____

b. Total annual non-emergency transports (9-1-1 and/or prioritized as not requiring lights and siren re:_____

c. Total annual transports (7-digit transfers scheduled or unscheduled calls):_____

13. Percentage of emergency responses resulting in a refusal or denial. (A refusal or denial is defined as no patient transport) (Select one option)

Percentage (0 – 100):_____

RESPONSE TIME STANDARDS

14. Are exemptions allowed? (Select one option)

- No
- Yes. What are they? (Some exemptions significantly skew the data, ex. System overload, distance, etc.):

15. Are ambulance response times measured? (Select one option)

- Yes
- No

16. Response time measurement used: (Select one option)

- Fractile
- Average

17. Response time compliance required? (Select one option)

- Yes
- No

RESPONSE TIME COMPLIANCE

18. Time Standard (minutes:seconds)

a. Emergency (lights and siren):_____
b. Non-emergency (no lights and siren):_____
c. Scheduled Transfers (from time of scheduled pickup):_____
d. Unscheduled Transfers (from time of requested pickup):_____
e. Other type of call:_____

19. Compliance Standard (Percent 0 -100)

Emergency lights and siren selection option:_____
Non-emergency no lights and siren selection option:_____
Scheduled Transfers from time of scheduled pickup selection:_____
Unscheduled transfers from time of requested pickup selection:_____
Ct (he)r type of calls selection option:_____

20. Actual Compliance (in reporting period)

a. Emergency (lights and siren):_____
b. Non-emergency (no lights and siren):_____
c. Scheduled Transfers (from time of scheduled pickup):_____
d. Unscheduled Transfers (from time of requested pickup):_____
e. Other type of call:_____

21. Please add any comments here to better explain your response time compliance standards above.

_____

22. Response time compliance measured by geography? (Select one option)

- Yes
- No
- Other (Please specify)_____

RESPONSE TIME COMPLIANCE BY GEOGRAPHY

Response time compliance be geography:_____

23. Time Standard (minutes:seconds)

a. Urban:_____
b. Suburban:_____
c. Rural:_____

24. Compliance Standard (%)

a. Urban:_____
b. Suburban:_____
c. Rural:_____

25. Actual Compliance (in reporting period)

a. Urban:_____
b. Suburban:_____
c. Rural:_____

26. If you measure geographic response time compliance by some other method than Urban/Suburban/Rural, please explain it below._____

RESPONSE TIME STANDARDS

Ambulance response time penalties (if any):

27. Per Minute Fine

a. Emergency (lights and siren):_____
b. Non-emergency (no lights and siren):_____
c. Scheduled Transfers (from time of scheduled pickup):_____
d. Unscheduled Transfers (from time of requested pickup):_____

28. Maximum

a. Emergency (lights and siren):_____
b. Non-emergency (no lights and siren):_____
c. Scheduled Transfers (from time of scheduled pickup):_____
d. Unscheduled Transfers (from time of requested pickup):_____

29. Other type of call:

a. Describe type of call:_____
b. Per minute fine:_____
c. Maximum:_____

FIRST RESPONDER RESPONSE TIMES

30. Are First Responder response times measured? (Select one option)

- Yes
- No

31. Response time measurement used. (Select one option)

- Fractile
- Average

32. Response time compliance required? (Select one option)

- Yes
- No

First Responder response time compliance:

33. Time Standard (minutes:seconds)

a. Emergency (lights and siren):_____

b. Non-emergency (no lights and siren):_____

34. Compliance Standard (Percent 0 – 100)

a. Emergency (lights and siren):_____

b. Non-emergency (no lights and siren):_____

35. Actual Compliance (in reporting period)

a. Emergency (lights and siren):_____

b. Non-emergency (no lights and siren):_____

First Responder response time penalties (if any):

36. Per Minute Fine

a. Emergency (lights and siren):_____

b. Non-emergency (no lights and siren):_____

37. Maximum

a. Emergency (lights and siren):_____

b. Non-emergency (no lights and siren):_____

OTHER RESPONSE TIME RELATED QUESTIONS

38. Sub-zone response time performance requirements or different response time performance requirements: (Select one option)

- Yes (if yes, please describe in next question
- No

39. Describe Sub-zone response time performance requirements:_____

40. Criteria for response time measurement for emergencies (9-1-1 and/or prioritized as requiring lights and siren responses):

a. Clock starts when (e.g., phone answered, address and call type determined, or unit dispatched):_____
b. Clock stops when (e.g., unit on scene, at patient side):_____

