

July 5, 2018

EMS Master Plan



Delaware County Emergency Medical Services
Delaware County, Ohio

Prepared by:



FITCH & ASSOCIATES, LLC

2901 Williamsburg Terrace #G ▪ Platte City ▪ Missouri ▪ 64079
816.431.2600 ▪ www.fitchassoc.com

CONSULTANT REPORT

Delaware County EMS – Delaware County, OH Emergency Medical Services Master Plan

Table of Contents

EXECUTIVE SUMMARY	1
KEY SYSTEM FINDINGS	2
DCEMS SPECIFIC FINDINGS AND RECOMMENDATIONS	3
FUTURE SYSTEM STRUCTURE AND FUNDING OPTIONS	4
STUDY METHODOLOGY	6
STAKEHOLDER ENGAGEMENT AND INPUT	6
OPERATIONAL ANALYSIS	6
CURRENT SYSTEM ENVIRONMENT	8
AREA DEMOGRAPHICS AND ECONOMIC CONDITIONS	8
<i>The Region</i>	8
<i>Anticipated Demand for Emergency Medical Services</i>	10
DESCRIPTION OF THE EMS SYSTEM	11
SYSTEM PARTICIPANTS	11
LEGAL ENVIRONMENT	12
FINANCIAL ENVIRONMENT	12
OPERATIONAL ENVIRONMENT	12
<i>Cross-Staffing Fire Ambulances and Apparatus</i>	13
<i>Ambulance Utilization</i>	15
OPERATIONAL PERFORMANCE	18
<i>Call Volume Statistics</i>	18
<i>Sufficiency of On-Duty Ambulances</i>	20
<i>Density and Response Times</i>	21
<i>Benchmarking the System</i>	25
DELAWARE COUNTY EMS DEPARTMENT	26
SERVICE AREA AND DEPLOYMENT	26
STAFFING AND AMBULANCE RESOURCES	28
FACILITIES	29
FLEET SERVICES	30
HUMAN RESOURCES/COMPENSATION	31
BEST PRACTICES FOR OPTIMAL EMS SYSTEM	36
EMS COMMUNICATIONS	39
<i>Benchmarks</i>	39
<i>Best Practices</i>	39
<i>Observations and Findings</i>	40

<i>Recommendations</i>	41
MEDICAL FIRST RESPONSE	41
<i>Benchmarks</i>	41
<i>Best Practices</i>	41
<i>Observations and Findings</i>	42
<i>Recommendations</i>	43
MEDICAL TRANSPORTATION.....	43
<i>Benchmarks</i>	43
<i>Best Practices</i>	43
<i>Observations and Findings</i>	44
<i>Recommendations</i>	46
MEDICAL ACCOUNTABILITY	47
<i>Benchmarks</i>	47
<i>Best Practices</i>	47
<i>Observations and Findings</i>	47
<i>Recommendations</i>	48
CUSTOMER/COMMUNITY ACCOUNTABILITY	50
<i>Benchmarks</i>	50
<i>Best Practices</i>	50
<i>Observations and Findings</i>	50
<i>Recommendations</i>	50
PREVENTION AND COMMUNITY EDUCATION.....	50
<i>Benchmarks</i>	50
<i>Best Practices</i>	51
<i>Observations and Findings</i>	51
<i>Recommendations</i>	51
ENSURING OPTIMAL SYSTEM VALUE	52
<i>Benchmarks</i>	52
<i>Best Practices</i>	52
<i>Observations and Findings</i>	52
<i>Recommendations</i>	53
ORGANIZATIONAL STRUCTURE AND LEADERSHIP	53
<i>Benchmarks</i>	53
<i>Best Practices</i>	53
<i>Observations and Findings (applies only to Delaware County EMS)</i>	53
<i>Recommendations</i>	56
OPTIONS FOR THE FUTURE.....	57
SUMMARY OF RECOMMENDATIONS.....	61

ATTACHMENTS

EXECUTIVE SUMMARY

The Delaware County Board of Commissioners requested Fitch & Associates (*FITCH*) study the Delaware County Emergency Medical Services Department (DCEMS). The overall objective of this analysis is to report on the current DCEMS including the areas of organization and management, fiscal analysis, services areas and regulatory environment, to consider what improvements could be achieved if an optimized system was adopted, and to provide recommendations for long-term planning purposes.

DCEMS is an integral part of a larger system that provides care for all county residents. This system includes several independent, multi-jurisdictional service providers. Because of the overlapping nature of this system, DCEMS could not always be analyzed in isolation. This analysis tries to focus on factors that are within the control of the DCEMS agency but notes when other agencies' actions must be considered as part of the analysis of a county-wide system to be able to articulate a future EMS plan.

Previous studies, including reports prepared by Commissioner Jeff Benton, the RW Management Services (fire consolidation), and by a group of township trustees and fire chiefs whose districts lie within Delaware County, were considered. Also considered were insights provided during face-to-face discussions with various groups during the project's site work, as well as benchmarking performance against commonly used objective measures. Some benchmarks assess only DCEMS and others assess the entire system in the county.

The body of the report describes the current delivery method, outlines key findings and improvement opportunities. It also suggests future structure options to ensure clinical and operational accountabilities plus financial sustainability for the Board's consideration.

Although individuals talk about "the Delaware County EMS System," in reality it is a patchwork quilt of service providers operating with its own medical direction and medical protocols. It is difficult to truly describe it as a system. There are seven separate EMS organizations operating independently with DCEMS overlaying the other six in certain jurisdictions with limited coordination. There is currently no common medical direction, no common medical quality improvement function or operational reporting, and there is little common training. Without these elements, it cannot be said that there is a comprehensive and cohesive "EMS system" in Delaware County.

An overarching and long-standing issue has to do with perceptions of funding inequity between the county, the townships and the city of Delaware that have voluntarily elected to provide ambulance service in addition to first-response service. The issue is divisive and interagency relationships between DCEMS and the fire departments involved in ambulance-service delivery have disintegrated significantly. Inflexible positions are expressed frequently by the operational leaders. The structural issue and its resolution belongs to the elected officials of the county, townships and city, rather than the operational leaders who do not have the authority to implement change. However, regardless of the ultimate

structure utilized, it is important that all fire and EMS agencies involved work together in a manner that is respectful, collaborative and effective in order to provide the best possible service to the residents and visitors of Delaware County.

Based upon the utilization of the 50-benchmarks assessment tool, DCEMS as a part of this fragmented system achieves 14 of the 50 elements as fully documented; another 22 were partially documented and 13 were not documented. One criterion was not applicable.

A total of 58 specific improvements recommendations for DCEMS were made for the Board of Commissioners' consideration. Fundamental system issues also are examined and a range of options are provided for consideration.

KEY SYSTEM FINDINGS

- Delaware County does not have a well-defined and cohesive EMS system. It has multiple, independent EMS agencies. Several are operated by townships and one city serving those corporate limits, as well as one agency (DCEMS) serving the entire county. Aside from centralized dispatch, there are no common system elements among these agencies.
- Two overarching operational issues require immediate attention:
 1. The Board of County Commissioners and elected officials in the impacted townships and municipalities should demand and implement changes in policies that will require the closest available ambulance to respond to every 9-1-1 call in Delaware County where an ambulance is needed.
 2. The 9-1-1 Center and all EMS agencies need to reduce the unnecessary use of red lights and sirens throughout the county when responding to low-acuity requests for service.
- EMS agencies in Delaware County do not provide necessary data to document operational and clinical effectiveness and facilitate system performance benchmarking.
- Low call volume throughout the county and the very large number of paramedics serving the county raise questions about the difficulty of maintaining professional competencies due to lack of exposure to critical patients and critical-skill utilization. Multiple "cross staffed" fire units in the Townships are, by definition, not fully dedicated ambulances. This staffing approach contributes to the low critical skill utilization.
- The operational climate, particular at the chief officers' level, has been soured by the lack of resolution for funding questions that has existed, unresolved, for many years.
- The community's long-term health is dependent upon the County Commissioners adopting a clear policy that would implement a comprehensive and cohesive EMS system.
- The County Commissioners, in concert with elected representatives in Delaware City and in the townships of Genoa, Harlem, Orange, Liberty and Concord, should assume responsibility for long-term, system-development discussions. Respectful interagency cooperation should be required.

DCEMS SPECIFIC FINDINGS AND RECOMMENDATIONS

The future configuration of Delaware County EMS depends on EMS system development decisions discussed above. However, regardless of the direction taken, DECEMS will be well served by implementing significant and positive changes. It requires transformation from its current and somewhat dated operational mode to a dynamic, proactive EMS agency that demonstrates clinical excellence and documents its contributions to the health and well-being of the community.

Staff and citizens alike regard Delaware County EMS as a “state of the art” organization. The service is well-funded and generously resourced to serve Delaware County and largely enjoys a positive reputation. However, the service neither collects nor presents even rudimentary clinical or operation data to be held accountable for its performance. In the future, the agency must be able to clearly document its performance against nationally-accepted benchmarks and demonstrate that its claims of service excellence can withstand external scrutiny. High Priority DECEMS Recommendations include:

- The closest available EMS unit(s) should be dispatched to each emergency, regardless of agency, zone or district considerations. All ambulances and other EMS vehicles should utilize automated vehicle location/in-vehicle navigation (AVL/IVN), providing location and travel information to the vehicle and to the communications center.
- Formally establish and monitor fractile (90th percentile compliance) response time requirements for life-threatening, non-life-threatening and low acuity requests for service. Adopt, collect, and report key clinical and operational performance benchmarks monthly, utilizing performance data to drive training, operational management, and clinical management decisions.
- Enhance the capability to properly classify calls and designate response priorities and modes for all ambulances and first response agencies. Clinically sophisticated software that facilitates dispatch and pre-arrival instruction QI processes should be utilized. Routinely re-deploy resources as calls ebb and flow within the system to assure uniform coverage levels throughout the area served by DCEMS.
- Document all EMS encounters (first response and ambulance units) in a single, integrated electronic medical record (eMR) system, electronically interfaced with the dispatch center and receiving hospitals.
- Enhance medical director involvement and expand the clinical quality improvement program. Budget sufficient funds to support medical director involvement 8-16 hours per week. This should be complemented by creating dedicated staff chief/officer positions for clinical quality management and clinical education.
- Utilize available “down time” between calls to conduct intensive on-duty training programs, including frequent reinforcement of high-acuity, low-occurrence (HALO) skills.
- Consider reducing ambulance staffing from three persons to two. Consider greater utilization of EMT personnel, such that individual paramedics have more opportunities to utilize critical interventional skills. Complement this change by Implementing “District Paramedic Response Units” (non-transporting) to assure adequate first-response and paramedic back-up in areas not served by fully-staffed fire departments.

- Consider utilizing a central station/EMS headquarters concept, incorporating administration, support staff (including billing), training, logistics, and other functions. The campus of the existing Delaware Career Center (north campus), appears to be an ideal site.
- Ensure that vehicles are replaced in accordance with predetermined Board approved vehicle replacement schedule. Achieve a ratio of 1 spare ambulance for every 1.5 front line ambulances until vehicle service issues are resolved.
- Human Resource and compensation equity issues for DCEMS need additional attention. The partnership between the HR Department and the County EMS Department can be strengthened to ensure that EMS officers are responsible for the personnel discipline, while HR provides guidance, training, and templates for success. Potential compensation adjustments should be considered in tandem with increased performance and utilization.
- Partner with hospital or county public health district for preventative education and/or community paramedic programs. Utilize agency call and patient care data to establish targets for community education and prevention programs for high risk groups and to serve as the basis for a mobile integrated health care/community paramedicine program.
- Encourage expansion and clinical development of medical first response services throughout Delaware County, incorporating law enforcement responders into the plan, if possible.
- Engage an organizational development consultant experienced with EMS agencies, to evaluate employee engagement, assess department culture and to develop specific goals/tasks addressing identified needs.
- Ensure that senior leaders regularly attend national EMS leadership conferences such as Pinnacle, EMS Today and/or EMS World to expose them to innovative and new best practice concepts.
- Externally validate system performance and progress of implementation of the Master Plan recommendations.

FUTURE SYSTEM STRUCTURE AND FUNDING OPTIONS

It is clear that a challenging precedent for all county services would be set if the county chose to directly subsidize townships and municipalities that voluntarily elect to provide EMS. Moreover, if the county were to begin providing additional funding to the one city and five township fire departments currently requesting that funding, the cities of Dublin, Westerville and Columbus may also expect payment for services provided to their citizens living inside Delaware County's boundaries.

It is also clear that the county could opt to re-deploy its existing resources to maintain current service levels throughout the entire county without the involvement of township and municipal fire districts and without incurring substantial additional costs. While some additional ambulances and support vehicles would be needed, the major cost—the necessary personnel—could be mitigated by providing 14-15 two-person ambulances instead of the 10 three-person ambulances that the county currently operates.

That said, there are multiple options identified below that could be utilized to resolve this ongoing issue while developing a more coordinated system. In options 1, 2 and 3, the county would develop a

governance, oversight and accountability structure (including medical direction, clinical protocols, patient-care reporting system, training, and possibly other elements).

Structural/funding options include:

Option “O” – Maintain status quo

There is no current public mandate to change the existing multiple-agency situation. It is possible to opt to continue the existing system despite its inefficiencies, although this course of action is not recommended.

Option “1” – County assumes all ambulance service

In this option, Delaware County EMS would become the sole provider of ambulance service throughout the county. The various fire organizations would focus on providing medical first-response services to the EMS system, in addition to their historical fire-suppression, technical-rescue and hazardous-materials roles. There would be varying levels of first-response coverage, based on the capabilities of the various fire agencies and funding priorities of the townships and municipalities.

Option “2” – County contracts with a shared-governance organization jointly formed by the five southern townships and one city

In this option, the county could develop an Interlocal Governmental Agreement (IGA) among the five southern fire districts and the city of Delaware to become the county’s designated service entity for assigned areas. In return for the county funding, the IGA would become the exclusive provider of EMS services in the jurisdictions served by its entities, while agreeing to certain aspects of the county EMS system (common items including medical direction, clinical protocols, patient-care reporting system, training and possibly other elements). Funding is tied to performance in this agreement. Delaware County EMS would no longer provide services in these jurisdictions but would continue to provide EMS services in all other areas of the county.

Option “3” – County contracts separately with each existing municipal/township ambulance provider to fully serve the townships of Orange, Liberty, Genoa, Concord and Harlem and the city of Delaware under performance-based agreements as part of the county EMS system.

In this arrangement, the county would develop a governance, oversight and accountability structure (again, including medical direction, clinical protocols, patient-care reporting system, training and possibly other elements). Funding is tied to performance in this agreement. Each agency would operate independently but would be accountable to the county’s EMS governance authority. DCEMS would no longer provide any services in these jurisdictions.

In summary, Fitch & Associates understands the complexity of the clinical, operational, fiscal and political issues outlined in this report. Working in a collaborative manner to build trust and fully implement the recommendations outlined throughout the body of the document offers the best opportunity to serve the community (residents and visitors) and achieve service excellence in the decades ahead.

STUDY METHODOLOGY

The project began with the receipt of an extensive set of documents and information provided by Delaware County EMS, in response to our request. This data included three years' worth of response data from the DelComm computer-aided dispatch system, including all EMS responses in the county, as well as internal policies, procedures, reports, and other documents. Also included were reports and responses thereto concerning funding of EMS in Delaware County – one prepared by Commissioner Jeff Benton, one prepared by RW Management Group (consultants), and a third dated July 2015 entitled "Proposed Fire Based EMS Collaboration Plan," as well as responses to those reports prepared by various groups.

STAKEHOLDER ENGAGEMENT AND INPUT

Initial site work was conducted in March 2018. Conferences and interviews were held with members of the Delaware County Fire Chiefs' Association, representatives of the International Association of EMTs and Paramedics, Local R7-11, NAGE-SEIU (the collective bargaining unit representing uniformed DelCo EMS employees), a group of interested employees, the Director and Deputy Director of Delaware County Emergency Communications (DelComm, the county's 911 and consolidated dispatch center), EMS management staff, the county administrator and one deputy administrator, each county commissioner, and an open group of employees. Additional documentary data was requested and received.

Follow-up site work was conducted in May 2018. Conferences and interviews were held with the EMS management team (individually and collectively), the DelCo EMS Medical Director, the county administrator and two deputy administrators, the EMS training supervisor and two instructors, and the Deputy Administrator/HR Director and Labor Relations Manager. An off-site meeting was held with members of the Delaware County Fire Chiefs' Association, as well as the larger EMS leadership team (captains and above). Several informal "dine and chat" sessions were held with employee groups, one at the Sunbury EMS station and the "Three Unit All Hands Breakfast" sessions held at Cracker Barrel. Final follow-up data clarification requests were made in June 2018.

OPERATIONAL ANALYSIS

Geographic data as well as three years' worth of call data provided by DelComm were utilized for the study. The County's Geographic Information Systems team (a unit of the County Auditor's office) provided excellent, high quality, data for the project, the products of those analyses, both tabular and cartographic, are found throughout this report.

The industry specific manner in which ambulance productivity is calculated is presented in the box below.

CONCEPT – THE AMBULANCE “UNIT HOUR” AND SYSTEM ANALYSIS

The measure of production in the ambulance business is the “ambulance unit hour” – an ambulance staffed with a crew and equipment, immediately available for dispatch. A single staffed ambulance, 24 hours per day, produces 8,760 unit hours per year.

“Unit Hour Utilization” or “UHU”, expressed as a percentage, is the number of ambulance transports per hour. A typical 911 (emergency-only) EMS system will record a UHU of .20 to .40 overall. The chart below equates UHU with ambulance transports per 24-hour day.

Calls per day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
UHU	0.042	0.083	0.125	0.167	0.208	0.176	0.250	0.292	0.333	0.375	0.417	0.458	0.500	0.542	0.583

We present this methodology in order to describe how we accounted for the unique “cross staffed” ambulances operated by the township. In short, an ambulance staffed 24 hours per day with dedicated personnel is credited with 8,760 unit hours per year. Ambulances that are cross-staffed with personnel having other duties cannot be assigned a UHU value because the number of staffed unit hours are not a matter of record.

CURRENT SYSTEM ENVIRONMENT

AREA DEMOGRAPHICS AND ECONOMIC CONDITIONS

The Region

Delaware County is one of 88 counties in Ohio. Located in central Ohio, it is part of the Columbus metropolitan area, bordering on the City of Columbus (which is principally located in Franklin County to the South). The estimated population in 2017 was 199,304, with annual county population growth in the area of 2% per year. Growth is significantly more robust in the southern one-third of the county. Median income for a household in the county was \$87,908 and the median income for a family was \$101,698 based on 2010 census documents. The per capita income for the county was \$40,682. About 4.6% of the population are below the poverty line, including 4.8% of those under age 18 and 5.4% of those age 65 or over. The county is highly regarded as a desirable place to live, boasting a well-educated resident population and a highly-regarded school system. A large portion of workers living in the county (76%) are employed outside of the county.¹

The population of Delaware County is expected to undergo substantial and steady growth in coming years. It is predicted that the population will reach 293,225 by 2030 and 392,071 by 2040. That growth is expected to occur principally in the southern portion of the county, moving northward as years pass.

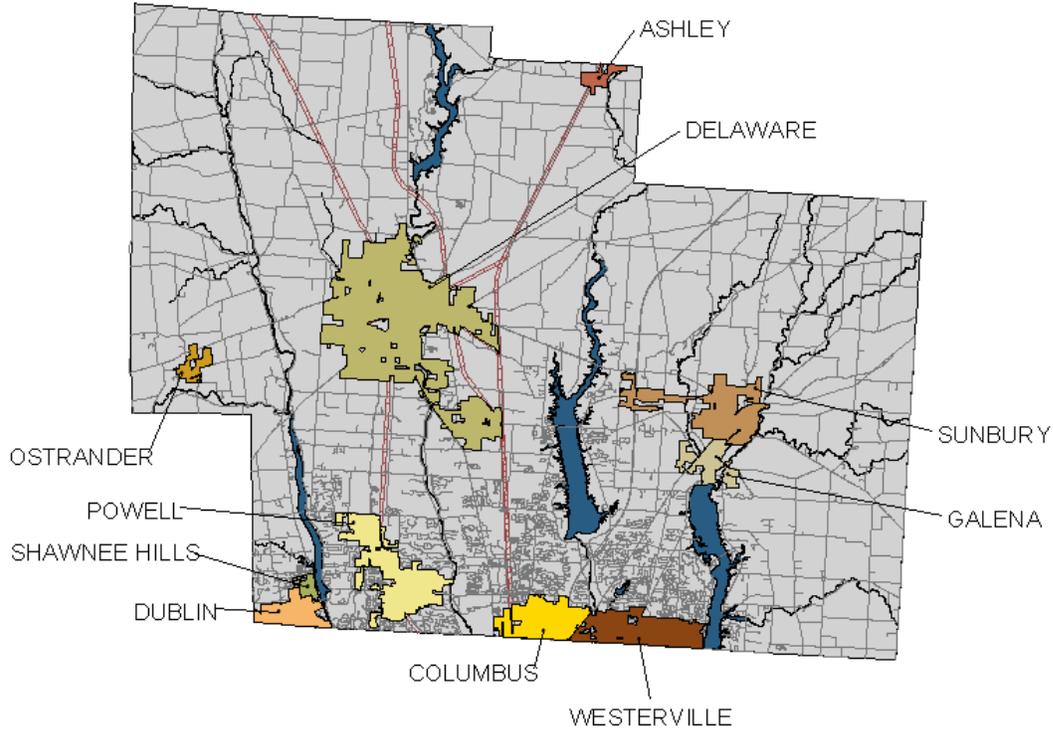
The county's Economic Development Director reports the following:

- Most of the growth is expected to occur in the "36/37 corridor," between Delaware City and Sunbury.
- 40% of the growth is expected to be residential.
- Townships control zoning, but the county controls sewer service and influences water service; this results in management of development being a cooperative venture.
- Townships can pass a special levy for fire service; cities may not. Fire service in cities is funded by the general fund (primarily property taxes).
- 80% of Delaware County's workforce works outside the county, principally in Franklin County (Columbus and Westerville).
- There is little "skilled labor" resident in Delaware County – many of the executives working at Franklin County Fortune 1000 corporations live in Delaware County. The average home in Delaware County currently sells for around \$350,000 (which will purchase an approximately 2,500 square foot patio home).
- Cities can annex townships and villages. Strip and "finger" annexations are prohibited.