41. Automated External Defibrillator Program with capability to arrive at scene within 5 minutes of dispatch? (Select one option)

- Yes
- No
- Other (Please specify)_____

42. Response units mobile and/or strategically located based on analysis of historical or predicted call request patters? (Select one option)

- Yes
- No
- Other (Please specify)_____

43. Required performance with defined termination provisions of EMS agency for non-compliance or breach of contract. (Select one option)

- Yes
- No
- Other (Please specify)_____

CLINICAL PERFORMANCE

44. Minimum level of dispatch certification required. (Select one option)

- EMD
- EMT
- EMT and EMD
- Paramedic
- Paramedic and EMD
- None
- Other (Please specify)_____

45. Priority dispatch protocols used on all EMS medical requests that triages severity and provides dispatch life support. (Select one option)

- o Yes
- o No
- o Other (Please specify)_____

46. Response mode (emergency/non-emergency) and configuration (first response only/first response and ambulance/ambulance only) determined by: (Select one option)

- o Local medical control
- o Local EMS regulatory entity
- o Fire
- o Other (Please specify)_____

47. First response provided by? (Select one option)

- o Fire
- o Police
- o Transporting Agency
- o Other (Please specify)_____

48. Minimum level required for first response? (Select one option)

- o EMS Basic
- o EMT Basic with AED
- o EMT Intermediate
- o EMT Intermediate with AED
- o EMT Paramedic
- o Other (Please specify)_____

49. All ALS or ALS/BTS (tiered) ambulance response? (Select one option)

- o ALS only (emergency, non-emergency, transfers)
- o ALS (emergency and non-emergency ALS/BLS transfers)
- o ALS (emergency) ALS/BLS (non-emergency and transfers)
- o ALS/BLS (emergency and non-emergency)
- o Other (Please specify)_____

50. Minimum ALS ambulance staffing? (Select one option)

- o 2 Paramedics
- o 1 Paramedic/1 Intermediate
- o 1 Paramedic/1 Basic
- o 1 Intermediate/1 Basic
- o 1 Nurse/1 Paramedic
- o 1 Nurse/1 Intermediate
- o 1 Physician/1 Paramedic
- o Other (Please specify)_____

51. Minimum BLS ambulance staffing? (Select one option)

- o 2 Intermediates
- o 2 Basic
- o 1 Intermediate/1 Basic
- o Not allowed
- o Other (Please specify)_____

52. Critical Care Transport: (Select one option)

- o Yes
- o No
- o If yes, minimum staffing?_____

53. National registry or equivalent certification required for EMT-Basic? (Select one option)

- o Yes
- o No

54. National registry or equivalent certification required for EMT-Intermediate? (Select one option)

- o Yes
- o No

55. National registry or equivalent certification required for EMT-Paramedic? (Select one option)

- o Yes
- o No

56. National registry or equivalent certification required for Nurse? (Select one option)

- o Yes
- o No

57. **Percent ACLS certified:** (Select one option)

Percentage (0 – 100):_____

58. **Percent PHTLS (or equivalent) certified:** (Select one option)

Percent (0 – 100):_____

59. Percent PALS, PEPPS (or equivalent) certified: (Select one option)

Percent (0 -100):_____

60. ALS skills performed by non-physician field staff.

- IV
- Intubation
- 12 lead ECG
- RSI
- Defibrillation
- Ventilators
- External Pacing
- End Tidal
- Needle Thoracotomy
- Field Thrombolitics
- Needle Cricothyroidotomy
- NG tube/lavage
- CO2 Capnography
- Amiodarone
- Intraosseous Infusion
- Vasopressin
- LMA
- King
- Combitube
- Therapeutic Hypothermia
- CO Detection
- Other (Please specify)_____

61. Emergency physicians are dispatched to life threatening emergencies as a standard procedures. (Select one option)

- Yes
- Occasionally
- Not at all

62. **If physicians are dispatched to life threatening emergencies as a standard procedure, then what is the percent of responses they are dispatched on?** (Select one option)

Percent (0 – 100):_____

63. If physicians are dispatched to life threatening emergencies as a standard procedure, then what is the percent of transports they are dispatched on? (Select one option)

Percent (0 – 100):_____

64. Emergency physician's method to travel to the scene. (Select one option)

- Own vehicle
- Ambulance
- Other (Please specify)_____

65. Does the emergency physician have any additional formalized training for the prehospital care environment? (Select one option)