The following figure reflects the municipalities within Delaware County.

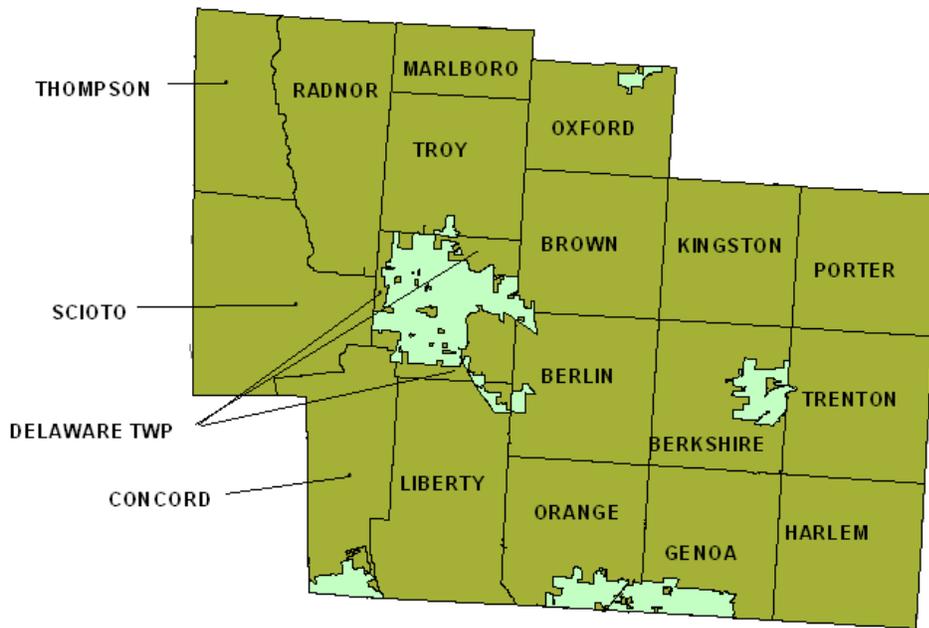
¹ Delaware County Economic Development Department, 2018.

Figure 1. Delaware County and Municipalities



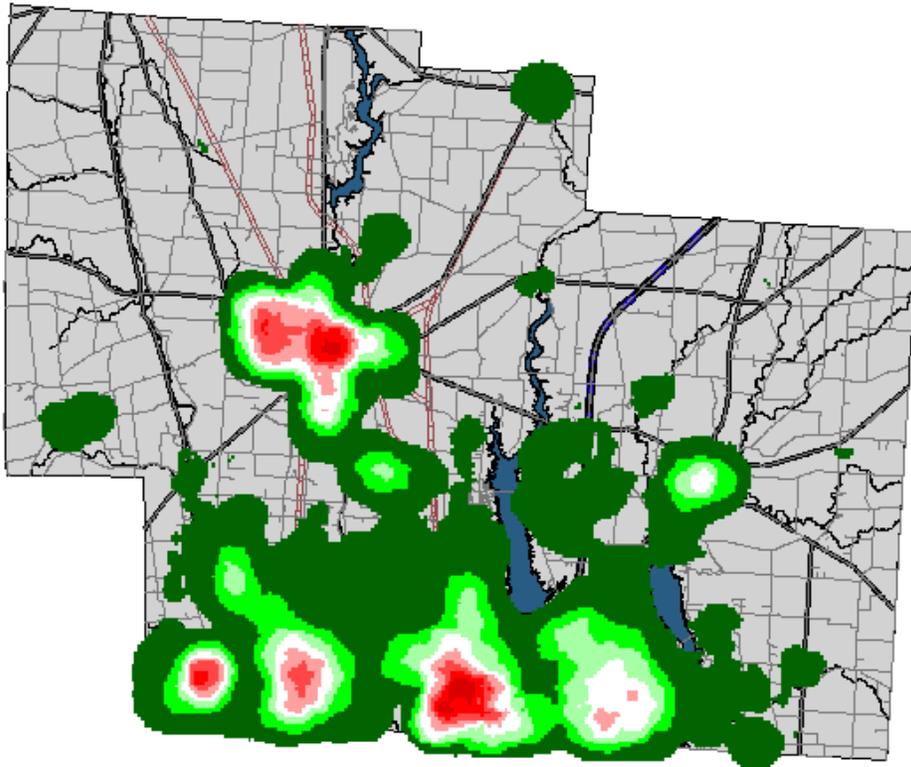
There are a number of townships in Delaware County and these are depicted in the figure below.

Figure 2. Delaware County Townships



The figure below depicts the county's population density and indicates the heavier density in the southern part of the county.

Figure 3. Delaware County Population Density



Although the population of the county is generally not dense (422/sq. mi.), the areas of greatest density lie along the Franklin County border in the south, as well as Delaware City proper.

Anticipated Demand for Emergency Medical Services

Delaware County's population demographics suggest a moderate-to-low rate of utilization for emergency medical services. As a rough benchmark, in an average community, 10% of the population will experience an emergency ambulance transport in any given year. The current utilization for Delaware County is 4.8%, suggesting a healthy population that does not currently require a high level of emergency medical service. This is consistent with the Robert Wood Johnson Foundation ranking of Delaware County as the "healthiest county in Ohio" for the third year in a row. As population grows, and the existing population ages, Delaware County can expect a consistent, proportional growth in demand for EMS services. Development patterns suggest an increase in traffic-related incidents over the coming years, particularly if highway construction lags behind residential development.

DESCRIPTION OF THE EMS SYSTEM

SYSTEM PARTICIPANTS

The Delaware County EMS *system* is extremely fragmented and includes a number of EMS agencies that operate independently within their own jurisdictions. The County EMS Department operates county wide, both in areas served by other agencies and within its own primary service area. The single unifying entity in the system is the Delaware County Emergency Communications Department (DelComm). DelComm answers all 911 calls originating in the county, dispatches 13 fire departments, Delaware County EMS, Delaware County Emergency Management Agency, Delaware City Police, and Powell Police.

There are four separate EMS medical directors, inconsistent billing practices, no common medical records system, and no county-wide quality improvement program. Delaware County EMS is funded by the county general fund. The fire-based ambulances are funded through the township or municipal ad valorem property tax structure. The City of Delaware and Liberty Township have a historical compensation agreement with the county, which compensates them on a “per response” and “per transport” basis, as they “opted in” to the county EMS system when that was established in the early 1970s.

Delaware County Emergency Medical Services provides county-wide paramedic-level ambulance response utilizing advanced life support (ALS) ambulances staffed with three paramedics. Six fire departments (City of Delaware, and the Genoa, Liberty, Orange, Harlem and Concord Townships) operate paramedic ambulances staffed with two paramedics within their jurisdictional borders.²

Over the years, and particularly since the four townships in the southern tier of the county - Genoa, Liberty, Orange, and Harlem³, and more recently Concord – underwent growth at a rapid rate, the townships developed or expanded their own ambulance capabilities. The reason for this development is not clear. Some indicated that the county EMS agency did not “keep up” with the demand for ambulance service in those townships and the townships were forced to step up to assure adequate service for their citizens. Others contend that the rationale for additional ambulance service was the desire to add career fire personnel to the former volunteer fire departments, which was not yet justified by the demand for fire suppression services. In the meantime, the county maintained and continued to serve the southern townships and, in several cases, maintained stations inside those township borders.⁴

² It should be noted that high performing EMS systems across the US, typically staff ambulances with one paramedic and one emergency medical technician (EMT). Few use the three paramedic configuration utilized by DCEMS.

³ The four townships (Genoa, Orange, Liberty, and Harlem – along with the City of Delaware, have formed a coalition to address EMS issues, and are referred to throughout this report as “Coalition” agencies. In discussions, this group is sometimes referred to as the GOLDH agencies.

⁴ It is reported that, since the township fire chiefs control the “run cards” or dispatch order for emergencies in their townships, those county ambulances are not fully utilized, and that township ambulances from greater distances handle calls that would be more appropriately be served by the county EMS unit.

Since 2015, the Coalition agencies have been urging that the county discontinue providing EMS within their service areas, and instead pay the various jurisdictions for providing EMS on behalf of the county.

LEGAL ENVIRONMENT

In the State of Ohio, neither a county nor a township is *required* to provide emergency medical services (Attorney General Opinion 2001-011). However, both counties and townships are *authorized* by state statute (R.C. 307.05 and R.C. 505.37(A)) to provide emergency medical services. The attorney general has opined that when both township fire-EMS personnel and county EMS personnel respond to an incident, the township fire-EMS personnel are in charge of all aspects of the incident. That said, all medical care must be provided under the auspices of a designated medical director as neither EMTs or Paramedics are independent medical practitioners.

A county or township that undertakes to provide EMS must do so throughout its borders. A county can meet that obligation by providing the service itself, or by contracting with a township. We further note, that as a basis for some of the recommendations, it is lawful for the county to contract with municipalities to fulfill its obligations to provide EMS those municipalities (Attorney General Opinion 2001-011).

FINANCIAL ENVIRONMENT

In the early 1970s, the County Commission enacted a one-half cent sales tax that was to be dedicated to fund EMS activities. There is ongoing controversy between the county and other jurisdictions as to the exact disposition of the half-cent EMS funds. One opinion is that the sales tax was intended to be dedicated exclusively for EMS services while other opinions are that the sales tax is intended for general government purposes of health, safety and welfare of the community.

Adding to the controversy is that township and municipal jurisdictions contend that the half-cent sales tax was designated to fund EMS county-wide, and that the amount of funding generated by that tax should be re-distributed to all agencies providing EMS on a per capita basis. However, current county elected and appointed officials concur that the sales tax is intended to fund *county* general government purposes as noted.

A logical position is that the county funds services that it provides but does not fund services that townships or villages choose to duplicate.

OPERATIONAL ENVIRONMENT

EMS operations in Delaware County, operate similar to fire departments in that they use station-based deployment and static “run cards,” with limited move-ups and units returning to their primary stations after discharging patients. Dispatch “run cards” are controlled by each fire or agency chief with the

result that the closest ambulance is not always dispatched to emergencies. Reportedly, it is not uncommon for a fire ambulance to drive past a county EMS station with an available ambulance and crew, on the way to a call that could have been handled more timely by the Delaware County ambulance.

Ambulances are not dispatched based on a “closest ambulance” or even a “closest station” basis. This is contrary to contemporary EMS system best practices. This policy decision does not serve patients well and could increase litigation risk should a patient allege they were harmed by it. It is also worth noting that at least one township (Genoa) was previously served by Delaware County EMS and at some point decided to provide services through the township itself.

Cross-Staffing Fire Ambulances and Apparatus

DCEMS personnel report that on a daily basis, DCEMS ambulances are called to respond into Coalition townships because fire-based ambulances are not available to handle those calls. The Coalition fire departments report that they operate 11 ambulances. However, only four of those ambulances are staffed with personnel dedicated to an ambulance. The remainder are “cross-staffed” with personnel also responsible for staffing fire suppression apparatus. In the event of a fire or response to another hazard, that ambulance is not available to respond to the medical emergency. Due to the uncertainty of ambulance availability, *FITCH* cannot count as “available” for the service mix an ambulance that is not staffed with dedicated personnel. Accordingly, and for system analysis purposes, we have utilized the methodology described below.

Ambulance Unit Hour and System Analysis

The measure of production in the ambulance business is the “ambulance unit hour” which is an ambulance staffed with a crew and equipment, immediately available for dispatch. A single staffed ambulance, 24 hours per day, produces 8,760 unit hours per year.

Unit Hour Utilization or UHU, expressed as a percentage, is the number of ambulance transports per hour. A typical 911 (emergency-only) EMS system will record a UHU of .20 to .40 overall. The chart below equates UHU with ambulance transports per 24-hour day.

Transports per day															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
UHU	0.04	0.08	0.13	0.17	0.21	0.18	0.25	0.29	0.33	0.38	0.42	0.46	0.50	0.54	0.58

This methodology is presented in order to describe how the unique “cross staffed” ambulances operated by the township are accounted for in the analysis of this report. An ambulance staffed 24 hours per day with dedicated personnel is credited with 8,760 unit hours per year. Ambulances that are cross-staffed with personnel having other duties cannot be assigned a UHU value because the number of staffed unit hours are not a matter of record.

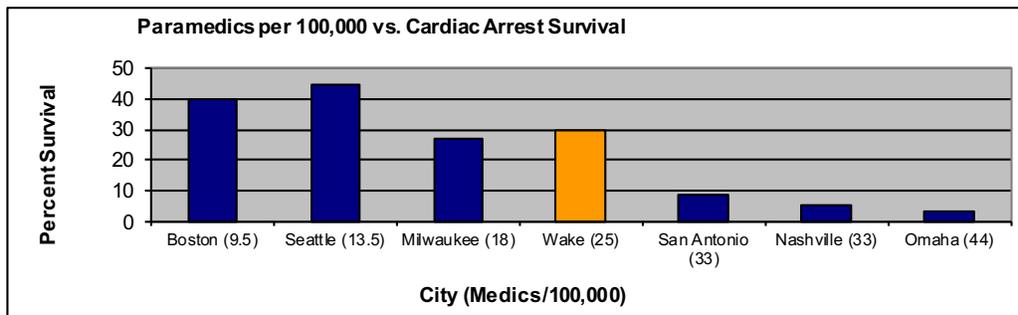
We also note that the current agreements between the county and Delaware City and Liberty Township call for compensation by the county for both ambulance transports and responses. In the current Delaware County system, data regarding the number responses by agencies other than the DCEMS is handled by each agency and cannot not be reliably validated or the necessity of each response validated. For that reason, *FITCH's* analysis will be based solely that the number of ambulance transports which can be validated through the 911 Communications system.

First Response Paramedics — Dual-Role, Cross-Trained Personnel

The Coalition fire departments point to the fact that they have paramedics aboard all first response vehicles, and thus can “put a paramedic on the scene” faster than the county EMS agency is able to do so. While this has intuitive appeal, there is limited and mixed clinical evidence about the impact of additional paramedics on first response apparatus. There is some evidence that “too many paramedics are bad for the patient,”^{5,6} and some evidence that except in very limited circumstances (e.g., less than 1% of EMS calls), EMS system response performance does not contribute to improved clinical outcomes.

⁷ A more recent editorial on the topic is worthy of further consideration.⁸

Figure 4. Paramedics/100,000 vs. Cardiac Arrest Survival



⁵ Davis, R. <http://www.usatoday.com/news/nation/ems-day1-cover.htm> (5/20/2005).

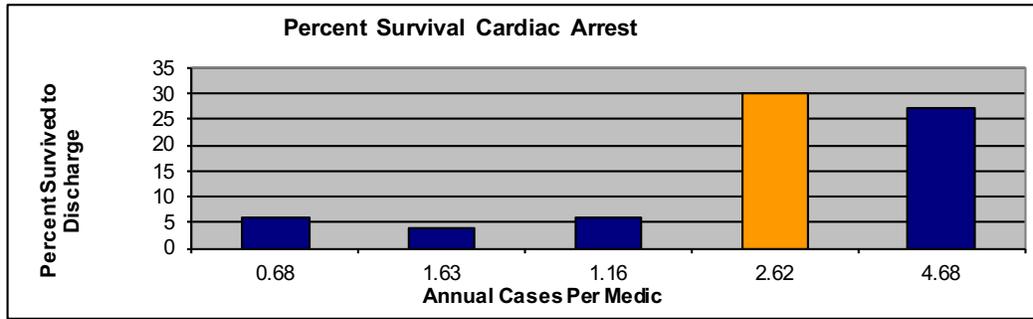
⁶ Sayre MR et al. *Cardiac Arrest Survival Rates Depend on Paramedic Experience*. *Academic Emergency Medicine* May 2006;13(5) Suppl 1: S55-56

⁷ Blackwell Th, Kaufman Js. *Response Time Effectiveness: Comparison Of Response Time And Survival In An Urban Emergency Medical Services System*. *Acad Emerg Med*. 2002 Apr;9(4):288-95.

⁸ Vick, S. *Fire and EMS: We Need Each Other Without the Same Thinking*. May 11, 2018.

https://www.linkedin.com/pulse/fire-ems-we-need-each-other-without-same-thinking-shain-vick/?lipi=urn%3Ali%3Apage%3Ad_flagship3_profile_view_base_recent_activity_details_shares%3BLXaeuoyPT7GcmmbMmhTnfw%3D%3D

Figure 5. Percent Survival Cardiac Arrest



Unfortunately, the fragmented nature of Delaware County’s EMS system makes even rudimentary comparisons of objective quality measures impossible. However, policy makers should note the following:

Some urban and suburban fire-based EMS systems have all or a very large percentage of their firefighters cross-trained as paramedics. On the face of the issue, it would seem better to have more than fewer paramedics. The counter-argument is that there are a limited number of high-acuity cases where paramedics have an opportunity to exercise their higher levels of knowledge and skills. Without sufficient opportunity to use their knowledge and skills, the quality of paramedic care can suffer. This advocates for having a smaller cadre of paramedics who go to higher acuity cases over a broader geographic area. This has been the approach used by the highly acclaimed fire-based paramedic program in the Seattle Fire Department for decades.^{9,10}

The issue of paramedic skills retention is further exacerbated by the relatively low volume of EMS activity in Delaware County. It requires an extraordinary effort to maintain a measure of professional competency across so many paramedics.^{11,12,13}

Ambulance Utilization

By current standards, all of the ambulances in the county, with the exception of those operated by Delaware City Fire Department, are significantly under-utilized. It is generally accepted in the EMS community that between three and four transports per day are necessary to justify funding of an additional EMS unit and that three to four paying transports per day are necessary for an ambulance to be financially self-sustaining. The figure below illustrates the number of ambulance transports per day for each unit in Delaware County.¹⁴

⁹ Cone, Bryce, Delbridge and Myers: Emergency Medical Services: Clinical Practice and Systems Oversight, Volume 2 (2014).

¹⁰ See also Kristin M. Vrotsos, Ronald G. Pirrallo, Clare E. Guse & Tom P. Aufderheide (2009) . Does the Number of System Paramedics Affect Clinical Benchmark Thresholds? *Prehospital Emergency Care*, 12:3,302-306, DOI: [10.1080/10903120802101355](https://doi.org/10.1080/10903120802101355).

¹¹ Gold LS. The Effect of Paramedic Experience on Survival from Prehospital Care. *Prehospital Emergency Care* 13:3, 341-244.

¹² Halm, EA (2002). Is Volume Related to Outcome in Prehospital Care? A Systematic Review and Critique of the Literature. *Ann. Internal Med.*, 137(6), 511-520.

¹³ Sayre MR (2006). Cardiac Arrest Survival Rates Depend on Paramedic Experience. *Academic Emergency Medicine* 13(5), S55.

¹⁴ Source: DelComm data 2017.

Figure 6. Ambulance Transport Utilization – CY 2017

Medic Unit	Annual Transports	Agency	Transports Per 24 Period (Day)
304	6	DelCity	0.02
442	45	Genoa Twp.	0.12
4	123	County	0.34
9	174	County	0.48
451	178	Harlem Twp.	0.49
8	185	County	0.51
341	234	Concord Twp.	0.64
6	257	County	0.70
10	267	County	0.73
5	274	County	0.75
3	294	County	0.81
302	327	DelCity	0.90
362	331	Orange Twp.	0.91
7	475	County	1.30
1	477	County	1.31
321	513	Liberty Twp.	1.41
441	529	Genoa Twp.	1.45
361	581	Orange Twp.	1.59
322	635	Liberty Twp.	1.74
2	760	County	2.08
303	849	DelCity	2.33
301	1647	DelCity	4.51

This includes both fully-staffed and cross-staffed ambulances.

Certainly, a jurisdiction can choose to provide services to whatever level it deems appropriate and can be financially supported. However, in light of so few actual contact hours with patients, Delaware County emergency medical personnel may lose skill proficiency absent extraordinary clinical continuing education efforts to maintain those skills.

FITCH further examined the need for ambulances by reviewing the geographic coverage of the current ambulance deployment across the county. Accordingly, the figure below indicates the number of square miles of coverage for the staffed units of each EMS agency in the county.

Figure 7. Ambulance Geographic Coverage

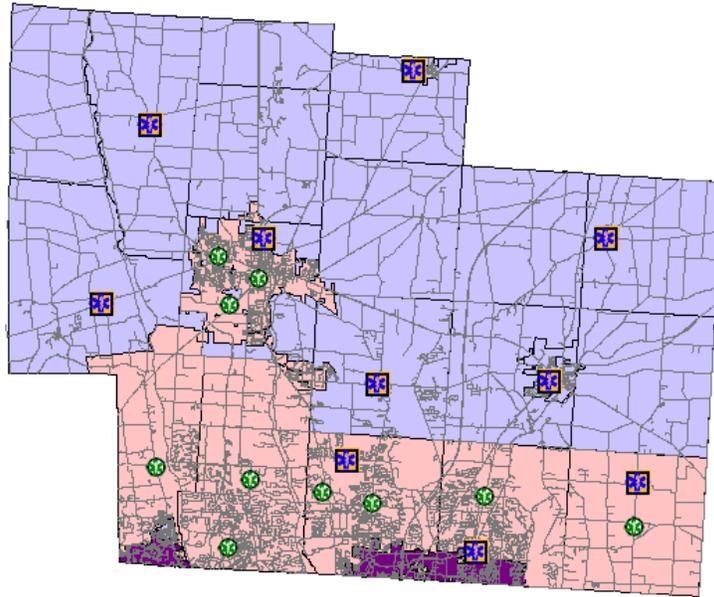
Agency	Area	One Amb/# SqMi	Agency Transports Per Day	Agency UHU (staffed ambulances)
DelCity	19	9.50	7.73	0.20
Genoa Twp.	21.5	21.50	1.57	0.09
Orange Twp.	22	22.00	2.50	0.09
Concord Twp.	22.3	22.30	0.64	0.04
Harlem Twp.	26.6	26.60	0.49	0.02
County	312.2	31.22	9.00	0.05
Liberty Twp.	33.4	33.40	3.15	0.08
County-wide (fire FT units only)				0.12
County-wide incl. calls by fire CS units (no UH attributed)				0.16
Typical Municipal 911				.20 - .45

An additional 2,861 transports were handled in CY 2017 by ambulances operated by fire district ambulances that are “cross-staffed” with fire apparatus. It is not feasible to present an accurate UHU for those units, as the range of possible UHUs could range from 1.000 (cross-staffed units only staffed for ambulance calls, producing 2,861 unit hours) to 0.041 (cross-staffed ambulances staffed full-time, producing 8 x 8, 760 or 70,080 unit hours). For comparison, if the call volume handled by cross-staffed ambulances was included and added to those of the full-time staffed ambulances, without attributing any additional unit hours to the fire service, the UHU would only be 0.168 – still a very comfortable level of utilization, well less than a typical municipal or county 911 service. This indicates that very little value is added to the system by the cross-staffed ambulances. The call volume could comfortably be handled without them.

Given that the county has unofficially adopted a response goal of 8 minutes 59 seconds on 90% of calls, and the expectation is generally being achieved, this distribution is a reasonable one. We expect a lesser ambulance density in the rural areas served by Delaware County EMS, a greater ambulance density in the more urban areas served by Delaware City Fire Department, with the suburban townships lying somewhere in between.

The figure below illustrates the areas covered primarily by the county EMS agency (shaded blue) and those primarily covered by the township and city fire departments (shaded pink).

Figure 8. Response Areas County EMS and Fire Agencies' EMS



Delaware County EMS also responds to calls in the areas served by the fire departments. Three county EMS stations are located within townships served by their own ambulances.

OPERATIONAL PERFORMANCE

The overall objective of this analysis is to report on current EMS system performance and to consider what system performance could be achieved if an optimized system was adopted.

Our analysis of system data was limited to spatial and temporal data provided by the 911 Center's CAD system. While the quality of the data provided is excellent, it has all the limitations of most CAD data:

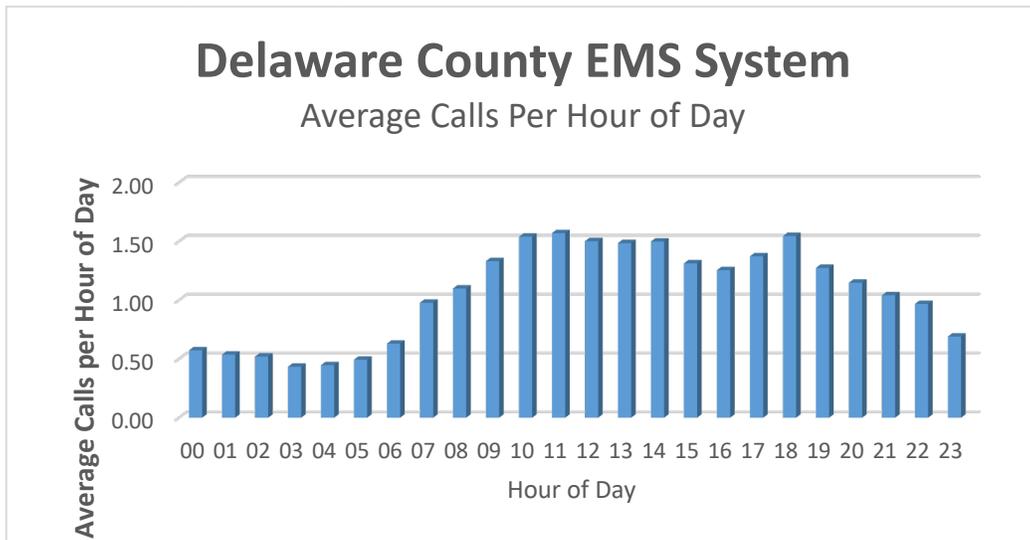
- difficulty parsing whether or not units arrived at a particular incident,
- multiple incident numbers for the same event, and the
- occasional lack of a required time stamp.

Accordingly, data is presented within the scope of this project with a strategic view and is not expected to strictly correlate with other reports.

Call Volume Statistics

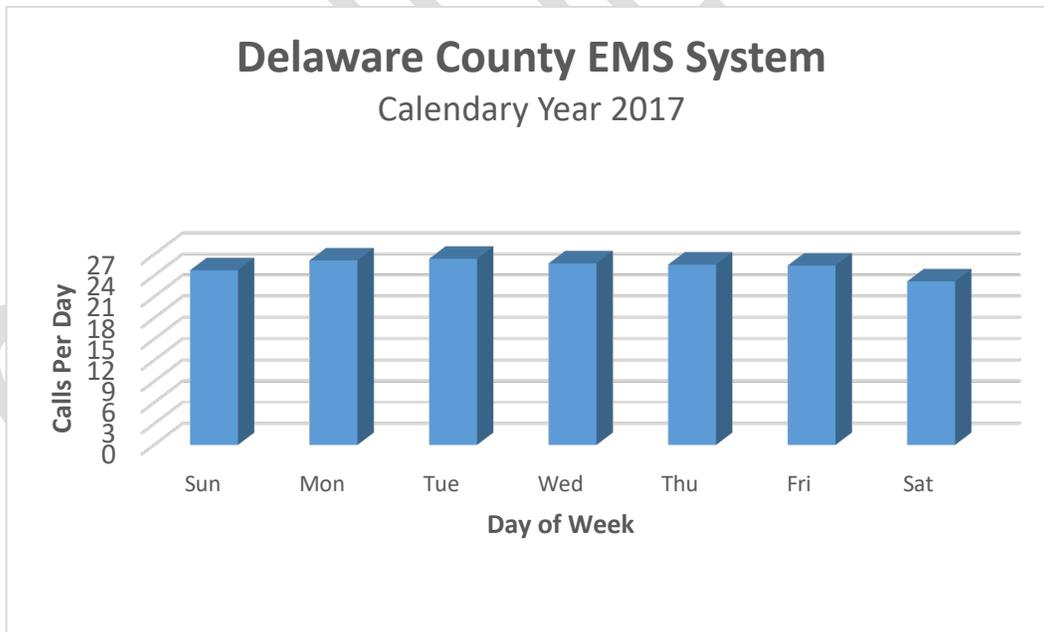
Call data was parsed using a variety of commonly used EMS analytical methods. The figure that follows in this section provide a framework to understand the system's level of activity.

Figure 9. Call Volume by Hour of Day



This pattern is typical of 911 EMS systems, where call volumes drop in the early-morning hours and climb throughout the day. The figure above clearly depicts the dramatic difference in call volume with a sharp minimum number of calls at 0300 to 0500 hours (0.5 calls/hour) and a broad maximum number of calls occurring at 0900-1800 hours.

Figure 10. Call Volume by Day of Week



This pattern is also typical of 911 EMS systems. There is a small reduction in calls on weekends, particularly Saturdays, but it is insufficient to justify altering system configuration.

In an EMS system seeking maximum efficiency, operating a uniform number of active staffed ambulances throughout the day and not matching resources with demand, is inherently inefficient. The most costly factor in providing ambulance services is the crew. Agencies operating in more densely populated service areas, such as the City of Delaware, are able to be more efficient as they *may* adjust the number of staffed units (unit hours) in response to the predictable changes in demand based as noted in the figure above. Smaller ambulance agencies operating in southern Delaware County do not have this opportunity.

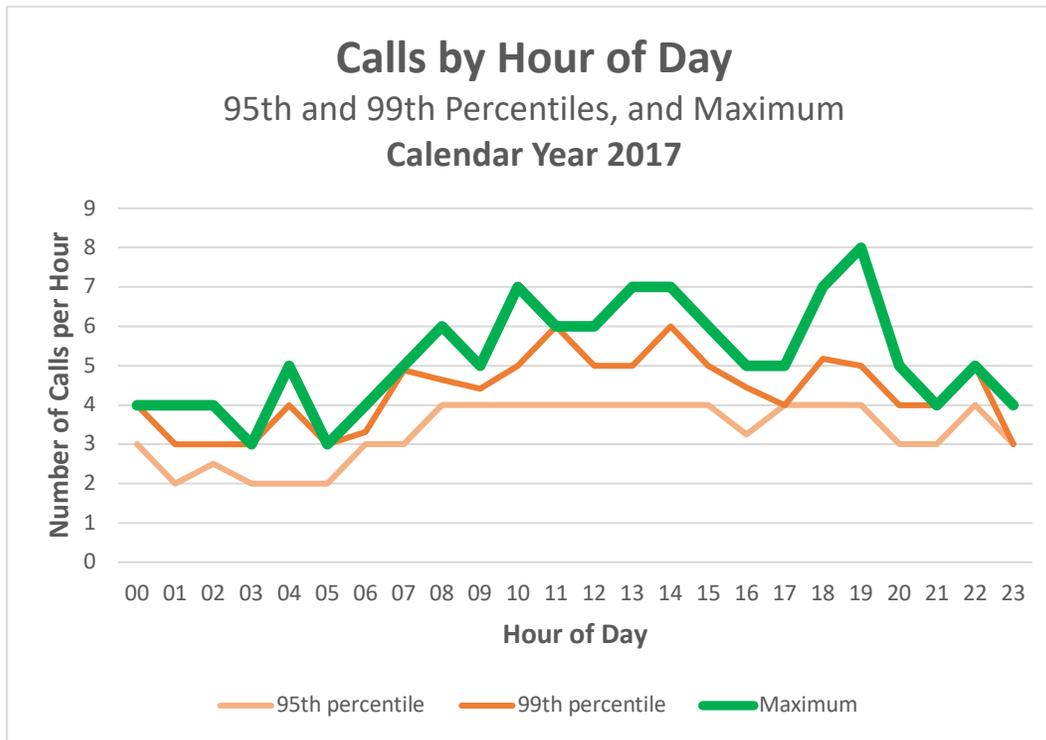
When an agency operates only one or two ambulances, adjustments to the number of active units becomes an all-or-nothing proposition. When each of the smaller ambulance services operates strictly independently as they do in the Delaware County system, there is no opportunity to leverage the economies of scale and fine-tune the number of active units among the smaller services by coordinating who goes off-line.

The county fire-based ambulance services accommodate changing demands by “cross-staffing” additional ambulances beyond those which they staff on a full-time basis. Personnel respond on the vehicle appropriate to the call at that time. While cross-staffing gives an appearance of greater capacity, it carries an inherent risk – the risk that the personnel expected to cross-staff an ambulance will not be available when called upon to staff fire apparatus or will not be available for fire suppression service when engaged in an ambulance call.

Sufficiency of On-Duty Ambulances

For many EMS systems, one necessary element of inquiry involves examining the sufficiency of on-duty ambulances. Governing bodies wish to know how often their system will fall below a pre-determined safety level of ambulances, or how often mutual aid from outside their service area will be required. We examine a year’s worth of ambulance calls by day and hour of day, and examine several percentiles and the maximum number of calls per hour.

Figure 11. Maximum Number Calls by Hour of Day



This parameter is of little concern in the Delaware County EMS system as there are at least 14 ambulances fully staffed 24 hours per day, with additional cross-staffed ambulances available from the participating fire departments. Even on the busiest day, only eight ambulance calls will typically be in progress at the busiest hour (1900). Thus, absent a catastrophic mass casualty event, Delaware County will rarely if ever require outside-of-county mutual aid.

Another parameter of note is the time on task devoted to ambulance transports. DelComm data for calendar year 2017 informs that the average ambulance transport requires 54 minutes, 44 seconds. This is a reasonably fast total time on task for paramedic ambulances completing a patient transport. It suggests that ambulances are not being unnecessarily detained at receiving hospitals.

Density and Response Times

Population and call volume density are factors to be considered in determining future response time standards for the EMS system. EMS day-to-day workload is driven by population density, age and health, as well as poverty and crime. Occasionally a situation arises that overruns these factors, such as a pandemic or the current heroin crisis.¹⁵

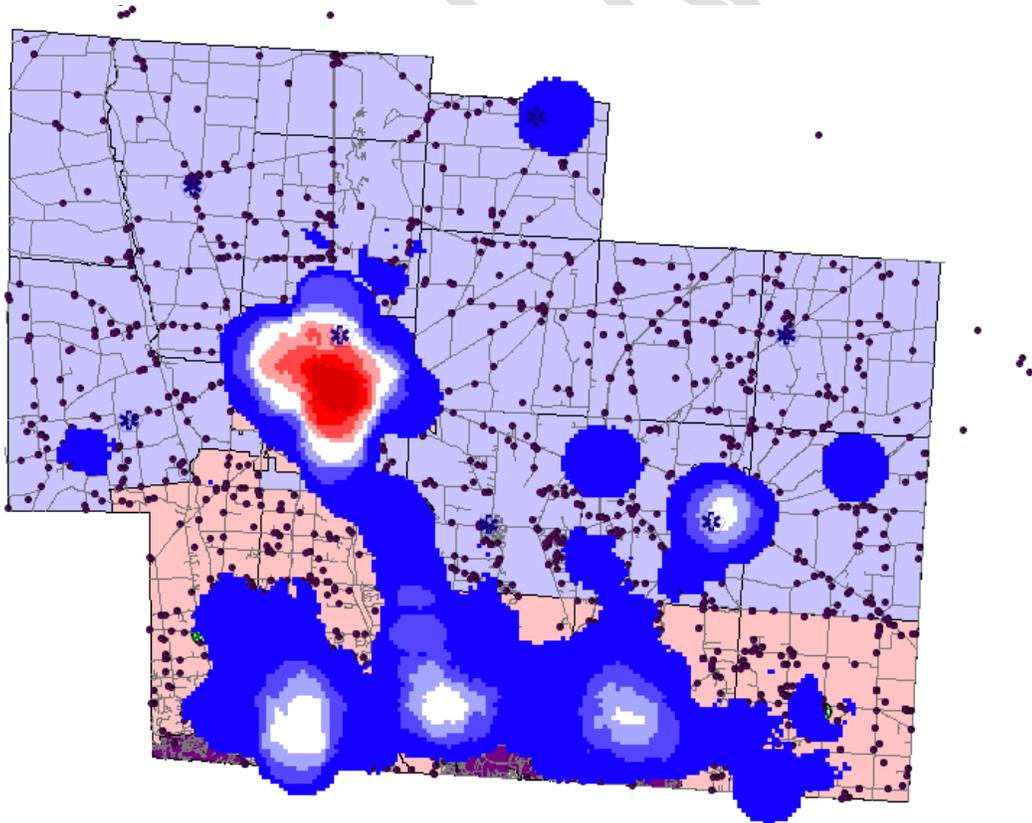
¹⁵ (2016 March 31) Efforts grow to tackle America’s heroin crisis. *The Economist*. Accessed May 17, 2016 from <http://www.economist.com/blogs/democracyinamerica/2016/03/addiction-and-legislation-0>

In Delaware County geographic coverage is currently the primary driver of ambulance deployment. The ambulance deployment scheme looks much like the static deployment scheme for a fire department. This is not surprising considering the high level of fire service involvement in Delaware County EMS over the last two decades. As communities develop, the drivers shift, with call density taking a greater role.

The call for fire protection services for real property is driven in large part by the Insurance Services Organization (ISO) standards and similar requirements. Buildings are static and there is little change in structures from day to day. EMS demand moves throughout the day as the residents and workers move from home to work, etc.

In Delaware County, a high percentage of residents are employed primarily in Columbus and Franklin County; the population — and EMS calls — shift to reflect these daily movements. It is reasonable to expect a shift in EMS demand during the workday in the bedroom communities. The figure below shows a heat map¹⁶ that identifies the location of EMS calls in Delaware County for 2017 (24 hours per day). The red areas show areas with the most calls and correlate to the communities identified in Figure 3.

Figure 12. 2017 Ambulance Transport Heat Map



¹⁶ Dempsey, C. (2014) "What is the Difference Between a Heat Map and a Hot Spot Map?" GISLounge.com. Accessed May 17, 2016 from <https://www.gislounge.com/difference-heat-map-hot-spot-map/>

Determining Appropriate Response Times

Delaware County is unique in that it has adopted, and for the most part achieved, an urban response time capability throughout the county, including in rural areas. This is an achievement but carries with it a significant cost. The county may wish to consider setting density-based response times that include different levels of response based upon the presumptive priority assigned at dispatch (e.g. life-threatening urgent responses, non-life threatening urgent responses and non-life-threatening/non-urgent response).

Local governments typically set response times based upon clinical, operational and political factors. Urban areas often utilize 8 minutes 59 seconds at the 90th percentile (8:59/90th) for life-threatening emergencies; 11:59/90th for non-life-threatening emergencies and 14:59 for non-urgent responses. Similarly, other communities have adopted density-based standards including 8:59/90th for urban areas, 12:59/90th for suburban areas, and 19:59/90th for more rural areas.

It is common to set low call density area response time requirements three to four minutes longer than those for urban areas. The National Fire Protection Association Standard 1720: “Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments” classifies initial response time standards based on the density of the community served and those are included in the figure below.¹⁷

Figure 13. NFPA 1720 Response Times

Demand Zone ^a	Demographics	Minimum Staff to Respond ^b	Response Time (minutes) ^c	Meets Objective (%)
Urban area	>1000 people/mi ²	15	9	90
Suburban area	500–1000 people/mi ²	10	10	80
Rural area	<500 people/mi ²	6	14	80
Remote area	Travel distance ≥ 8 mi	4	Directly dependent on travel distance	90
Special risks	Determined by AHJ	Determined by AHJ based on risk	Determined by AHJ	90

^aA jurisdiction can have more than one demand zone.
^bMinimum staffing includes members responding from the AHJs department and automatic aid
^cResponse time begins upon completion of the dispatch notification and ends at the time interval shown in the table.

Developing criteria for ambulance response performance is a matter of balancing the required response performance with the cost of providing that level of service and considering the wishes and perceptions

¹⁷ National Fire Protection Association Standard 1720: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments: 2014 Edition.

of the residents being served. The more rural the community, the fewer calls per square mile – thus it is possible to spend a great deal of money to provide and staff EMS units that will handle very few calls. On the other hand, residents in rural areas are likely to be unhappy with long ambulance response times. This is a difficult discussion that must be conducted in any community contemplating creation or alteration of its EMS system.

Recommendations

1. Formally establish fractile (90th percentile compliance) response time requirements for life-threatening, non-life-threatening and low acuity requests for service.
2. Document all EMS encounters (first response and ambulance units) in a single, integrated electronic medical record (eMR) system.
3. The eMR system should include a bi-directional hospital data exchange to facilitate appropriate quality assurance/outcome analysis processes.
4. Consider procuring and implementing a real-time dashboard system such that oversight staff can monitor the system performance and initiate appropriate interventions as required.
5. Regardless of system model selected, where EMS unit hour utilization (adjusted for dispatch volume and time on task) exceeds, 0.40, agencies should transition as quickly as possible away from 24-hour shifts. Based on current work loads this is a distant concern for DCEMS.
6. All ambulances in the EMS system should fully participate in a single, county-wide dynamic deployment system.