- Yes
- No

66. Is there a formalized multi-casualty response plan? (Select one option)

- Yes
- No

67. Total number of medical cardiac arrests with attempted resuscitation:

a. Ventricular Fibrillation/Ventricular Tachycardia
b. PES/EMD
c. Asystole

68. Total number of successful resuscitations (patients reaching hospital with cardiac rhythm - Utstein definition):

a. Ventricular Fibrillation/Ventricular Tachycardia
b. PEA/EMD
c. Asystole

69. Prevention programs:

- Public CPR
- Drowning prevention
- Child Safety
- Drunk driving prevention
- Car seat Inspections
- Elderly Safety
- Public first aid
- Flu Shots
- Other (Please specify)_____

Agency Training Programs

70. Employees Only: (Check all that apply)

- EMT
- EMT I
- EMT P
- ACLS
- PHTLS
- TEMS
- Rescue
- AMLS
- PALS
- CPR Healthcare
- CPR Community Hands Only

71. Community – (Check all that apply)

- EMT
- EMT 1
- EMT P
- ACLS
- PHTLS
- TEMS
- Rescue
- AMLS
- PALS
- CPR Healthcare
- CPR Community Hands Only

72. Rescue (Check all that apply)

- EMT
- EMT I
- EMT P
- ACLS
- PHTLS
- TEMS
- Rescue
- AMLS
- PALS
- CPR Healthcare
- CPR Community Hands Only

73. Do you utilize ePCR (Electronic Patient Care Reporting)? (Select one option)

- o Yes
- o No
- o Implementing presently
- o Implementation planned

74. If you do utilize ePCR, from which vendor?

- o ZOLL
- o Sansio
- o Beyond Lucid Technologies
- o TriTech
- o ImageTrend
- o emsCHarts
- o Medusa
- o ESO Solutions
- o Other (Please specify)_____

75. Is the ePCR integrated with cardiac monitor /12- lead? (Select one option)

- o Yes
- o No

76. Is the ePCR integrated with any other systems? (Select one option)

- o Yes
- o No

77. Please describe the other ePCR integrations:_____

78. Do field personnel from your agency routinely transmit 12-lead ECG's to the receiving hospital? (Select one option)

- o Yes
- o No

79. Do you follow national protocols to treat patients with the conditions below? (Yes or No on each)

a. STEMI:
b. Stroke:
c. Cardiac Arrest:
d. Hypoglycemia:
e. Asthma:
f. Trauma:

80. If you answered yes to any one of the above, please provide the source for the protocol:

_____

QUALITY ASSURANCE

81. Formal dispatch quality assurance program: (Select one option)

- Yes
- No
- If yes, please provide the QA software name (if any) used (e.g. AQUA)_____

82. If you answered yes to formal dispatch quality assurance program, please provide the following

a. Percentage of cases reviewed (Percent 0 – 100):_____

b. Percentage of cases compliant (Percent 0 – 100):_____

83. Medical Control: (Select one option)

- Medical Director/Office
- Medical Control Board
- None
- Other (Please specify)

84. If you selected Medical Director/Office, please provide the number of hours per week or FTE:

_____

85. Please describe the duties of Medical Control:_____

86. Funding source for medical control by percentage (e.g. 50% first responders, 50% reporting ambulance service):_____

87. Number of FTE equivalents (exclusive of Medical Director) involved in oversight and quality management program:

88. Chart Review: (Select one option)

- Yes
- No
- If yes, percentage of charts reviewed:_____

89. Individual skills measured? (Select one option)

- Yes
- No
- If yes, percentage:_____

90. Training/QA records management? (Select one option)

- Yes
- No

91. Formal training officers program? (Select one option)

- Yes
- No

92. Continuing education program? (Select one option)

- Yes
- No

93. System studies and research? (Select one option)

- Yes
- No

94. Other medical oversight and quality management actions/programs, please describe:

_____

95. Is customer satisfaction measured? (Select one option)

- Yes
- No

96. If yes, how is it measured? (Select one option)

- By you/internal
- By an external entity
- Other (Please specify)_____

97. If customer satisfaction is measured, how is it measured? (Select one option)

- Comment cards
- Telephone survey
- Other (Please specify)_____

98. Is customer satisfaction reported externally? (Select one option)

- Yes
- No
- If yes, to whom:_____

99. Is your system currently tracking compliance with clinical metrics such as bundles of care?

- Not currently
- STEMI
- Stroke
- Asthma
- Hypoglycemia
- Trauma
- Other (Please specify):_____

100. Service Accreditation(s)/Quality Award(s) yes/no/in progress

a. CAAS (Select one option):_____
b. IAED/ACE (Select one option):_____
c. ISO (Select one option):_____
d. Baldridge/EFQM (Select one option):_____
e. CAMTS (Select one option):_____

101. Other Service Accreditation(s)/Quality Award(s)? Please specify:_____

FLEET STANDARDS

102. Size of the fleet:

a. Ambulance:_____
b. Critical Care:_____
c. Stretcher Vans:_____
d. Wheelchair Vans:_____
e. Non-transport Response Vehicles:_____

103. Vehicle collisions per 100,000 total vehicle miles/kilometers (vehicle to vehicle contact with damage exceeding $250):_____

104. Critical vehicle failures per 100,000 total vehicle miles/kilometers (ANY vehicle failure during an emergency or non-emergency response or transport):_____

105. Ambulance replacement/retirement policy:

a. Maximum miles/kilometers:_____
b. Maximum years:_____

Please answer the following according to the type of ambulance(s) you have:

106. Total number of units

a. Type 1 ambulance:_____
b. Type 2 ambulance:_____
c. Type 3 ambulance:_____

107. Do you remount them? Select yes or no

a. Type 1 ambulance (Select one option):_____
b. Type 2 ambulance (Select one option):_____
c. Type 3 ambulance (Select one option):_____

108. What is the maximum number of remounts?

a. Type 1 ambulance:_____
b. Type 2 ambulance:_____
c. Type 3 ambulance:_____

109. Formal driving program required for designated drivers? (Select one option)

- Yes
- No
- If yes, provide the program name/brand:_____

110. Vehicle operations recorder? (Select one option)

- Yes
- No

111. If vehicle operations are recorded, please provide the type(s) of device(s) you utilize:

- ZOLL Road Safety
- DriveCam
- Digital Ally
- Ferno Acetech
- Other (Please specify):_____

112. Brand of cot? (Select one option)

- Ferno
- Stryker
- Other (Please specify):_____

113. Are the cots power assisted? (Select one option)

- Yes
- No
- Other (Please specify):_____

114. Bariatric unit? (Select one option)

- Yes
- No
- Other (Please specify):_____

115. Ambulance building standards permitted in your jurisdiction: (Select one option)

- None
- CAAS GVS
- Federal K Spec
- NFPA
- Other (Please specify):_____

116. Other lifting devices:_____

117. Powered lift on vehicle:_____

HUMAN RESOURCES PERFORMANCE

118. Field staff covered by a collective agreement/union contract? (Select one option)

- No
- Yes, Union/Local name:_____

119. Dispatch staff covered by a collective agreement/union contract? (Select one option)

- No
- Yes, Union/Local name:_____

120. Office staff covered by a collective agreement/union contract? (Select one option)

- No
- Yes, Union/Local name:_____

121. Employee illness and injury percentage (Employee becoming ill or injured as a result of being involved in an EMS encounter): (Select one option)

Percent (0 – 100):_____

122. Number of full-time employees:

a. At your fiscal year end:_____
b. Who left during your fiscal year:_____

123. Supervisor to employee ratio (field operations): (Select one option)

Percent (0 – 100):_____

124. Is there an internal management training program for operational staff? (Select one option)

- Yes
- No

125. Prevention programs

- Blood-borne and air-borne pathogens
- EMD Awareness
- Hazmat (OSHA or equivalent)
- PPE (meet level C)
- EVOC
- EVOC course name, if provided:_____

COSTS

Note: For purposes of this survey, all costs (directly or indirectly) related to the provision of providing ambulance service shall be included. See "Definitions" for explanation of Categories.

126. System scheduled unit hours per year:_____

Total system expenditures:

127. Labor related

a. Contractor/Provider:_____
b. Oversight Authority (if applicable):_____

128. Operating

a. Contractor/Provider:_____
b. Oversight Authority (if applicable):_____

129. Capital

a. Contractor/Provider:_____
b. Oversight Authority (if applicable):_____

REVENUE

130. Ambulance rates (no need to enter $ sign):

a. ALS Emergency:_____
b. ALS Non-emergency:_____
c. BLS Emergency:_____
d. BLS Non-emergency:_____
e. Critical Care Transport:_____
f. ALS Transfer:_____
g. BLS Transfer:_____
h. Aid Call:_____
i. Emergency Physician:_____
j. EMS Response without Transport:_____
k. Wheel Chair:_____
l. Dispatch:_____
m. Emergency Mileage:_____
n. Non-emergency Mileage:_____
o. Long Distance Mileage:_____