Benchmarking the System

By any measure, Delaware County has an abundance of EMS resources. We have used as benchmarks some comparators from a wide variety of other counties in which *FITCH* has provided similar analyses. These are typical measures used to describe system efficiency and non-clinical performance.

Unit Hour Utilization:

Typical County 911 system:	0.20 – 0.45
Delaware County (countywide)	0.09

Budget Per Capita

Typical County 911 system:	\$35 - \$55
Delaware County EMS:	\$61 ¹⁸

Budgeted Cost Per Transport

Typical County 911 system:	\$400 - \$700
Delaware County EMS:	\$2,740 ¹⁹

Response Performance:

Typical County 911 System	12-15 min. 90 th percentile
Delaware County (countywide):	8.4 min. 90 th percentile

¹⁸ This number includes ONLY the budget of Delaware County EMS and does NOT include any township monies. The number would increase substantially if township dollars were included.

¹⁹ This number includes ONLY the budget of and transport by Delaware County EMS.

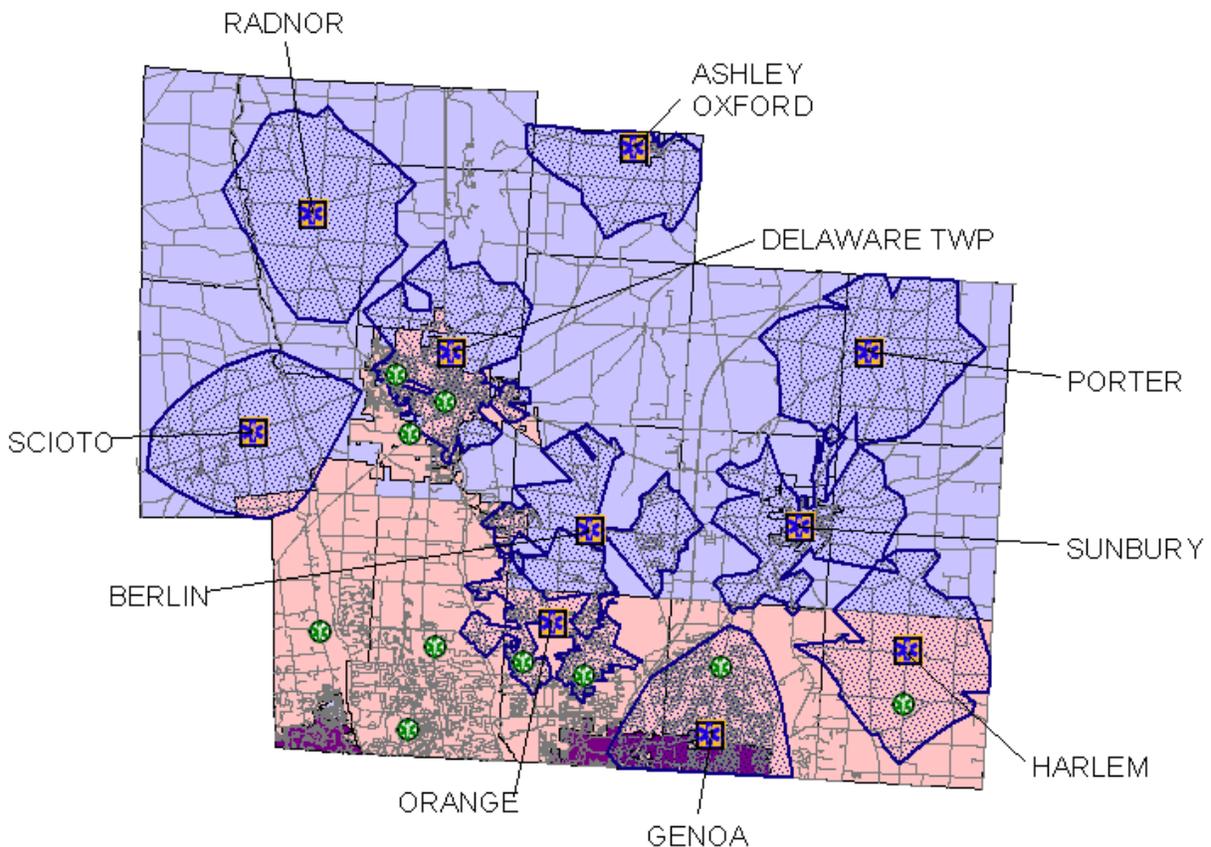
DELAWARE COUNTY EMS DEPARTMENT

SERVICE AREA AND DEPLOYMENT

Delaware County EMS is a general fund department of Delaware County government. In EMS parlance, it is known as a “third service” model – separate from law enforcement and fire suppression. The department is headed by a Chief, assisted by two Assistant Chiefs (Operations and Administration). These three individuals, plus a single administrative assistant, constitute the entire headquarters staff.

Operationally, the service is divided into three shifts; each shift staffs 10 ambulances on a 24-hour on, 48-hour off rotation. Each shift is supervised by two captains, who operate SUV command vehicles. Each captain is responsible for roughly one-half of the county and its ambulances. Each ambulance is based at its own station, which are spread throughout the county as depicted in the figure below.

Figure 14. DCEMS Station Locations and 3.5-mile service areas



The agency is designed to, and generally does, provide an urban level of response performance throughout most of the county (9 minutes or better, 90% of the time). There are exceptions as noted below:

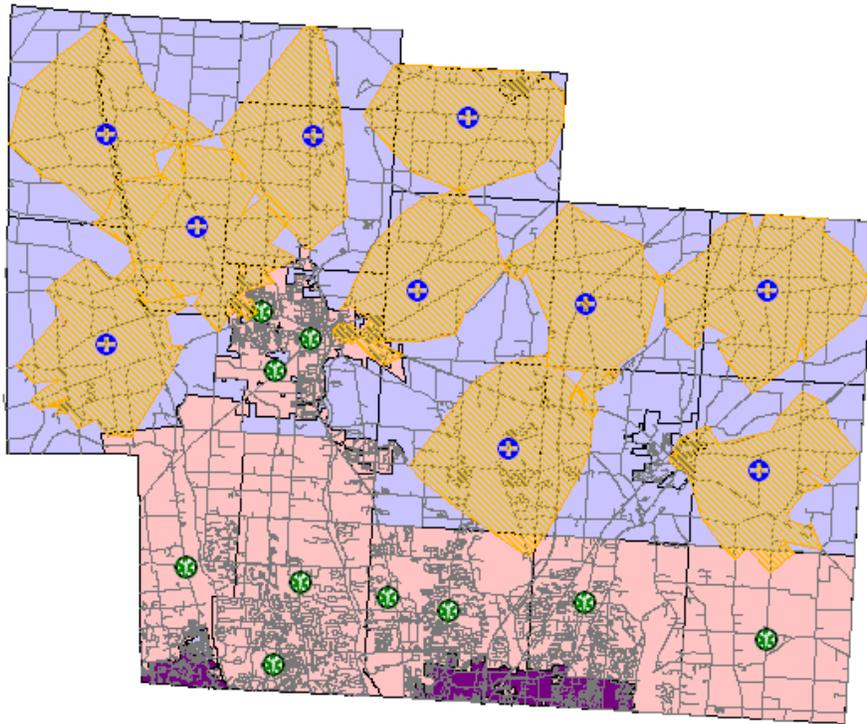
- In the center of the county (Kilbourne area), there is a gap in EMS station location, which results in significantly longer response performance than in the rest of the county.
- In the Coalition townships, EMS stations are not optimally sited, and are not used in a “closest ambulance” manner. However, slight adjustments in station location, as well as improved dispatch protocols (AVL-based closest unit dispatch) would improve this situation.
- There is currently no EMS station properly sited to cover the Concord area. This area currently generates few EMS calls but is undergoing rapid growth.

Other coverage gaps exist, but at this time do not seriously impact response times. These are noted below:

- In the north-central portion of the county, the current Radnor station is not optimally located to serve the north-central and northwest of the county. To maintain existing response coverage, that station should be moved to the west.
- The station located in Ashely is not optimally located, as it is too close to the county line (causing half of its response area to be located outside Delaware County. That station should be re-located south and west to better serve the area east of Radnor. This area probably requires a new station to adequately serve it.
- The geographically largest coverage gap, is located west of Porter, between Porter and Delaware City.
- East of Sunbury, there are several approaches that could be taken to improve coverage in that area. The unit currently stationed in Harlem Township could be re-located to the north, or the unit currently located in Berlin could be moved to the east.

The figure below illustrates a 3.5-mile coverage of one possible configuration for re-arranged station locations.

Figure 15. Potential Re-Configuration of DCEMS Station Locations



STAFFING AND AMBULANCE RESOURCES

The county's ambulance staffing is not typical, in that each ambulance is staffed with three paramedics – a lieutenant, who serves as the unit supervisor, and two staff paramedics. Fewer than 1% of the EMS or fire service agencies in the nation utilize three-person ambulance staffing. However, there is some limited justification for additional ambulance staff, in that the level of fire first response in the area primarily served by Delaware County EMS is inconsistent. Primarily volunteer fire departments engage in medical first response in levels of care, in number of personnel sent to a medical event, and the classification of calls to which they respond. In several instances, what would normally be thought of as “first responders” are actually “second responders,” as they are either summoned when EMS arrives at the scene and realizes the need for additional help, or simply due to the time required for volunteers to respond from home to their fire station, activate fire apparatus, and respond to the scene. It is not at all uncommon for an EMS call to require more than two and often, as many as six to eight responders to effectively manage a complex medical emergency or traumatic injury.

The county currently utilizes a three-person ambulance staffing model for all ambulances. This model may be appropriate (but not the only solution) in the central and northern portions of the county, where first-response service is inconsistent. However, in an environment where career first response services are available 24/7, the additional resources required to staff three-person ambulances could be instead used to add additional ambulances or other EMS-based first-response vehicles to the system and improve operational efficiencies.

As a sole-purpose EMS agency with good funding and low unit utilization, Delaware County EMS has the potential to be a high performance/high value EMS agency with superior training and clinical abilities. However, at the present time the agency does not measure the operational and performance metrics necessary to establish a baseline, nor does it have sufficient clinical oversight or clinical/educational staff to move toward “high performance/high value goals. This standard would include not only demonstration of operational and emergency clinical excellence, but those other areas of EMS expertise that are often sacrificed in less well-funded and/or less well-staffed EMS agencies. These areas include among others, public education, illness and injury prevention and control, community paramedicine, and enhanced EMS special operations.

FACILITIES

Delaware County operates an EMS system that is driven primarily by time coverage (response time), which currently throughout most of the county is what is most often known as an “urban standard” – 9 minutes or better, 90% of the time. To achieve this standard, EMS needs stations located such that a 3.5-mile road travel radius from each station touches the 3.5-mile travel radius from each surrounding station. There are several stations that are less than optimally located using this standard, and a couple of areas where 3.5-mile coverage is not provided – some of the southern townships, where County EMS resources have been made moot by expanding township EMS providers, and a couple of areas (the southwestern portion of the county, Concord Township, as well as the Kilbourne area located in the center of the county). With the exception of the current EMS station #3, located in Orange Township, the EMS stations are modest and serviceable. To fully cover the entire county, perhaps two new stations are needed, and additional cooperative locations are necessary.

Aside from the stations, the EMS support functions (administration, training, logistics) do not enjoy adequate spaces. The current headquarters space is overcrowded, shared with other organizations, and not supportive of key EMS functions such as logistics, fleet management, and training. Medical supplies, for example, are kept at the Ashlee station, which is at the northern border of the county, and training activities lead a gypsy existence. Moving EMS headquarters “upstairs” in the current (10 Court Street) headquarters building does not meet the needs of the agency. A headquarters station or EMS “central station” would offer great benefits, including providing greater interaction between leadership, support services, and line staff.

Recommendations:

7. Consider building an EMS headquarters station, incorporating administration, support staff (including billing), training, logistics/restocking, and other functions in a central location. The campus of the existing Delaware Career Center (north campus), apparently soon to be vacated, would be an ideal site with available space.
8. Consider re-location of existing EMS stations as described above. If the county elects to serve as the sole EMS provider for the county, EMS station #3 will need to be replaced and at least two additional locations (southeast and southwest) would be required. If the environment permits, all

of the township fire departments have adequate facility spaces to accommodate a co-located EMS unit.

FLEET SERVICES

Delaware County EMS has a high-quality ambulance fleet, supported by a smaller fleet of light support vehicles driven by chief officers, shift captains, and selected support personnel. The choice of type of ambulance chassis has varied over the years, including Type 3 (van cutaway chassis), Type 1 (pickup truck chassis), and Type 4 (a/k/a Type I-HD) medium truck chassis. The agency has consistently purchased good-quality ambulance modules built and mounted by Horton.

First-line ambulances range in age from one to eight years of age, with appropriate mileages. Vehicles are expected to be purchased in accordance with a fleet replacement schedule. However, the Board of County Commissioners does not necessarily fund replacement per the schedule, resulting over the years in a backlog, with some vehicles in the “backup” fleet being up to 19 years old, and having very high mileages (up to 214,000 miles). The five spare ambulances are not fully equipped for immediate service, lacking cardiac monitors, portable radios, and other biomedical equipment, and some lacking current stretchers. Current best practices call for a “ready spare” ratio of one spare ambulance for every 1.3 to 1.5 front line ambulances – the lower ratio being acceptable for ambulance fleets with “high performance” repair and maintenance operations. Because of its current maintenance methodology, Delaware County EMS requires the higher ratio (1:1.5), because of the maintenance situation described below. This would equate to 7 ready spare ambulances rather than the current 5, with those ready spares being less than 15 years of age and or 150,000 miles. One 2003 ambulance, with mileage in excess of 150,000 miles, has been designated as a “bariatric unit” and equipped with a rudimentary winch and ramp capability.

Limitations on capabilities have necessitated DelCo EMS to utilize a variety of methods for performing preventative maintenance and conducting vehicle repairs. Newer vehicles, still under warranty, are sent to the original equipment manufacturer (OEM) chassis dealer for oil changes and other preventative and maintenance for repairs. This results in vehicles being out of service for extended periods, depending on the workload of the dealer shop. Later in their lives, vehicles are serviced by the Delaware Service Center, the county light vehicle shop. This shop is small, under-staffed, and cannot physically handle the larger EMS vehicles. It is uncertain whether or not the Delaware Service Center staff are emergency vehicle technician (EVT) certified. These vehicles must be sent to an outside private garage, which is known to perform quality work but is significantly more costly. We note that the County Engineer also maintains a separate maintenance facility that is equipped to handle medium- and heavy-duty trucks.

Recommendations:

9. Work with the Board of County Commissioners to be certain that vehicles are replaced in accordance with the vehicle replacement schedule.
10. Delaware County should undertake a multi-departmental strategic examination of its fleet management and maintenance capabilities. It is possible that considerable fiscal savings and

increases in efficiency could be achieved by a strategic combination of vehicle service capabilities with facilities and staff appropriate for the entire county fleet.

11. Wherever the responsibility for ambulance vehicle repair and maintenance ultimately resides, all technicians assigned to repair ambulances should be certified on the “ambulance track” by the EVT Certification, <http://www.evtcc.org/tracks>. At least one of the technicians should be certified at the EVT Master Level III level for ambulances.
12. Achieve a ratio of 1 spare ambulance for every 1.5 front line ambulances.
13. Procure a bariatric ambulance, equipped with a lift, HoverMatt, HoverJack, and other bariatric specialty equipment for use as required. The bariatric ambulance should, when fully loaded including crew, have a minimum weight-carrying capacity of 1,000 pounds before GVWR is reached.
14. Procure additional equipment such that ready spare ambulances could be placed in to service if needed as additional (not replacement) ambulance resources.

HUMAN RESOURCES/COMPENSATION

Several EMS-related human resources issues have been discussed in other sections of the report. This section addresses issues related to the relationship between the EMS Department and the county Human Resources (HR) Department. The functional nature of the relationship can be strengthened through enhanced collaboration by both units.

Other concerns expressed involved the interactions between the County’s central personnel function and the EMS unit supervisory staff. Additional effort to train EMS staff to manage the personnel function in accordance with central personnel guidelines could avoid EMS personnel feeling in some instances that they have not been supported nor are not empowered to handle even low level disciplinary actions.

One important issue for career EMS personnel is the absence of a career ladder that does not involve supervision. Other health care professions have developed “clinical ladders” where nurses, in particular, are able to earn progressively higher compensation by increasing skills, knowledge, and contribution to the organization.²⁰ These programs have been very successful in increasing retention and career satisfaction and would be a positive addition to the HR/EMS relationship.

FITCH notes that an important unaddressed human resources issue for county EMS personnel is the implementation/documentation of physical fitness/physical capabilities standard, both pre-hire and annual. Ensuring that all caregivers are physically capable of performing all job tasks, either in actual practice or during training evolutions is essential. Observing and documenting these events in the highly-distributed EMS work environment is particularly challenging. First line supervisors (lieutenants) are part of the daily crew, and captains and above are rarely available to observe and document performance on calls. It is essential to the health and safety of the community as well as the employees

²⁰ <https://www.acrpnnet.org/2017/12/04/clinical-research-nurse-career-advancement-using-clinical-ladder-programs/>

themselves that they be able to climb stairs, lift and move patients, carry equipment, and provide patient care in *all* of the possible patient care environments.²¹

Each EMS unit (shift) is staffed by 34 personnel – 2 captains, 10 lieutenants, 20 Paramedics or AEMTs, and two “floater” AEMTs or paramedics. This number of floaters is insufficient to cover anticipated vacation, sick leave, and other absences. An increase in authorized positions to allow for 3-4 floaters per shift would further reduce the need for overtime (particularly mandatory overtime) and increasingly scarce part-time personnel.

Recommendations:

15. Strengthen the partnership between the HR Department and the EMS Department, particularly ensuring that EMS officers are responsible for the discipline of EMS personnel, while HR provides guidance, training, and templates for success.
16. Undertake a focused discussion of “24-hour shift issues” such that EMS and HR leadership share a common understanding of issues and potential resolutions.
17. Document compliance with a comprehensive employee fitness, wellness, and fitness for duty program, supported by appropriate policies, procedures, and collective bargaining provisions. This program should be fully implemented in a window of no more than three years.
18. Consider authorization for additional float personnel to address vacation, sick leave, and training.
19. Consider development and implementation of a clinical specialist or career ladder program, particularly to support achievement of the medical director’s vision of “clinical mastery” for paramedic personnel.
20. Consider a separate pay scale for use by line employees who are not assigned to a 2912-hour annual schedule, including part-time employees and employees undergoing orientation training.

Compensation

It is not uncommon for EMS agencies to have unique needs and issues associated with the 24-hour shift schedules that are not analogous to other county agencies. For example, the issues concerning the application of the hourly rate of pay for employees working 2,912 hours per year (regular 24 hour) to the compensation of individuals (most significantly new hires) working 40-hour or less work weeks) has virtually taken Delaware County EMS out of the market for part-time employees.

Hourly pay rates for part-time paramedics are reported to be below the hourly rates paid to EMT-Basic and non-credentialed drivers in nearby private organizations. Moreover, the strict application of the county’s approach to part-time employees under the Affordable Care Act which is a limitation on work hours, further reduces the utility or availability of part-time personnel. A different approach to 2,912-hour staff would be helpful.

²¹ <http://work.chron.com/physical-requirements-become-paramedic-16091.html>;
<https://www.emsworld.com/article/11143454/are-you-fit-duty>;
https://umanitoba.ca/faculties/kinrec/recreationservices/media/Paramedic_physical_fitness_assesment_Course_Description.pdf; <https://www.fitresponder.com/programs/physical-abilities-testing/>.

An issue of concern within EMS is that salaries, at all levels, have not grown appropriately with other indicators (cost of living, cost of housing in Delaware County, etc.). Conducting a comprehensive salary study was beyond our scope of work. We did however review previously-collected data provided by EMS management and the collective bargaining unit. It is our view, based on decades of experience with EMS systems and personnel, that the staff at all levels of DCEMS are paid at a level that reflects the low personnel utilization within the system. There is a “chicken and egg” argument about whether organizational performance is the result of attracting people willing to work for low pay in exchange for limited work demands, or if the county pays less than comparable agencies due to the low work demands. In any case, if the agency is to become a high-performance/high value service, it will need to address performance expectations and compensation at all levels to attract and retain the brightest, most capable, most motivated, and highly innovative staff. Compensation changes should be predicated upon enhanced productivity levels.

A second global compensation issue to be addressed is salary compression, whereby there is little difference between successive ranks. The result is that field personnel often have little incentive to seek supervisory positions and take on the responsibilities that are part of the new rank. At the present time, there are hourly employees that are paid more, on an annual basis, than the chief and assistant chiefs. This is simply inappropriate, and over the years will result in staff being disinterested in advancement due to the financial penalties.

There is much discussion in the EMS community, and in Delaware County, specifically, about the identification of appropriate comparable data to be used for salary setting. There is little science and many opinions about who should be looked at for what purpose. Most of this discussion is pure opinion. In establishing comparable data in a particular community, we look at where individuals go when they leave EMS service, as well as the amount of pre-service education that is provided. Generally speaking, where EMS is provided in the private sector, salaries are lower and high turnover is built in to the agency’s personnel management scheme. Where EMS is provided in the public sector, we look at their public safety counterparts (fire and law enforcement) as a start for the discussion. This report was not commissioned as a salary study, but the issue was raised so often in discussions that the consultants felt it necessary to address this aspect of service delivery.

The figures in Attachment C serve to compare the salaries of Delaware County EMS paramedics to individuals serving as firefighter-paramedics in Delaware County, at the line worker (firefighter/paramedic), first line supervisor (EMS and fire lieutenants) and second line supervisors (EMS and fire captains).²² The vast majority of what firefighter-paramedics do is to respond to EMS calls. We have also provided a comparison to the same groups in the Delaware County law enforcement organizations.²³ A Delaware County EMS paramedic earns \$12.24 (entry level) to \$16.28 (highest pay

²² No adjustments were made to account for the different schedules worked by police, fire, and EMS personnel, nor for the application of the different overtime rules applicable to each discipline. To consider this, one would look at the total annual compensation, including overtime included in regularly scheduled hours but excluding any additional or optional overtime.

²³ Data from existing collective bargaining agreements, provided by the Ohio State Employment Relations Board, 2017. http://www.serb.state.oh.us/sections/research/WEB_CONTRACTS/WebContracts.htm.

point), while the lowest municipal organization has a hourly range of \$19.38 to \$24.26 (Genoa Township), while at the high end the range is \$23.08 to \$28.92 (Delaware City). Similar discrepancies are noted in the comparisons of EMS and fire lieutenant and captain compensation.

The comparison of EMS and law enforcement hourly rates show an even more profound discrepancy. At the entry level, the lowest-paid line law enforcement officer in Delaware County (Delaware County Sheriff's Office) earns \$29.24 per hour, while an entry-level paramedic earns \$12.24 per hour. At the same time, the highest paid field (patrol) law enforcement officer (Powell Police Department) earns \$41.57 per hour while the highest paid Delaware County field paramedic earns \$16.28. In the supervisory ranges, these separations become even more profound, with the lowest paid EMS captain earning \$19.97 per while his or her counterpart in the Delaware City Police Department earns \$46.85.²⁴

Finally, we compared entry-level hourly rates for paramedics, whose pre-service education is at the level of an associate degree regardless of whether or not the degree is actually conferred, with the salary of an entry-level registered nurse holding an associate degree.²⁵ OhioHealth Grady Memorial Hospital starts Registered Nurses that hold associate-level degrees at \$24-\$26 per hour (nearly 100% higher than a Delaware County paramedic).

Other factors to consider regarding EMS personnel include that EMS workers are injured on-the-job at rates greater than firefighters and law enforcement officers²⁶. They are subject to violence at rates 14 times greater than firefighters.²⁷ EMS personnel are seven times more likely to be killed by workplace violence than all other groups of health care providers.²⁸

Current compensation levels for Delaware County EMS paramedics need to be addressed, and improvements are necessary to attract, promote, and retain the quality of personnel necessary to move the service to its full potential in the next decade. Compensation adjustments need to be based upon a mix of comparable markets, productivity enhancements and the successful implementation of system policy changes and recommendations.

²⁴ Note – hourly rates can be somewhat misleading in that some EMS and fire personnel schedules involve regularly scheduled (built in) overtime hours each pay period. Another way to more accurately compare compensation rates is to look at the annual expected “salary” when a worker works their normally scheduled number of hours but excluding any additional hours worked.

²⁵ Phelps, S. *Length of professional education of paramedics and nurses at community colleges in the Northeast United States*. <https://www.magonlinelibrary.com/doi/10.12968/ippr.2015.5.2.42> (2015).

²⁶ Suyama J¹, Rittenberger JC, Patterson PD, Hostler D. *Comparison of public safety provider injury rates*. *Prehosp Emerg Care*. 2009 Oct-Dec;13(4):451-5. doi: 10.1080/10903120903144908.

²⁷ *Violence Against EMS Responders*. U.S. Fire Administration, August 2017. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4736678/pdf/AJIM-59-150.pdf> See also <http://www.jems.com/articles/2016/01/study-medics-face-greater-risk-of-assault.html>.

²⁸ Maguire, BJ et al. Occupational Injuries among Emergency Medical Services Personnel, *Prehospital Emergency Care*, Volume 9, 2005 - Issue 4.

Recommendations:

21. Conduct additional salary studies with focus on local public safety and health care profession comparable data.
22. Adjust salaries, based on objective performance measures, to attract and retain the highest quality paramedics for a high-performing EMS agency in the next decade.
23. In addition to paramedic and supervisory personnel covered by the CBA, assure that chief officer salaries are appropriate, including measures such that hourly personnel are not more highly compensated than chief officers.

CONFIDENTIAL

BEST PRACTICES FOR OPTIMAL EMS SYSTEM

Every EMS organization is comprised of multiple process areas to address specific functions of the operation. The Consultant team met with key system participants, as well as with community, hospital and local stakeholders. A summary of the best practices and findings for each process is described below. Recommendations for enhancing activities are included where appropriate.

Specific benchmarks and Delaware County's performance in each of the following categories are described:

9-1-1 and Communications	Customer and Community Accountability
Medical First Response	Prevention and Community Education
Medical Transportation	Organizational Structure and Leadership
Medical Accountability	Ensuring Optimal System Value

The summary of these 50 benchmarks can be found in Attachment A – Benchmark Summary. An EMS system key goal is to ensure access and appropriate response for those in need of emergency services and medical transportation. The mission of EMS can be isolated to three core functions. They are: preventing and reducing the number of lives lost; minimizing the patient's pain and suffering, and reducing the expenses associated with catastrophic injuries and illnesses.

Modern EMS suffers from an identity crisis since its creation five decades ago to handle the carnage on the highways²⁹ and provide out-of-hospital cardiac care³⁰. Does EMS fall under public safety, health care or public health?

In 2007, the National Academies of Sciences' Institute of Medicine (IOM) issued a White Paper titled: "EMS at the Crossroads." IOM identified six primary issues.

- Insufficient Coordination
- Disparities in Response Time
- Uncertain Quality of Care
- Lack of Disaster Readiness
- Divided Professional Identity
- Limited Evidence Base³¹

²⁹ National Research Council. (1966). *Accidental Death and Disability: The Neglected Disease of Modern Society*. Washington DC, National Academies of Science.

³⁰ Pantridge, JF and JS Geddes. (1967). "A mobile intensive-care unit in the management of myocardial infarction." *Lancet* (2): 271.

³¹ Committee on the Future of Emergency Care in the United States Health System (2007). *Emergency Medical Services: At the Crossroads*. Washington, DC, Institute of Medicine.

Rural counties have additional issues:

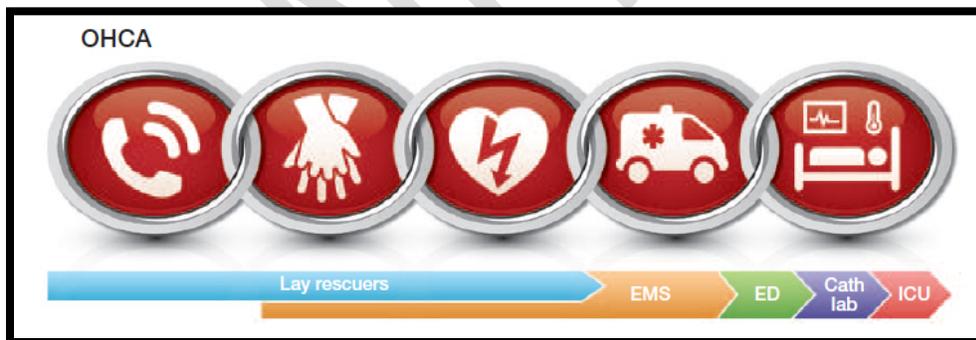
- Areas with low population density generally cannot support a 24-hour full-time paid ALS EMS response system
- Low population density also results in a smaller pool of people from which to recruit volunteer EMS personnel
- EMS caregiver initial and continuing education requirements require a significant time commitment and often are not locally available
- Large geographic areas with secondary roadways are often difficult to navigate and hinder response time³²

Nearly a decade after the IOM report was published these same issues are problematic in Delaware County to a greater or lesser degree.

An optimal EMS system is best designed from the patient's perspective. Patients should expect that the service will be engaged in illness and injury prevention, health education, and early symptom recognition, in addition to responding to emergency and transportation requests. The EMS system should provide a rapid and appropriate response when a caller dials 9-1-1 and routinely provide medical instructions until help arrives.

The 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiac Care focuses on the impact the community has on patient outcome. The revised Chain of Survival emphasizes rapid identification of potential cardiac arrest, followed by immediate delivery of high quality CPR and early defibrillation with an AED.

Figure 16.



Communities able to implement a rapid response see a cardiac arrest survival rate approaching 50%. Team-based response, using the community and medical first responders, should be able to deliver rapid defibrillation and high-quality CPR, arriving to the patient's side within four to six minutes of a 9-1-1 dispatch, with 90% reliability.

³² Simon, L. (2015). Rural EMS faces its own emergency. American City and County. New York City, Penton.

Patients should be transported to a hospital that can treat their specific condition. The EMS system should be externally and independently monitored, with participants held accountable for their responsibilities. Finally, the system should deliver good value for the resources invested.

Milestone documents in the early development of Emergency Medical Services Systems (EMSS) included the National Academy of Sciences-National Research Council White Paper “Accidental Death and Disability: The Neglected Disease of Modern Society,” the federal Highway Safety Act of 1966, and the federal Emergency Medical Services (EMS) Systems Act of 1973. They guided the first 50 years of Emergency Medical Services System growth on the local, regional, and state levels.

These early systems evolved from “neighbor helping neighbor” volunteer groups to highly complex response systems of physician extenders that function as part of the larger healthcare delivery system.

EMS systems nationwide are struggling to meet clinical, operational, and financial performance objectives. Ambulance services are primarily funded under a complex and flawed federal reimbursement methodology that does not cover the full cost of operations or the cost of readiness. Studies, including those prepared for the International City and County Management Association (ICMA) and the National Academies of Science Institute of Medicine, (IOM) document the underlying issues.

The fragmented nature of EMS means that there are many organizations that provide recommendations, protocols, and best practices from their clinical, operational, or regulatory viewpoint. State EMS regulations reflect minimum performance requirements.

Other commonly accepted “standards” are drawn from a variety of sources, including:

- “10 EMS Standards,” currently used to evaluate state EMS systems
- “EMS Clinical Practice and Systems Oversight” developed by the National Association of EMS Physicians as core curriculum for American Board of Emergency Medicine certification in EMS
- “Evidence-Based Performance Measures for Emergency Medical Services Systems: A Model for Expanded EMS Benchmarking.” Position statement by the 2007 Consortium of U.S. Metropolitan Municipalities’ EMS Medical Directors
- “EMS Agenda for the Future,” developed by the US Department of Transportation
- “EMS at the Crossroads,” developed by the National Academies of Sciences’ Institute of Medicine 2007
- “The 7 Pillars of EMS Officer Competency” by the National EMS Management Association
- “EMS in Critical Condition: Meeting the Challenge,” produced by The International City/County Management Association
- “EMS Structured for Quality: Best Practice in Designing, Managing and Contracting for Emergency Ambulance Service,” published by the American Ambulance Association
- International Academies of Emergency Dispatch

- Commission on the Accreditation of Ambulance Services
- National Fire Protection Association

In like manner, there is no single universally best EMS system design model or single “best practice system” that can be identified.

Emergency medical services are best viewed as a system with a number of components that contribute to providing the best care for an ill or injured patient. The major components of the optimal system are outlined below and will serve as the framework for the evaluation and assessment of Delaware County EMS and the system, as a whole. Recognizing and striving to meet these benchmarks results in a patient-focused system.

EMS COMMUNICATIONS

Benchmarks

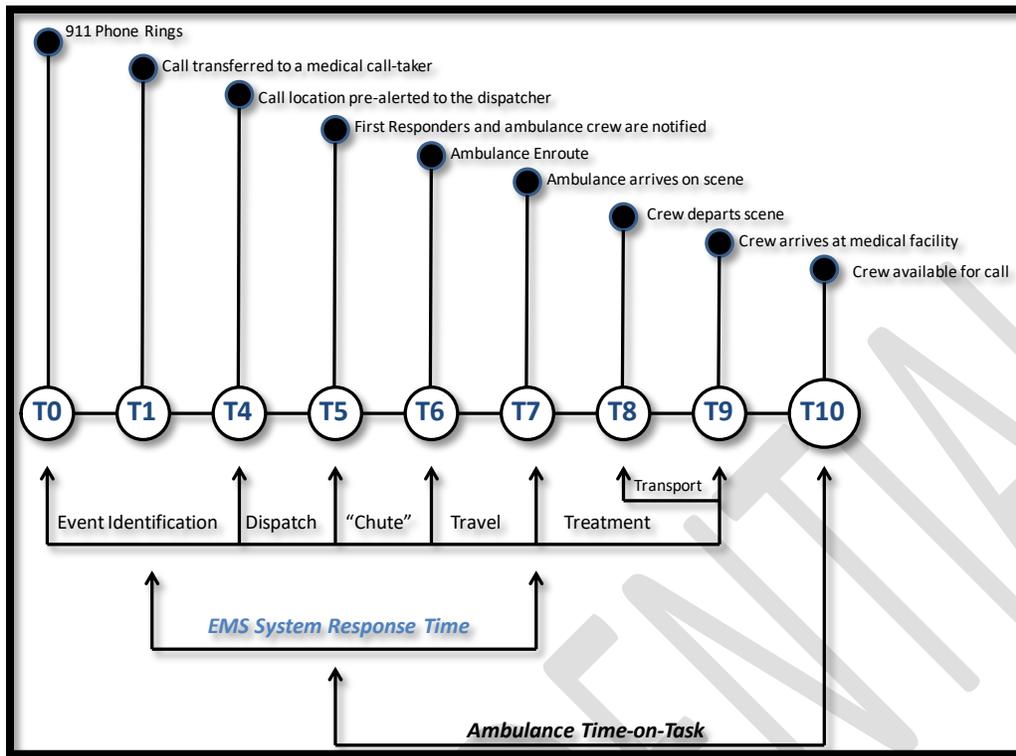
- Public has access through a single number, preferably enhanced 911.
- Coordinated 911 Public Safety Access Points (PSAPs) exist for the system.
- Certified personnel provide pre-arrival instructions and emergency medical dispatching (EMD) and this function is fully medically supervised.
- Data collection exists allowing for key service elements to be analyzed.
- Technology supports interface between 911, dispatching and administrative processes.
- Radio linkages between dispatch, field units and medical facilities provide adequate coverage and facilitate communications.

Best Practices

Best practice EMS systems are organized to facilitate wire-line, cellular, voice over internet protocol (VoIP), automatic crash notification, patient alerting system devices and other public 911 access to the Emergency Medical Services System. Voice, video, telemetry, and other data communications conduits are employed, as necessary, to best enhance real-time information management for patient care.

A medically directed system of protocol-based Emergency Medical Dispatch (EMD) and communications is in place. The call reception and EMS call processes are designed logically and do not delay activation of medical resources. Technology supports the caller being directed to the appropriate Public Safety Answer Point (PSAP) for the geographic location of the call. All 911 callers should receive call prioritization and pre-arrival instructions in accordance with International Academies of Emergency Dispatch (IAED) or a similar process. Automated quality improvement (QI) processes are used for facilitating results being reported to clinical and operations executives in a concise manner.

Figure 17. Typical EMS Call Processing Flow-Chart



Data collection facilitates the analysis of key service elements and this data is routinely benchmarked and reported. Technology supports interface between 911, medical dispatch functions and administrative processes. Radio/cellular linkages between dispatch, field units and medical facilities provide adequate coverage and facilitate both voice and data communications. There is interoperability between allied public safety agencies.

Observations and Findings

Ambulances are dispatched based on availability in station, rather than GPS/AVL capabilities. Order of dispatch is dictated by static dispatch "run cards" rather than closest unit by GPS/AVL location. Calls are not classified or dispatched according to priority, apparently based on a belief that "dispatch should not tell the operating agencies how to respond." We did not gain clear information about the conduct of medical quality assurance on what pre-arrival instructions are provided. The dispatch CAD does not electronically interface with the DelCo EMS electronic patient care reporting system.

Recommendations

24. All ambulances and other EMS vehicles should utilize automated vehicle location/in-vehicle navigation (AVL/IVN), which provides location and travel information to the vehicle and to the communications center.³³
25. The closest available EMS unit(s) should be dispatched to each emergency, regardless of agency, zone or district considerations.
26. The capability to properly classify calls and designate response priorities and modes for all ambulances must be significantly enhanced. Clinically sophisticated software that facilitates QI processes should be utilized.
27. Significantly strengthen prospective and retrospective medical oversight of the medical communications function to include a medically-overseen priority dispatch system with automated quantifiable quality improvement processes, including routine case reviews by the medical director.
28. Ensure and document that 95% of those requiring pre-arrival instructions receive them in accordance with nationally recognized standards.
29. The CAD system should electronically interface with a single electronic patient care record (ePCR) system used by all agencies providing emergency medical service in Delaware County.
30. Report quarterly communications center performance metrics to County Commission and other system stakeholders.
31. Within 36 months, the EMS communications center should achieve accreditation through the International Academies of Emergency Dispatch or an alternative program meeting the IAED requirements.

MEDICAL FIRST RESPONSE

Benchmarks

- First responders are part of a coordinated response system and medically supervised by a single system medical director.
- Defined response time standards exist for first responders.
- First response agencies report/meet fractile response times.
- Automatic External Defibrillators (AED) capabilities are on all first line apparatus.
- Smooth transition of care is achieved.

Best Practices

Medical first responders in best practice systems are organized appropriately for the communities in which they serve. They function as part of an integrated response system that is guided by state and local legislative authority, and which reflects accepted medical practice. First responders (paid or volunteer) are certified at a minimum EMT-Defibrillator or Medical First Responder (MFR) level. They are medically supervised by the system medical director, including participation in performance

³³ At our final meeting with the Delaware County Fire Chiefs Association, there was unanimous consent among those in attendance that closest available unit dispatch using GPS/AVL was desirable and would be supported by that group.

improvement audits/activities. Defined response time standards exist for formal first responders and those response times are reported with those of the system. Early defibrillation capabilities are available for EMS first responders and in areas of high-density response areas such as airports, hotel complexes. When community or first response personnel are involved in patient care, a smooth transition of care is achieved.

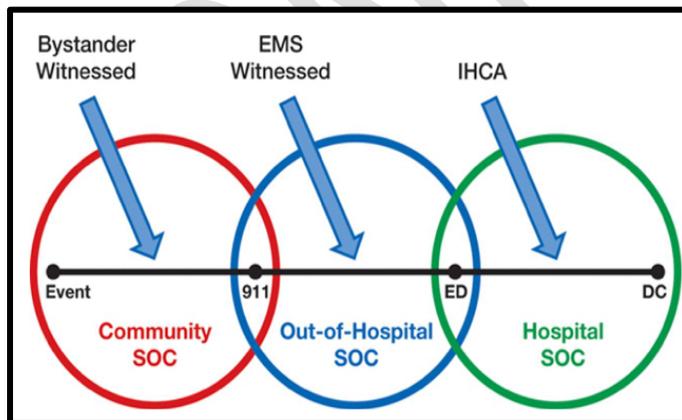
Observations and Findings

Medical first responders play a critical role in mitigating life-threatening emergencies and support the communities' EMS efforts as part of the public safety mission. In the majority of North American cities, this role is typically funded by local tax dollars as part of the public safety budget rather than from user fees.

MFR services are provided by all Delaware County fire departments. All first response apparatus are equipped with automatic external defibrillators (AEDs). The career and combination fire departments that offer ambulance service also provide paramedic-level first response, typically using fire suppression personnel and apparatus. The volunteer fire departments provide first response in a mixed manner – each department has a list of call types that it will respond to, and the level of response depends on the level of volunteer available at the particular time of the call. This inconsistency is one of the reasons that Delaware County has determined it necessary to staff its ambulances with three personnel.

Care transitions between first response and transport agencies are reported as positive and non-problematic.

Figure 18. AHA System of Care



The American Heart Association advocates a team-based System of Care (SOC). The community and medical first responders should be able to deliver rapid defibrillation and high-quality CPR, arriving to the patient's side within four to six minutes of a 9-1-1 dispatch, with 90% reliability.³⁴

Accomplishing this performance requires creative utilization of public access AEDs,

CPR-trained community members, and innovative use of social media and information technology to alert nearest CPR-trained person, and match patient location with nearest AED.

³⁴ Kronick SL, Kurz MC, Lin S, Edelson DP, Berg RA, Billi JE, Cabanas JG, Cone DC, Diercks DB, Foster J, Meeks RA, Travers AH, Welsford M. Part 4: systems of care and continuous quality improvement: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2015;132(suppl 2): S397–S413.