131. Bundled billing? (Select one option)

- ○ Yes
- ○ No

132. If you do not have bundled billing, please list the items billed:_____

133. Special event coverage/rates (sporting events, public gatherings, etc.). If you do not charge for a particular service, please leave it blank. Please enter as rate/unit (e.g. $50/hr):

a. Long Distance Mileage:_____
b. Special Event (w/unit):_____
c. Special Event (wo/unit):_____
d. Bike Medic Team:_____
e. Golf Cart Medic Team:_____
f. Single Medic:_____
g. AED Team:_____
h. Command Post Team:_____

134. If you provide another type of special event coverage, please describe it and provide the cost as rate/unit (e.g. $50/hr):_____

Payor Breakout:

135. Number of invoices

a. Medicare:_____
b. Medicare HMO:_____
c. Medicaid:_____
d. Medicaid HMO:_____
e. Health Insurance:_____
f. HMO:_____
g. Contracts:_____
h. Private Pay:_____

136. Total Billed

a. Medicare:_____
b. Medicare HMO:_____
c. Medicaid:_____
d. Medicaid HMO:_____
e. Health Insurance:_____
f. HMO:_____
g. Contracts:_____
h. Private Pay:_____

137. Contractual Allowance/Write-off

a. Medicare:_____
b. Medicare HMO:_____
c. Medicaid:_____
d. Medicaid HMO:_____
e. Health Insurance:_____
f. HMO:_____
g. Contracts:_____
h. Private Pay:_____

138. Total Collected

a. Medicare:_____
b. Medicare HMO:_____
c. Medicaid:_____
d. Medicaid HMO:_____
e. Health Insurance:_____
f. HMO:_____
g. Contracts:_____
h. Private Pay:_____

139. Average charge per transport, including mileage:

a. Emergency:_____
b. Non-emergency:_____
c. Combined (emergency & non-emergency):_____

140. Unadjusted Collection Rate (Total amount collected/total amount billed) (Select one option)

Percent (0-100):_____

141. Average Revenue (total receipts from transports divided by total number of transports). (enter the amount, no dollar sign required):_____

142. Total Annual Subsidy (enter the amount, no dollar sign required):

a. Local Government:_____
b. State Government:_____
c. Other:_____
d. Total:_____

143. Does a subscription program exist? (Select one option)

- Yes
- No

144. If a subscription program exists, please provide the following:

a. Number of members:_____
b. Subscription receipts:_____
c. Program costs (to the organization to have the program):_____

145. If a subscription program exists, please provide the following rate information:

a. Single:_____
b. Family:_____
c. Other:_____

Interested in learning about mix and yield from ambulance service billing. For each year, complete the information below to show transports, charges and cash collected for the services performed in that year.

2013

146. Transports

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

147. Amount Billed

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

148. Cash Collected

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

2014

149. Transports

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

150. Amount Billed

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

151. Cash Collected

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

2015

152. Transports

a. Insurance:_____
b. Medicare:_____
c. Self-Pay:_____
d. All Other:_____
e. Total:_____

153. Amount Billed

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Totals:_____

154. Cash Collected

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

2016

155. Transports

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

156. Amount Billed

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

157. Cash Collected

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

2017

158. Transports

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

159. Amount Billed

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

160. Cash Collected

a. Insurance:_____
b. Medicare:_____
c. Medicaid:_____
d. Self-Pay:_____
e. All Other:_____
f. Total:_____

MOBILE INTEGRATED HEALTHCARE PROGRAM

161. Describe the state of your Mobile Integrated Healthcare (MIH) program (e.g. don't see the value, information gathering, planning to launch, active, etc.)._____

162. What types of MIH programs does your agency have or desire? Narrative replies will be shared. Please include the following: number of FTEs involved for each program, call volume for each program, revenue sources (grants, capitated reimbursement, fee for service, self-funded) for each program._____

163. Do you currently or plan on offering telephonic RN Triage Programs? If so, what software do you use for RN Triage?_____

164. What are your clinical or operational indicators for use of each of your programs?_____

165. Please list program partnerships (existing or planned). e.g. hospitals, insurance plans, post-acute, nursing facilities, hospice, etc.:_____

166. Would you join/lead a subcommittee to develop specific measures for MIH reporting?_____

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