Recommendations

32. Encourage expansion and clinical development of medical first response services throughout Delaware County, including law enforcement responders in to the plan if possible. The County should assure that first response is available for all high-priority EMS calls, to assure adequate personnel on the scene to manage a serious medical emergency, regardless of jurisdiction. All firefighting personnel should be trained to at least the Emergency Medical Responder (EMR) level of competency. All first response EMS units, regardless of the agency operating them, should be equipped with automated external defibrillators and persons trained to use them.
33. Work with fire service leadership to limit “hot” response to those medical calls where clinical evidence suggests that time is an actual factor in improving outcomes. It is well-established that there is no benefit, but great public risk, from excessive use of emergency warning lights for non-critical EMS calls.³⁵

MEDICAL TRANSPORTATION

Benchmarks

- Defined response time standards exist.
- Agency reports/meets fractile response times.
- Units meet staffing and equipment requirements.
- Resources are efficiently and effectively deployed.
- There is a smooth integration of first response, air, ground and hospital services.
- Develop/maintain coordinated disaster plans.

Best Practices

In a best practice EMS system, a mechanism exists to identify and assure adequate deployment of ground, air and other transportation resources meeting specific standards of quality, to assure timely response, scaled to the nature of event. There is capability to monitor safety and response time issues. Defined response time targets come into play, according to severity of call, and individual response components are measured by using both mean and 80th percentile measures.

Defined clinical service levels use current medical research to guide the medical interventions of the system. Changes to improve clinical practice can be introduced rapidly. Ambulances are staffed and equipped to meet the identified service requirements. Procurement, maintenance, and logistics processes function to optimize unit availability. Resources are efficiently and effectively deployed to

³⁵ Wolfberg D. Pro Bono: EMS Use of Red Lights and Siren Offers High Risk, Little Reward. JEMS, February 1, 2017. <http://www.jems.com/articles/print/volume-42/issue-2/departments-columns/pro-bono/pro-bono-ems-use-of-red-lights-and-siren-offers-high-risk-little-reward.html>.

achieve response time performance for projected demand with due regard for taxpayers and end users. When multiple agencies are involved, a smooth integration and transition of care is achieved.

The system is capable of scaling up day-to-day operations to meet the needs of larger, all-hazards events, based on threat and capabilities assessments of the likeliest events to occur in the state. It is essential that mass casualty responses involve logical expansion and extension of daily practices and not the establishment of new practices reserved for large-scale events.

Observations and Findings

All EMS calls in Delaware County receive a paramedic-level response. Fire Department ambulances respond with at least one paramedic and are typically accompanied by a fire suppression apparatus that is also staffed with at least one paramedic. Delaware County EMS ambulances respond with a crew of three paramedics (or occasionally two paramedics and an Advanced EMT), along with whatever first response is provided by the fire district in which the call occurs.

Delaware County is not divided into EMS zones. Analysis and discussions focus on municipal and township boundaries, and in the case of several multi-jurisdiction fire districts (e.g., BST&G fire district and Porter-Kingston Fire District), by the fire districts. Reports that are provided are agency-focused, rather than citizen or jurisdiction focused. Providers serve all calls within their assigned zones, from stations owned or otherwise provided by the various agencies. Some of the county EMS stations are not optimally located to serve the districts, and some have limited service areas due to their proximity to the county line. The zones are not configured for optimal ambulance response.

The County, through the 911 Center, has data available to analyze and report response performance across zones, but does not do so. There is no regular reporting of county-wide data for first responder arrival or ambulance.

DCEMS protocols appear to be consistent with other similar EMS systems. However, performance of the system and/or individual medics are not routinely reported. While the impression of care we observed was positive, we cannot offer an opinion related to the quality of care provided due to the lack of objective data. The lack of any visible emphasis on data-driven performance management is a deficiency noted in our examination of DelCo EMS, closely tied to that of medical direction and clinical quality. Employees at all levels are quick to describe their service as “state of the art” – however when queried more deeply, they point to a staffing pattern that they like, their possession of high quality equipment, and their sole focus on EMS. DCEMS’s primary QI efforts involve Captains reviewing e-PCR reports for completeness on a daily basis. The service was unable to quantify any positive impact on patient care and clinical outcomes from the QI data reviews conducted.

For more than a decade, EMS agencies across the country have worked hard to become “data driven” – to have their operational and clinical decisions be based on sound data and applied science. In the clinical realm, this is referred to as “evidence-based medicine.” A hallmark of a data-driven EMS agency is that it

routinely captures and reports its operational and performance data (“metrics”) and compares them to other EMS agencies around the country – particularly those who are known for excellence in a particular discipline. It uses that information to shape ongoing training and clinical efforts. For example, EMS agencies routinely compare their “cardiac arrest success rates” using the “Utstein Style,” as reported to the National CARES registry (where other agencies’ data can be found also). Response and related performance are reported both specific to that agency, and as compared to external standards such as those established by state EMS offices, county EMS systems, and externally-mediated performance contracts. Clinical benchmarks are compared to those set forth in the 2008 seminal article, “Evidence-Based Performance Measures for Emergency Medical Services Systems: A Model for Expanded EMS Benchmarking,”³⁶ and those established by the National Association of State EMS Officials Performance Improvement Project.³⁷

DCEMS should be able to routinely demonstrate the impact of its performance and QI efforts using nationally and internationally accepted standards and benchmarks. Figure 19 and Figure 20 are samples of clinical quality scorecards and factors routinely benchmarked in best practice systems.³⁸

Figure 19 Sample Clinical Scorecard

UMC EMS Score Card		Standard	18-Jan	18-Feb	18-Mar	1st Quarter
Quality Improvement	Percentage of ePCR reports reviewed from transports	100%	100.00%	100.00%	100.00%	100.00%
	Number of ePCR reports reviewed		3,388	3,099	3,198	10285
	Average QI score for caregiver ePCR	>3.0	3.24	3.29	3.29	3.27
Trauma	Number of trauma-related calls		371	351	367	1,089
	Average time of scene - Minor	20 minutes	11.77	11.17	11.53	11.49
	Average time of scene - Moderate	20 minutes	16.4	16.7	16.4	16.5
	Average time of scene - Severe	15 minutes	22.7	8.45	15.23	15.48
	Average time of scene - Critical	>10 minutes	11.69	11.26	11.05	11.48
	Average time on scene - Cardiac arrest	>10 minutes	16.41	4.63	27.44	16.16
	Primary reason for delays	>10 minutes	8.42	0	4.88	4.43
STEMI / Chest Pain	Number of chest pain related calls		131	123	151	405
	Number of 12-leads on STEMI		100.00%	100.00%	100.00%	100.00%
	Number STEMI activation by EMS		8	15	14	37
	15 minute < Scene time with STEMI	80%	100%	88%	100%	96%
	Percent of STEMI ECG transmissions	100%	100%	100%	100%	100%
	Percent of STEMI that received NTG		38%	66%	50%	51%
	Percent of STEMI that receive ASA		75%	66%	68%	70%
	12-lead time < 10 minute on scene	90%	96.00%	97.00%	96.00%	96.33%
Field Statistics	Total IVs attempted		1,162	913	980	3,055
	Total successful IVs		989	736	802	2,527
	Successful IV: 1st attempt		835	685	711	2,231
	Total percent of successful IVs	80%	85%	81%	82%	83%
	Number of IOs		31	16	28	75
	Number of CPAP		26	18	13	57
	Total intubations		55	32	58	145
	Total Successful intubation		46 (84%)	25 (78%)	48 (83%)	119(81.66%)
	Intubation successful: 1st attempt		43 (78%)	24 (74%)	45 (78%)	112(76.66%)
	Total CPAP with transition to intubation		4	1	3	8
	Intubation via PAI		16	10	24	50
	Number of Cricothyrotomy		0	0	1	1

³⁶ Myers JB, Slovis C. et al. (for the Metropolitan EMS Medical Directors Consortium). *Prehosp Emerg Care*. 2008 Apr-Jun;12(2):141-51. doi: 10.1080/10903120801903793.

³⁷ <http://www.nasemso.org/Members/Trauma-Managers/Toolkit-Performance-Improvement.asp>

³⁸ Sample scorecards courtesy of University Medical Center EMS, Lubbock, Texas

Figure 20 - Sample Clinical Outcomes Summary

UMC EMS Quarterly Outcomes		17-Jan	17-Feb	17-Mar	1st Quarter	
Cardiac Arrest	Number of cardiac arrests	58	44	51	153	
	Number of Arrest worked in the field	29	21	21	71	
	Median age for all arrest	48.93	68.13	65.01	61.02	
	Median age for arrest worked	57.58	67.42	56.14	60.38	
	Average scene time	49.16	32.91	36.25	39.44	
	Transports to UMC	8	7	7	22	
	Transports to CMC	10	4	6	20	
	Transport to LHH	0	0	0	0	
	ROSC	14 (48.27%)	9(42.8%)	12(57.1%)	35(49.39%)	
	Initial rhythm V-fib / V-Teach	6	2	6	14	
	Witnessed arrest	14	10	10	34	
	Number of Double sequential defib	2	1	2	5	
	Number of transports	18	11	13	42	
	Number of field terminations	11	10	8	29	
	Compressions in target (CCF)	AHA >60%	48%	47%	60.44%	51.81%
	Depth in target		52%	52%	63%	56%
Rate in target		87%	90%	91%	89%	
Avg. pre-shock (seconds)	<7 seconds	2.83	9	2.8	4.87	
Avg. post-shock (seconds)	<7 seconds	1.88	1.77	1.75	1.8	
Ave. per-shock (seconds)	<10 seconds	4.66	18.22	5.6	9.49	
UMC EMS Annual Outcomes		17-Jan	17-Feb	17-Mar	1st Quarter	
Stroke / CVA	Number of Positive stroke scales	40	25	24	89	
	VAN Positive score	14	7	2	23	
	Time on scene average	<15 minutes	11.37	11.28	10.75	11.13
	Arrival Facility with proper size IV (18 ga.)		92%	92%	71%	85%
	Arrival Facility with an IV		100%	100%	100%	100%
	Blood draw on arrival		67%	60%	50%	59%

Use of these color coded type scorecards make it easy for clinical and administrative leaders to monitor trends and link performance to training necessary to improve performance. More sophisticated systems such monitor performances by individual, unit, shift and agency. Fully automated QI support systems that allow these trends to be monitored in real time are commonly used by best practice systems.^{39 40}

Recommendations

34. Establish an appropriate position responsible for gathering and presenting clinical, operational, financial, and human resources performance metrics. Such a position should report directly to the chief and have collateral reporting relationships with the Medical Director and clinical affairs chief.
35. Adopt, collect, and report performance benchmarks as described above, on a monthly, bi-monthly, or quarterly basis.
36. Utilize performance data to drive training, operational management, and clinical management decisions.

³⁹ <https://www.firstwatch.net/>

⁴⁰ <https://www.jems.com/articles/print/volume-43/issue-2/features/pinellas-county-fla-ems-implements-truly-effective-quality-improvement.html>

MEDICAL ACCOUNTABILITY

Benchmarks

- Single point of physician medical direction for entire system.
- Specialized medical director training/certification.
- Physician is effective in establishing local care standards that reflect current national standards of practice.
- Proactive, interactive and retroactive medical direction is facilitated by the activities of the medical director.
- Patient Care Report/Quality Improvement (PCR/QI) data transparency for MD review.
- Clinical Education/Development Effectiveness.
- Clinical Education Efficiency.

Best Practices

Medical direction for an entire EMS system is provided by a single physician, qualified and trained to serve as an EMS medical director. The medical director establishes local clinical standards of care that are evidence-based and reflect current national standards of practice. The agency has a comprehensive clinical quality assurance program that incorporates proactive, interactive (in field) and retrospective elements. The medical director has complete access to the patient care records and uses data from those records to develop and guide an effective, up-to-date clinical education program that reflects actual needs.

Observations and Findings

The principal product of an EMS agency is medical (clinical) care and ambulance transportation. Objectively demonstrating the quality and sophistication of the clinical care delivered by DCEMS and its paramedics need to become the organization's highest priority.

Medical direction is provided by the DelCo EMS Medical Director, Ashish Panchal, M.D., Ph.D. Dr. Panchal is a career emergency medicine and EMS physician. He is an Associate Professor of Emergency Medicine at The Ohio State University Wexner Medical Center and holds a PhD in Organ System Physiology from Case Western Reserve University and a MD from The Ohio State University. In addition to his work at Wexner and Delaware County, Dr. Panchal heads the research program at the National Registry of EMTs and serves on many state and national scientific bodies.

Dr. Panchal indicated that Delaware County EMS can occupy a unique position of excellence in the EMS community. As a single-role EMS agency, DelCo EMS can devote its full attention to the delivery of the highest level and quality of pre-hospital care. He is concerned that the low volume of patient contacts, coupled with the agency's practice of allowing paramedics to remain at the same station and unit (shift) for long periods allows for the "rust-out" of critical diagnostic and interventional skills. At his urging, the agency recently implemented "core competency" skill testing, which revealed the need for greater

training and practice in critical clinical areas. Dr. Panchal personally reviews all “time critical” patient care reports (about 40 per month). He is also concerned that, with four medical directors operating in this relatively small county, there is no one to assure a single standard of care throughout the county.

A second concern raised in the discussion of clinical affairs was the lack of resources devoted to this core function. The \$12,500 per year medical direction budget is simply not adequate for an organization this size. The budget only provides 8-10 days per year of compensated medical director time. Moreover, clinical affairs and quality assurance are the responsibility of the Assistant Chief – Administration, whose plate is already more than full, and who has no subordinates to which these important matters can be delegated.

There is no system of medical accountability in Delaware County. Each agency may, and does, select its own EMS medical director. As noted previously, system and agency clinical scorecards are mechanisms used to routinely monitor and enhance care in best practice systems.

In-Service Training

The in-service training program utilized by DelCo EMS managed as a collateral duty by a shift captain. Because the training program is spelled out in the collective bargaining agreement (CBA Article 24), it is highly structured and not very flexible. The main effort consists of periodic offering and paying for employees to participate in standard “merit badge” courses including ACLS, ITLS, PALS, and CPR. These courses are instructor-intensive, re-hash material taught in pre-service paramedic school, and are often years out of date in content. The CBA does not limit what other training the employer might provide, but these possibilities are limited by budgeted funds for personnel training and by the lack of purposed in-house educational staff. “New items” such as a new drug or the use of new medical equipment are conducted on-duty, by in-house instructors who are also line employees. The department is to be commended for beginning an effort to send paramedics to Crisis Intervention Team training in company of law enforcement officers.

The linkage between clinical quality improvement efforts and the path of the training program are not optimal. The department has a single “medium fidelity” simulator. Efforts to conduct meaningful training are limited by the need for the department to utilize classroom space not purpose-built for EMS and not always available for EMS department use (e.g., “the fishbowl” room in the EMS headquarters building). In-house educational programs are described by staff as “dry” and “not challenging.”

Recommendations

37. Budget additional funds to allow for the medical director to work on DelCo EMS matters at least one and preferably two days per week.
38. Create a chief-level position responsible for clinical affairs, quality management, and support of the medical director.
39. Utilize available “down time” to conduct intensive on-duty training programs, including frequent reinforcement of high-acuity, low-occurrence (HALO) skills. Line paramedics should have hand-on, simulator-based training in critical skills at least every 2 months, throughout the year.

40. As a matter of priority, the department should create a position for a chief training officer, supplemented by a small staff of clinical educators. The chief training officer should have strong experience in EMS/medical simulation, reality-based training, high-acuity clinical skills, and the development of “just in time” educational programs designed to meet needs contemporaneously identified by the quality management process.
41. “Merit-badge” courses should be eliminated from the CBA, replaced by an article that the department’s periodic training program will meet all content and skill requirements for employees to re-credential with the State of Ohio and the National Registry of EMTs on an ongoing basis.
42. High-fidelity medical and trauma simulators should be procured and utilized to assure ongoing clinical competence. Wherever possible, simulators should be mobile or transportable, considering the possibility of a mobile simulation vehicle or trailer.
43. Dedicated training and education space must be identified and made available to the EMS Department. Given the general high utilization of county shared space, it is not feasible to move 40-person, equipment and technology-intensive training programs randomly throughout the county. Training and education spaces should include a flexible classroom for at least 50 persons, at least 4 breakout rooms, staff offices, storage and technology workspaces, and should be amendable to hard-wiring or wireless connection of educational technology including simulators.

CUSTOMER/COMMUNITY ACCOUNTABILITY

Benchmarks

- Legislative authority to provide service and written service agreements are in place.
- Units and crews have a professional appearance.
- Formal mechanisms exist to address patient and community concerns.
- Independent measurement and reporting of system performance are utilized.
- Internal customer issues are routinely addressed.

Best Practices

A “best practices” EMS system has clear legislative authority to provide service in its service area. Written agreements, where necessary, are clear, up-to-date and regularly reviewed. Units and crews have a professional appearance. The EMS agency has a formal mechanism to address patient and community concerns. Independent measurement and reporting of system performance are regularly conducted, published, and utilized to guide agency decisions. The concerns of internal customers (staff, co-responders, other public safety agencies, health care facilities) have a venue and are appropriately heard and addressed.

Observations and Findings

Concerns about the lack of an EMS system in Delaware County were addressed earlier. There is much work to be done to move from a multiple, independent agency environment to a comprehensive EMS system. DCEMS agency has achieved CAAS accreditation, so appropriate processes are in place. Concerns of internal customers present a mixed picture – staff concerns are addressed via the collective bargaining agreement and the union processes, while those of external agencies are part of the larger system governance issues earlier discussed.

Recommendations

44. Work with county elected officials to support resolution of the larger system issues.
45. Assure that processes established during CAAS accreditation are utilized.

PREVENTION AND COMMUNITY EDUCATION

Benchmarks

- System personnel provide positive role models.
- Programs are targeted to “at risk” populations.
- Formal and effective programs with defined goals exist.
- Targeted objectives are measured and met.

Best Practices

In an optimal EMS system, EMS agencies present positive role models to the community they serve. These include physical fitness, daily activity, abstinence from use of tobacco products. The EMS agency develops and delivers prevention programs that are targeted at risks in the community (e.g., warm-weather and waterfront community EMS agencies deliver drowning-prevention and pool safety programs). All agencies, regardless of venue, deliver programs to improve community CPR performance and access to automated external defibrillators in public buildings, schools, shopping malls, and other high-population venues. These programs are specific, measurable, and have targeted outcomes, which are measured and met, or modified for improvement, by the agency.

Observations and Findings

We did not find a focus on community education and prevention at Delaware County EMS. In meetings with crews, both scheduled and unscheduled (station visits and other encounters), we observed and interacted with crews. Multiple crew members expressed concerns about the lack of fitness among colleagues; fearing that they would be unable to safely complete routine EMS tasks.

We also found little evidence of agency involvement in public information, education, and prevention programs, or other outreach efforts.

In the last decade, programs known as “mobile integrated health care” and “community paramedicine” have surfaced throughout the nation. These programs are intended to improve community health, reduce health care costs, and reduce the need for ambulance transports to expensive hospital emergency departments through early intervention and matching of patient needs with community health and other preventative and maintenance resources. As a well-resourced EMS agency, Delaware County EMS could be ideally positioned to improve the health status of the county through innovative community paramedicine programming in collaboration with are hospitals and the local health department.

Recommendations

46. Enforce physical standards and develop employee wellness program to assure that all employees are capable of safely and completely performing all tasks expected of an emergency paramedic, using a validated functional job description.
47. Develop a “Chain of Survival” program focusing on public access CPR and defibrillation.
48. Utilize agency call and patient care data to establish targets for community education and prevention programs, and to serve as the basis for a mobile integrated health care / community paramedicine program.

ENSURING OPTIMAL SYSTEM VALUE

Benchmarks

- Clinical outcomes are enhanced by the system.
- Ambulance Response Utilization and transport Utilization (UHU) are measured and hours are deployed in a manner to achieve efficiency and effectiveness.
- Ambulance cost per unit hour and transport document good value.
- Service agreements represent good value.
- Non-emergency ambulance service is effective and efficient
- Non-ambulance but medically necessary (MAV) services are effective and efficient.
- System facilitates appropriate medical access.
- Financial systems accurately reflect system revenues and both direct and indirect costs.
- Revenues are collected professionally and in compliance with regulations.
- Tax subsidies, when required, are minimized.

Best Practices

A “best practices” EMS organization delivers clinical outcomes that enhance the health of individual patients and the community. The system measures its resource allocation and utilization (UHU) and deploys ambulance unit hours to effectively match the needs of the community. Costs are minimized appropriately, with “cost per unit hour” and “cost per transport” demonstrating good value. Where utilized, service agreements (contracts for service) are well-developed and assure good dollar value. Non-emergency and non-ambulance medical transportation services are evaluated and meet community standards. The system facilitates appropriate medical access by transporting patients to appropriate hospitals capable of caring for specific conditions. The agency’s financial systems accurately document costs, and revenues are collected professionally and in compliance with regulations. Tax subsidies, if required, are minimized.

Observations and Findings

Delaware County EMS is unique in that it is very well funded for its responsibilities. The system was built to deliver an urban response performance of 9 minutes or better, 90% of the time, and effectively does so. Accordingly, given the rural nature of much of the county, the system is designed without concern for efficiency. Maximizing unit hour utilization and controlling cost per unit hour and cost per transport are not significant issues. Accordingly, they are not regularly measured or examined. Non-emergency ambulance services and non-ambulance medical transportation are not within the purview of the EMS system.

DelCo EMS is principally funded by general fund tax revenues, but have recently initiated “soft billing”, as have several of the other transporting agencies. We did not encounter a great deal of interest in billing or the associated revenue stream, as might be expected in this economic environment. However, we note that DelCo EMS, performing nearly 5,000 transports per year, could expect roughly \$2 million in

annual ambulance revenue, while the entire system, at almost 11,000 transports per year, could expect nearly \$4.4 million in revenue. While not necessary for ambulance operations, good stewardship would suggest that efforts should be made to maximize collective revenue, accounting for “soft bill” co-pay write-off for local taxpayers, with full billing going to out-of-county users.

Recommendations

49. Regularly monitor and report system operating measures. Consider ways to utilize available unit hours that are not utilized on ambulance transports.
50. Assure that billing practices are thorough and well-implemented. With consideration to “soft billing” principles, assure that all revenue due to Delaware County is actually collected.

ORGANIZATIONAL STRUCTURE AND LEADERSHIP

Benchmarks

- A lead agency is identified and coordinates system activities.
- Organizational structure and relationships are well defined.
- Human resources are developed and otherwise valued.
- Business planning and measurement processes are defined and utilized.
- Operational and clinical data informs/guides the decision process.
- A structured and effective performance-based quality improvement (QI) system exists.

Best Practices

In a “best practices” EMS system, there is a single lead agency that is responsible for planning, guiding, and coordinating the EMS activities of all system entities. Organizational relationships and the system structure are well-defined. Human resources are developed and otherwise valued, through leadership development programs, clinical ladders, externships (other county departments), etc. The system utilizes operational, clinical, financial, human resources and other data to guide decision-making. Quality management principles are applied to business planning and decisions.

Observations and Findings (applies only to Delaware County EMS)

Senior Leadership:

Delaware County EMS is organized along lines similar to a small suburban fire department. It is headed by an EMS Chief, who oversees that activities of two assistant chiefs – one responsible for “operations” and the other responsible for “administration” – which really encompasses much more than the traditional administrative functions. The Assistant Chief – Operations supervises 6 shift captains, who in turn supervise all EMTs and AEMTs in the field (span of control approximately 1:15). This small senior staff functions “at capacity”, although much of the work could be categorized as “urgent but not important” or ministerial in nature, required by the bureaucratic nature of being part of a governmental

agency. Two of the three chief officers are long-time Delaware County EMS staff, while the third recently joined EMS after working at the Delaware (City) Fire Department.

The chief officers, as a group, lack an expansive vision for a 21st century EMS agency, and perceive that their primary mandate is to maintain current level of service without (a) spending additional money, or (b) causing angst in the line workforce. They do not generally have great exposure to EMS and its many permutations and opportunities throughout the United States, as participation in national and international training opportunities are severely limited by funding. They also articulate that “until the EMS funding and political situation is resolved, we really don’t know which way our leadership wants us to head.” There is some merit to these concerns.

It was noted that the EMS chief officers are not compensated commensurate with their peers in the other public safety services (law enforcement and fire), despite their oversight of larger budgets and workforces. (See Attachment C) Moreover, the EMS chief appears to be the lowest paid of the county general government department heads. These discrepancies continue throughout the EMS organization, with EMS shift supervisors paid substantially less than fire and police supervisors, and staff paramedics and EMTs paid substantially less than line firefighters and law enforcement officers. While this can lead to a “chicken and egg” discussion about compensation versus performance, it does suggest that county elected and appointed leadership need to place a higher value on the services of the EMS Department.

Senior EMS staff, both chief officers and captains, do not feel “empowered” to manage their organization effectively. They cite as examples (a) the lack of “signature authority” that results in the EMS Chief being unable to send people to training opportunities or otherwise spend funds from the department’s budget, and (b) EMS supervisory personnel expressed frustration related to manner in which personnel matters are handled. In their words, the captains and chiefs are not looked at as persons in authority by line staff, because they are “powerless to do anything of substance” in the department without prior approval by commissioners, county administration, or the HR Department.

We note that, during discussions with employees, it was mentioned many times that the EMS Department is very “transparent.” There appear to be no secrets kept by management from the employees. This is noteworthy in that it is not typical in many EMS agencies and is viewed as a positive attribute of DelCo EMS leadership.

There were a number of labor management issues described during the site work. There has been a long-standing impasse concerning the labor contract, as employees seek to improve their compensation. The county’s negotiating practice has placed the EMS Chief and his staff in the middle of the bargaining process, which introduces a toxic element to the day-to-day relationships. Moreover, the facility arrangement of the EMS Department isolates the EMS chiefs from their staffs, having a separate headquarters where most of their time is spent. There is a lack of daily contact between line EMS staff and their senior management. As a result, staff are concerned (and routinely cite examples) that chief

officers are not current on “how things work in the field” (e.g. where chief officers were unaware of “supply closet” procedures changed agency-wide two years ago).

Middle Management/Leadership:

The culture and success of an organization rises and falls on its mid-level supervisors and managers – the law enforcement sergeants, the fire battalion chiefs, and the EMS shift or district supervisors⁴¹. In this area, we have some concerns, similar to those expressed about senior staff. The shift captains serve as the link between the EMS chief officers and line staff. They are an essential, bi-directional link in an organization where employees do not report to a single worksite and interact regularly with management. They must advocate for the staff, bringing forward concerns, suggestions, and other important messages. As important, they must bring to their employees the vision and leadership expectations to the field from the senior leadership. Without a proper balance of communication in both directions, employee engagement will wane, and the organization’s direction will begin to drift. We did not sense that the majority of the shift captains were fully committed to their roles as leaders and contributors to the organization’s vision. Like the chiefs, much of the captains’ angst is directed to something beyond their control – the threat (real or imaginary) of change imposed on the EMS organization by the encroachment of the township fire departments into the EMS realm.

This state of affairs is not totally unexpected. Most of the shift captains have an additional or collateral duty, often one that is in other EMS organizations a separate, full-time job. The captain responsible for training strives to manage a full-time training program for 100 employees (a full-time job in itself), while at the same time being responsible for daily operations on a full-time shift, with a span of control of 15 employees. One or both of these responsibilities must of necessity receive less than 100% of his attention. Another captain is responsible for scheduling, including coverage of vacations, sick leave, training, and other staffing flexibility issues. This function does not allow the necessary dedication of this officer’s energies to engaging and supporting his subordinates while serving as an effective advocate for senior leadership. The same can be said for the rest of the captains, who bear responsibility for the department’s fleet, for the department’s information technologies function, for the department’s facilities. This situation is further exacerbated by the fact that the captains and senior leadership formally meet only once per month. We are also concerned that there is no formal leadership development program for lieutenants, captains, or chief officers.⁴² In our session with the leadership group, we were concerned that shift captains, in particular, had little to contribute to a vision for the future of Delaware County EMS over the next 10 years.

The “distributed workforce” (where employees report to work in multiple locations and do not routinely interact with senior management) poses additional challenges, particularly visible in the area of internal communications. In discussions with line staff it is clear that too many messages get lost somewhere between headquarters and the staff on each shift. One staff member indicated that it is sometimes

⁴¹ In many EMS agencies, these are considered “first line supervisors” but in Delaware County EMS, the existence of an apparatus-level supervisor – the lieutenant – occupies that first line of supervision.

⁴² See attached Appendix ____, Leadership Development Guidelines for EMS Organizations.

necessary to resort to social media to ask other employees for the correct answer to a particular question. Employees further report frequent “different answers” from particular supervisors.

Of particular concern is the use of the “chain of command” utilized in this organization. Employees complain that some captains respond to inquiries by directing staff members upward in the chain of command, serving as “communication routers.” The employee is then frustrated because the next person in the chain asks, “Did you ask your supervisor this question?” Why aren’t you following the chain of command? Other captains, faced with a question which requires further input, actually carry the question forward themselves, returning to the employee with the answer. This option often takes longer than the employees appreciate. Another issue has to do with e-mail communications and the chain of command. The e-mail often concludes with the standard, “If you have any questions, please contact me directly.” However, direct contact results in referral to the chain of command. These inconsistencies, while minor standing alone, have a cumulative negative impact on the employees.

Recommendations

51. County administrators and the Board of County Commissioners should take steps, in cooperation with the Township Trustees, to take the discussion of fire service involvement in EMS out of the hands of uniformed fire and EMS personnel and remove it to the political realm.
52. Consider the use of facilitated processes to achieve greater internal involvement in strategic planning and future visioning.
53. Consider the engagement of an organizational development consultant experienced in working with EMS agencies, to evaluate employee engagement, department climate and culture and related issues, and to develop a program to address identified needs.
54. Ensure that senior leaders regularly attend national EMS leadership conferences such as Pinnacle, EMS Today or EMS World.
55. Develop a plan and processes to bring EMS staff at all levels to more appropriate levels of compensation. Salary increases should be built on achievement of specific, measurable performance goals, including achievement of recommendations in this report.
56. Develop and adopt a leadership development program for all levels of the organization.
57. Consider adding additional staff support to address the following areas:
 - a. Public Information and Education Officer
 - b. Scheduling (clerical)
 - c. Logistics
 - d. Critical Incident Stress/Peer Support issues
58. Explore the use of technology (Adobe Connect, ZOOM, or similar) to allow for daily briefings and other direct communication between senior leadership and line personnel.

OPTIONS FOR THE FUTURE

OPTIONS FOR STRUCTURING THE DELAWARE COUNTY EMS SYSTEM:

The scope of this project did not involve addressing issues beyond the future of Delaware County EMS. However, system structure rapidly became the “elephant in the room” and county elected, and appointed leaders asked that we provide them options to address the 20+ year old controversy involving who should deliver EMS in what parts of the county. Accordingly, we offer the following for consideration:

OPTION “0” – NO CHANGE

There is no pressing public or political mandate for change. The county could continue to operate as it currently does, with the county EMS agency serving county-wide. With this option the county would accept that, where a township elects to supplement the county service at its own expense, that the township may do so. Ultimately, the county and townships will likely revisit this decision when resources become more scarce. In this option, the only significant mandate should require that the closest available ambulance, based on GPS/road-travel proximity, be dispatched to any 911 ambulance call. The many inconsistencies (medical standards, quality assurance, medical records, billing) that currently negatively impact high quality, effective service would continue. The ability to effectively address future healthcare and healthcare finance issues using this approach are limited.

OPTION “1” – COUNTY ASSUMES ALL AMBULANCE SERVICE

This appears to be the most economical option. However, it would require the townships eliminate the EMS service that they currently provide. It would require the county to either (a) increase the number of ambulances in the county by 4 to 6 24-hour units, or (b) create a response standard greater than the current system performance and re-deploy existing resources to better cover the south of the county. If the county were to handle ALL emergency ambulance calls in the county, including those currently handled by the fire service, the existing 10 ambulances would only have a UHU of .154 (the number of additional resources required would be minimal, BUT resources would have to be moved from north to south). Alternatively, the county could re-configure its ambulances from 3-person crews to 2-person crews, and thereby create sufficient additional ambulance unit hours to serve the entire county without the need to add additional personnel to its staff. We note that medical research suggests that there is no evidence that performance of critical procedures varies whether a crew consisted of two, three, or four persons.^{43,44} From the perspective of the individual taxpayer, this is the most economical alternative, particularly if the township fire departments vacated the ambulance transportation space and focused their efforts on providing high-quality fire and EMS first response services. Based on the assumptions provided in Commissioner Benton’s earlier study and the fire-based EMS Coalition’s

⁴³ Martin-McGill C, Guyette F, Rittenberger J. *Effect of Crew Size on Objective Measures of Resuscitation for Out-of-Hospital Cardiac Arrest*. Prehosp. Emergency Care 2010 Apr 6, pp. 239-244.

⁴⁴ Ghilarducci D. *Dual Paramedic vs. Single Paramedic Ambulances in Santa Cruz County*, <http://www.santacruzhealth.org/Portals/7/Pdfs/EMS/2017%20Paramedic%20Staffing%20Final.pdf>.

response, we could not validate that this would be a more expensive option, particularly if accomplished by re-structuring existing configuration to two-person units.

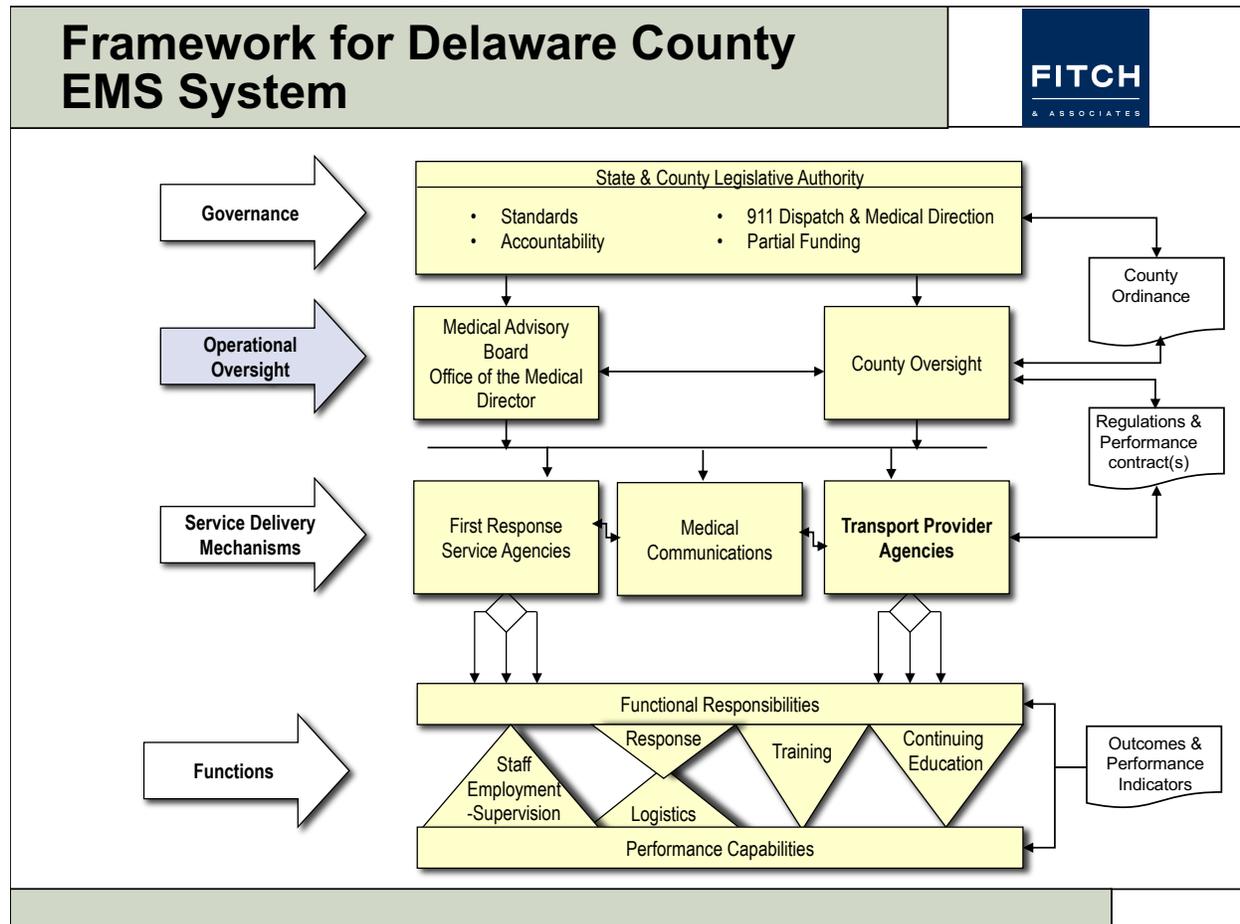
OPTION “2” – COUNTY CONTRACTS WITH A SHARED GOVERNANCE ORGANIZATION JOINTLY FORMED BY THE FIVE SOUTHERN TOWNSHIPS

The system data shows that the ambulances operated by the five southern townships are infrequently utilized and do not represent optimal efficiency (see Figure 6). In some circumstances, it might be considered beneficial to place those ambulances under a common operating authority, rather than the current five separate fire districts. This approach involves the development of an Interlocal Governmental Agreement (IGA). This could allow for some efficiencies allowing for fewer spare ambulance vehicles, savings on purchasing of drugs, supplies, and equipment, and lesser overhead (particularly assuming that ambulances could be stationed in existing fire stations). However, the geography of the area (short north to south, wide east to west) does not support the greatest saving option – reducing the number of staffed, low-utilization ambulances. This option is permitted by ORC §507.71 (Joint Ambulance District). The County would enter into a performance based agreement with the IGA entity as illustrated at Figure 21 below.

OPTION “3” – COUNTY CONTRACTS WITH EXISTING MUNICIPAL/TOWNSHIPS AMBULANCE PROVIDERS TO FULLY SERVE THE TOWNSHIPS OF ORANGE, LIBERTY, GENOA, CONCORD AND HARLEM, AND THE CITY OF DELAWARE AS PART OF THE COUNTY SYSTEM

This option ensures that a countywide system of care could be established and maintained. Townships would be obligated to provide stipulated level of services under a performance-based agreement with the county as illustrated at Figure 21 below. This, appears to be the least effective and least efficient of the options presented and would require investment by the County in a contract administrator to ensure performance was being met by the multiple agencies.

Figure 21. Illustration of Relationships



This option develops the required accountabilities with other providers through contractual relationships. The county would be able to focus on currently unserved territory and re-allocate resources to better serve the northern portion of the county, as well as to prepare for additional roles to be expected of progressive EMS agencies in the future. Moreover, it would allow for the county government (not necessarily the EMS department) to provide appropriate clinical and operational oversight for services provided to the entire county.

The question would be the identification of a reasonable amount to compensate the municipal ambulance providers for serving the areas that they currently serve. That amount is not, as has been suggested, a simple per capita division of the proceeds of the county 0.5 cent sales tax. Neither is it the cost per unit hour that the county spends to serve its current service area, because serving geography becomes more costly as the population density decreases. Moreover, all of the EMS agencies are leaving billing money on the table, through low billing rates and inconsistent soft billing practices. It would be reasonable for the county to compensate the municipalities for some amount that reflects the

difference between the reasonable⁴⁵ cost per transport and the reasonable revenue per transport. What amounts should be included in those figures is a subject for negotiation between the county and the municipalities.

If the county elects this option, the following items are recommended key elements of a “participation agreement” that includes both the funding agreement and other terms:

- A single common electronic medical records system used by all participating agencies, with bi-directional interface to the receiving hospitals that receive an aggregate of 90% of the county ambulance transports.
- All participating agencies to function under a common medical protocol and the authority of a single medical director.
- All participating agencies participate in a medically-directed common continuing education plan for EMTs, AEMTs, and paramedics.
- The closest available ambulance and first response unit are to be dispatched to any incident, regardless of jurisdiction. The concept of “run cards” for EMS response should be eliminated in favor of closest unit, GPS-based dispatching.
- All agencies participate in common performance reporting and clinical quality assurance measures, to be based on current evidence-based medical literature.
- Comprehensive contractual compliance requirements including financial incentives and disincentives are to be utilized.

⁴⁵ In this county, the reasonable cost per transport and the actual cost per transport are not close to the same figure. The various entities have elected to over-resource the EMS system such that costs per transport are extraordinarily high.

SUMMARY OF RECOMMENDATIONS

1. Formally establish fractile (90th percentile compliance) response time requirements for life-threatening, non-life-threatening and low acuity requests for service.
2. Document all EMS encounters (first response and ambulance units) in a single, integrated electronic medical record (eMR) system.
3. The eMR system should include a bi-directional hospital data exchange to facilitate appropriate quality assurance/outcome analysis processes.
4. Consider procuring and implementing a real-time dashboard system such that oversight staff can monitor the system performance and initiate appropriate interventions as required.
5. Regardless of system model selected, where EMS unit hour utilization (adjusted for dispatch volume and time on task) exceeds, 0.40, agencies should transition as quickly as possible away from 24-hour shifts. Based on current workloads this is a distant concern in the Delaware County EMS system.
6. All ambulances in the EMS system should fully participate in a single, county-wide dynamic deployment system.
7. Consider building an EMS headquarters station, incorporating administration, support staff (including billing), training, logistics, and other functions in a central location. The campus of the existing Delaware Career Center (north campus), apparently soon to be vacated, would be an ideal site with available space.
8. Consider re-location of existing EMS stations as described above. If the county elects to serve as the sole EMS provider for the county, EMS station #3 will need to be replaced and at least two additional locations (southeast and southwest) would be required. If the environment permits, all of the township fire departments have adequate facility spaces to accommodate a co-located EMS unit.
9. Work with the Board of County Commissioners to be certain that vehicles are replaced in accordance with the vehicle replacement schedule.
10. Delaware County should undertake a multi-departmental strategic examination of its fleet management and maintenance capabilities. It is possible that considerable fiscal savings and increases in efficiency could be achieved by a strategic combination of vehicle service capabilities with facilities and staff appropriate for the entire county fleet.
11. Wherever the responsibility for ambulance vehicle repair and maintenance ultimately resides, all technicians assigned to repair ambulances should be certified on the “ambulance track” by the EVT Certification, <http://www.evtcc.org/tracks>. At least one of the technicians should be certified at the EVT Master Level III level for ambulances.
12. Achieve a ratio of 1 spare ambulance for every 1.5 front line ambulances.
13. Procure a bariatric ambulance, equipped with a lift, HoverMatt, HoverJack, and other bariatric specialty equipment for use as required. The bariatric ambulance should, when fully loaded including crew, have a minimum weight-carrying capacity of 1,000 pounds before GVWR is reached.
14. Procure additional equipment such that ready spare ambulances could be placed in to service if needed as additional (not replacement) ambulance resources.

15. Strengthen the partnership between the HR Department and the EMS Department, particularly ensuring that EMS officers are responsible for the discipline of EMS personnel, while HR provides guidance, training, and templates for success.
16. Undertake a focused discussion of “24-hour shift issues” such that EMS and HR leadership share a common understanding of issues and potential resolutions.
17. Document compliance with a comprehensive employee fitness, wellness, and fitness for duty program, supported by appropriate policies, procedures, and collective bargaining provisions. This program should be fully implemented in a window of no more than three years.
18. Consider authorization for additional float personnel to address vacation, sick leave, and training.
19. Consider development and implementation of a clinical specialist or career ladder program, particularly to support achievement of the medical director’s vision of “clinical mastery” for paramedic personnel.
20. Consider a separate pay scale for use by line employees who are not assigned to a 2912-hour annual schedule, including part-time employees and employees undergoing orientation training.
21. Conduct additional salary studies with focus on local public safety and health care profession comparable data.
22. Adjust salaries, based on objective performance measures, to attract and retain the highest quality paramedics for a high-performing EMS agency in the next decade.
23. In addition to paramedic and supervisory personnel covered by the CBA, assure that chief officer salaries are appropriate, including measures such that hourly personnel are not more highly compensated than chief officers.
24. All ambulances and other EMS vehicles should utilize automated vehicle location / in-vehicle navigation (AVL/IVN), which provides location and travel information to the vehicle and to the communications center.
25. The closest available EMS unit(s) should be dispatched to each emergency, regardless of agency, zone or district considerations.
26. The capability to properly classify calls and designate response priorities and modes for all ambulances must be significantly enhanced. Clinically sophisticated software that facilitates QI processes should be utilized.
27. Significantly strengthen prospective and retrospective medical oversight of the medical communications function to include a medically-overseen priority dispatch system with automated quantifiable quality improvement processes, including routine case reviews by the medical director.
28. Ensure and document that 95% of those requiring pre-arrival instructions receive them in accordance with nationally recognized standards.
29. The CAD system should electronically interface with a single electronic patient care record (ePCR) system used by all agencies providing emergency medical service in Delaware County.
30. Report quarterly communications center performance metrics to County Commission and other system stakeholders.
31. Within 36 months, the EMS communications center should achieve accreditation through the International Academies of Emergency Dispatch or an alternative program meeting the IAED requirements within 36 months.
32. Encourage expansion and clinical development of medical first response services throughout Delaware County, including law enforcement responders in to the plan if possible. The County should assure

that first response is available for all high-priority EMS calls, to assure adequate personnel on the scene to manage a serious medical emergency, regardless of jurisdiction. All firefighting personnel should be trained to at least the Emergency Medical Responder (EMR) level of competency. All first response EMS units, regardless of the agency operating them, should be equipped with automated external defibrillators and persons trained to use them.

33. Work with fire service leadership to limit “hot” response to those medical calls where clinical evidence suggests that time is an actual factor in improving outcomes. It is well-established that there is no benefit, but great public risk, from excessive use of emergency warning lights for non-critical EMS calls.
34. Establish an appropriate position responsible for gathering and presenting clinical, operational, financial, and human resources performance metrics. Such a position should report directly to the chief and have collateral reporting relationships with the Medical Director and clinical affairs chief.
35. Adopt, collect, and report performance benchmarks as described above, on a monthly, bi-monthly, or quarterly basis.
36. Utilize performance data to drive training, operational management, and clinical management decisions.
37. Budget additional funds to allow for the medical director to work on DelCo EMS matters at least one and preferably two days per week.
38. Create a chief-level position responsible for clinical affairs, quality management, and support of the medical director.
39. Utilize available “down time” to conduct intensive on-duty training programs, including frequent reinforcement of high-acuity, low-occurrence (HALO) skills. Line paramedics should have hand-on, simulator-based training in critical skills at least every 2 months, throughout the year.
40. As a matter of priority, the department should create a position for a chief training officer, supplemented by a small staff of clinical educators. The chief training officer should have strong experience in EMS/medical simulation, reality-based training, high-acuity clinical skills, and the development of “just in time” educational programs designed to meet needs contemporaneously identified by the quality management process.
41. Merit-badge courses should be eliminated from the CBA, replaced by an article that the department’s periodic training program will meet all content and skill requirements for employees to re-credential with the State of Ohio and the National Registry of EMTs on an ongoing basis.
42. High-fidelity medical and trauma simulators should be procured and utilized to assure ongoing clinical competence. Wherever possible, simulators should be mobile or transportable, considering the possibility of a mobile simulation vehicle or trailer.
43. Dedicated training and education space must be identified and made available to the EMS Department. Given the general high utilization of county shared space, it is not feasible to move 40-person, equipment and technology-intensive training programs randomly throughout the county. Training and education spaces should include a flexible classroom for at least 50 persons, at least 4 breakout rooms, staff offices, storage and technology workspaces, and should be amendable to hard-wiring or wireless connection of educational technology including simulators.
44. Work with county elected officials to support resolution of the larger system issues.
45. Assure that processes established during CAAS accreditation are utilized.

46. Enforce physical standards and develop employee wellness program to assure that all employees are capable of safely and completely performing all tasks expected of an emergency paramedic, using a validated functional job description.
47. Develop a “Chain of Survival” program focusing on public access CPR and defibrillation.
48. Utilize agency call and patient care data to establish targets for community education and prevention programs, and to serve as the basis for a mobile integrated health care / community paramedicine program.
49. Regularly monitor and report system operating measures. Consider ways to utilize available unit hours that are not utilized on ambulance transports.
50. Assure that billing practices are thorough and well-implemented. With consideration to “soft billing” principles, assure that all revenue due to Delaware County is actually collected.
51. County administrators and the Board of County Commissioners should take steps, in cooperation with the Township Trustees, to take the discussion of fire service involvement in EMS out of the hands of uniformed fire and EMS personnel and remove it to the political realm.
52. Consider the use of facilitated processes to achieve greater internal involvement in strategic planning and future visioning.
53. Consider the engagement of an organizational development consultant experienced in working with EMS agencies, to evaluate employee engagement, department climate and culture and related issues, and to develop a program to address identified needs.
54. Ensure that senior leaders regularly attend national EMS leadership conferences such as Pinnacle, EMS Today or EMS World.
55. Develop a plan and processes to bring EMS staff at all levels to more appropriate levels of compensation. Salary increases should be built on achievement of specific, measurable performance goals, including achievement of recommendations in this report.
56. Develop and adopt a leadership development program for all levels of the organization.
57. Consider adding additional staff support to address the following areas:
 - e. Public Information and Education Officer
 - f. Scheduling (clerical)
 - g. Logistics
 - h. Critical Incident Stress/Peer Support issues
58. Explore the use of technology (Adobe Connect, ZOOM, or similar) to allow for daily briefings and other direct communication between senior leadership and line personnel.

ATTACHMENT A

Ambulance Benchmark Summary

ATTACHMENT A: Ambulance Benchmark Summary

**SYSTEM COMPONENTS BENCHMARKS OVERVIEW
DELAWARE COUNTY, OHIO**

*KEY: D=Documented, ND=Not Documented PD= Partially Documented
Except system-related questions, responses pertain only to Delaware County EMS (Department).*

Communications Benchmarks		Comments
Public access through a single number, preferably enhanced 911	D	<i>County operates central 911 center, (DelComm),. Handles all municipal and county public safety.</i>
Coordinated PSAPs exist for the system	D	<i>Single PSAP.</i>
Certified personnel provide pre-arrival instructions and priority dispatching (EMD) and this function is fully medically supervised	PD	<i>EMD (pre-arrival instructions) are provided; priority dispatch is not provided.</i>
Data collection which allows for key service elements to be analyzed	PD	<i>Current CAD has limited configuration and reporting capabilities</i>
Technology supports interface between 911, dispatching & administrative processes	PD	<i>There is no electronic interface between CAD and ePCR systems (multiple agency in use).</i>
Radio linkages between dispatch, field units & medical facilities provide adequate coverage and facilitate communications	D	<i>Trunked 800 MHz system provides excellent communication and coverage.</i>

Medical First Response Benchmarks		Comments
First responders are part of a coordinated response system and medically supervised by a single system medical director	PD	<i>Medical first response is inconsistent, ranging from "paramedic on every call" to "whomever is available" depending on jurisdiction. Multiple medical directors and inconsistent protocols.</i>
Defined response time standards exist for first responders	ND	<i>Each jurisdiction sets own standards. In volunteer jurisdictions, "first response" often arrives after ambulance.</i>
First response agencies report/meet fractile response times.	ND	<i>No response time reporting noted.</i>
AED capabilities on all first line apparatus	D	
Smooth transition of care is achieved	D	<i>Field care transitions reported to be professional</i>

ATTACHMENT A: Ambulance Benchmark Summary

KEY: D=Documented, ND=Not Documented PD= Partially Documented

Medical Transportation Benchmarks	Comments	
Defined response time standards exist	ND	<i>There is no legally defined response performance standard. De facto 9/90 standard is being met county-wide.</i>
Agency reports/meets fractile response times	PD	<i>There is no standard public reporting of response performance. Data is available but not utilized.</i>
Units meet staffing and equipment requirements	D	<i>Comply with EMS regulations. – All DelCo units are staffed with 3 paramedics (occ. 2 paramedics + 1 AEMT).</i>
Resources are efficiently and effectively deployed	D	<i>County station-based deployment plan established to provide 9/90.</i>
There is a smooth integration of first response, air, ground and hospital services	D	<i>Appears to be excellent.</i>
Develop/maintain coordinated disaster plans	D	<i>Adequate plans exist. Uncertain whether they are appropriately exercised or not.</i>

Medical Accountability Benchmarks	Comments	
Single point of physician medical direction for entire system	ND	<i>There are at least 4 medical directors for ambulance agencies.</i>
Written agreement (job description) for medical direction exists	PD	<i>Spelled out in the contract. DelCo EMS has insufficient medical director hours for need.</i>
Specialized medical director training/certification	D	<i>County medical director is fellowship eligible MD/PhD; full-time EMS physician. Other agencies not examined.</i>
Physician is effective in establishing local care standards that reflect current national standards of practice	PD	<i>DelCo protocols are current and still improving. Assistance is needed with QA/QI/medical oversight activities.</i>
Proactive, interactive and retroactive medical direction is facilitated by the activities of the medical director	D	<i>DelCo medical direction is good. Retrospective review is limited to time-critical calls (due to limited MD hours).</i>
PCR/QI data transparency for MD review	PD	<i>DelCo medical director has full access to ePCRs. Limited staff support for data pulls, etc.</i>
Clinical Education/Development Effectiveness	PD	<i>DelCo CE program meets/exceeds state requirements but is focused on “merit badge” courses. Little evidence of “just in time” CE driven by QI info.</i>
Clinical Education Efficiency	PD	<i>Outcomes are not measured, so evaluation is difficult.</i>

ATTACHMENT A: Ambulance Benchmark Summary

KEY: D=Documented, ND=Not Documented PD= Partially Documented

Customer/Community Accountability Benchmarks	Comments
Legislative authority to provide service and written service agreements are in place	PD <i>Each individual jurisdiction has own legal authority. No legislated cooperation or central focus.</i>
Units and crews have a professional appearance	D <i>DelCo units and crews were clean and presentable. T-shirt crew uniforms did not present a clinical appearance. Supervisor/senior officer uniforms neat and professional.</i>
Formal mechanisms exist to address patient and community concerns	PD <i>Formal system-wide mechanism to document patient, community or caregiver issues is not used regularly.</i>
Independent measurement and reporting of system performance are utilized	ND <i>None seen on visits</i>
Internal customer issues are routinely addressed	PD <i>On-going labor negotiations and management staff communications demonstrated some issues.</i>

Prevention & Community Education Benchmarks	Comments
System personnel provide positive role models	PD <i>Observed issues include obesity and smoking. It does not appear that there is much EMS/public interaction during the workday.</i>
Programs are targeted to “at risk” populations	ND <i>Limited public education efforts mentioned. No dedicated resources available, but plenty of available medic time in DelCo EMS.</i>
Formal and effective programs with defined goals exist	ND <i>County is currently working on plans.</i>
Targeted objectives are measured and met	ND <i>Not observed on initial visits.</i>

ATTACHMENT A: Ambulance Benchmark Summary

KEY: D=Documented, ND=Not Documented PD= Partially Documented

Ensuring Optimal System Value Benchmarks		Comments
Clinical outcomes are enhanced by the system	ND	<i>There is minimal clinical outcome evaluation and reporting. DelCo medical director believes care is good quality, but no documentation.</i>
Amb Response Utilization and transport Utilization (UHU) is measured and hours are deployed in a manner to achieve efficiency and effectiveness	PD	<i>The entire system is generously resourced and UHU is very low. The system is driven by response standards, without concern for efficiency.</i>
Ambulance cost per unit hour & transport document good value	PD	<i>3 paramedics (or 2 +1 AEMT) per ambulance – may not represent good value and may contribute to degradation of clinical skills. Cost per unit hour and transport are very high.</i>
Service agreements represent good value	ND	<i>Do not exist with DelCo or other system agencies.</i>
Non-emergency ambulance effective & efficient	ND	<i>Multiple NET agencies no oversight by County</i>
Non-Ambulance but medically necessary (MAV) services are effective and efficient	NA	<i>Not in scope of assessment</i>
System facilitates appropriate medical access	D	
Financial systems accurately reflect system revenues and both direct and indirect costs	PD	<i>Soft billing write-off policies not clear</i>
Revenues are collected professionally and in compliance with regulations	D	<i>Unknown</i>
Tax subsidies when required are minimized	PD	<i>County recently legislated and began “soft billing” policy. Issues is with multiple jurisdictions taxing for services.</i>

ATTACHMENT A: Ambulance Benchmark Summary

KEY: D=Documented, ND=Not Documented PD= Partially Documented

Organizational Structure & Leadership Benchmarks	Comments
A lead agency is identified and coordinates system activities	ND
Organizational structure and relationships are well defined (system). Organizational structure and relationships are well defined (DelCo EMS).	PD
Human resources are developed and otherwise valued	PD
Business planning and measurement processes are defined and utilized	PD
Operational and clinical data informs/guides the decision process	PD
A structured and effective performance-based quality improvement (QI) system exists	ND

Summary —

Documented	14
Partially Documented	22
Not Documented	13
N/A	1

ATTACHMENT B

Leadership Development For EMS Organizations

Leadership Development for EMS Organizations

One of the ongoing discussions about the current state and future of many EMS organizations involves leadership and leadership development. Formal processes for leadership development and selection are often not utilized, and individuals who are perceived as “the best” at their level in the organization are promoted to higher levels when vacancies occur. This practice has been demonstrated to be unsuccessful in many EMS organizations, as the competencies necessary for success as a field paramedic are not those necessary to be successful as a first-line supervisor. Similarly, the best first line supervisors do not necessarily have the knowledge and skills to be successful as managers or executives. Good leadership does not happen by accident. It is developed through education, training, and quality experience. Every EMS organization EMS should develop a robust leadership development program, encouraging those who are interested in advancement to prepare for their next step in the organization.

The National EMS Management Association (NEMSMA, www.nemsma.org) has developed a recognized set of competencies for EMS leaders at the supervisor, manager, and executive levels in EMS. These competencies can be found at <https://www.nemsma.org/index.php/competencies/the-seven-pillars-of-national-ems-officer-competencies>. These competencies form the basis of the EMS Officer credentialing program developed by NEMSMA and administered through the American College of Paramedic Executives. This program is described at <https://www.nemsma.org/index.php/credentialing/credentialing-home>.

The following is offered as a blueprint for EMS officer development that should be considered for implementation by EMS organizations. It is important to note that many of the courses described are available without charge or for nominal fees. Leadership development opportunities should be afforded to any employee interested in advancement, provided that current job performance is satisfactory. The agency should develop a policy, published and made available to all employees, describing its leadership development program and the processes for involvement in it.

For all EMTs, AEMTs and Paramedics:

- National Association of EMTs *Principles of Ethics and Personal Leadership (PEPL)* course (can be taught in-house or locally by qualified instructors).

For staff paramedics aspiring to serve as EMS Field Training Officers:

- 3 years’ experience as a field paramedic demonstrating excellent clinical skills and workplace performance.
- Completion of the NEMSMA EMS Field Training and Evaluation Program *Basic Field Training Officer* course.

ATTACHMENT B: Leadership Development for EMS Organizations

For EMS Field Training officers aspiring to serve as first-line supervisors (lieutenant):

- Introductory leadership course such as 21st Century Leadership's on-line *Learn, Grow, Lead* course (http://21stcenturyleaders.com/?page_id=264).
- Basic EMS supervision course such as the National Fire Academy Supervising Emergency Medical Services course (P0146) (<https://apps.usfa.fema.gov/nfacourses/catalog/details/10703>), or the state law enforcement training center *First Line Supervision and Management* course
- EMS Incident Operations (R0147) course. (<https://apps.usfa.fema.gov/nfacourses/catalog/details/10431>).
- Preparation for credentialing as ACPE Supervising Paramedic Officer.

For first-line EMS supervisors aspiring to shift commander and second line supervisor roles (captain):

May have Prior level requirements.

- EMS Management Development program such as the American Ambulance Association's *Ambulance Service Manager* (ASM) course (<https://ambulance.org/education/ambulance-service-manager-asm/>),
- Leadership development program such as National EMS Leadership Academy Level I and Level II programs (<https://safetechsolutions.us/academies/ems-leadership-academy>) or similar programs offered by state organizations such as state ICMA chapters, schools of government, etc.
- Larger incident command and control course, such as the National Fire Academy Command and Control of Incident Operations course (R0312), (<https://apps.usfa.fema.gov/nfacourses/catalog/details/10703>).
- Introductory EMS Management course such as the National Fire Academy Management of Emergency Medical Services course (P0260), (<https://apps.usfa.fema.gov/nfacourses/catalog/details/10717>).
- Associate of Science or Applied Science in EMS.
- Complete credentialing as ACPE Supervising Paramedic Officer.

For second-line supervisors aspiring to senior management positions (deputy director or program manager):

May have prior level requirements.

- EMS Management Development program such as the American Ambulance Association *Ambulance Service Manager* (ASM) course (<https://ambulance.org/education/ambulance-service-manager-asm/>), or University of North Carolina-Charlotte EMS Management Institute (<https://continuinged.uncc.edu/ems>).
- Leadership development Program such as National EMS Leadership Academy Level III and IV programs (<https://safetechsolutions.us/academies/ems-leadership-academy>).
- Bachelor of Science in Emergency Medical Services or a related field.
- Preparation for credentialing as ACPE Managing Paramedic Officer.
- Completion of subject matter credentialing in area of specialty:
 - Clinical QA/QI: Just Culture, LEAN six-sigma or similar, National Fire Academy EMS Quality Management course (R0835) (<https://apps.usfa.fema.gov/nfacourses/catalog/details/10645>), or similar.

ATTACHMENT B: Leadership Development for EMS Organizations

- Education and Training: National Association of EMS Educators Level I and Level II courses; complete NEMSEC credentialing (<http://naemse.org/page/aboutnemsec>).
- Fleet Manager: <https://www.nafa.org/f/Home.aspx>.
- Advanced Incident Management and Unified Command, such as Texas Engineering Extension Service (TEEX) Enhanced All-Hazards Incident Management/Unified Command course (MGT 314) (<https://teex.org/Pages/Class.aspx?course=MGT314&courseTitle=Enhanced+All-Hazards+Incident+Management/Unified+Command>).

For senior managers preparing for service as EMS Executives (director, chief, general manager or chief deputies):

May have prior level requirements.

- Municipal/County Government education, presented in many states by university schools of government, government service organizations such as ICMA, etc.
- Senior level leadership development programs, such as *Pinnacle EMS Leadership Conference* (www.pinnacle-ems.com), *West Point Leadership Program* (<http://www.methodist.edu/wplp>), and similar programs. Many of these are accessible via state and regional law enforcement organizations and educational centers.
- Master's degree in a related discipline, such as MBA, MHA, MPA, MHS.
- Completion of ACPE executive-level requirements (achievement of FACPE status).

The programs listed here are not meant to be exhaustive or exclusive recommendations – there are many equivalent courses available throughout the nation. At each level, an aspirant should attain appropriate academic, leadership, management, and operational education and training.

ATTACHMENT C

Public Safety Hourly Wage Comparisons

PUBLIC SAFETY HOURLY WAGE COMPARISONS – DELAWARE COUNTY OHIO

EMS – FIRE SERVICE SALARY RANGE COMPARISONS

Figure 22

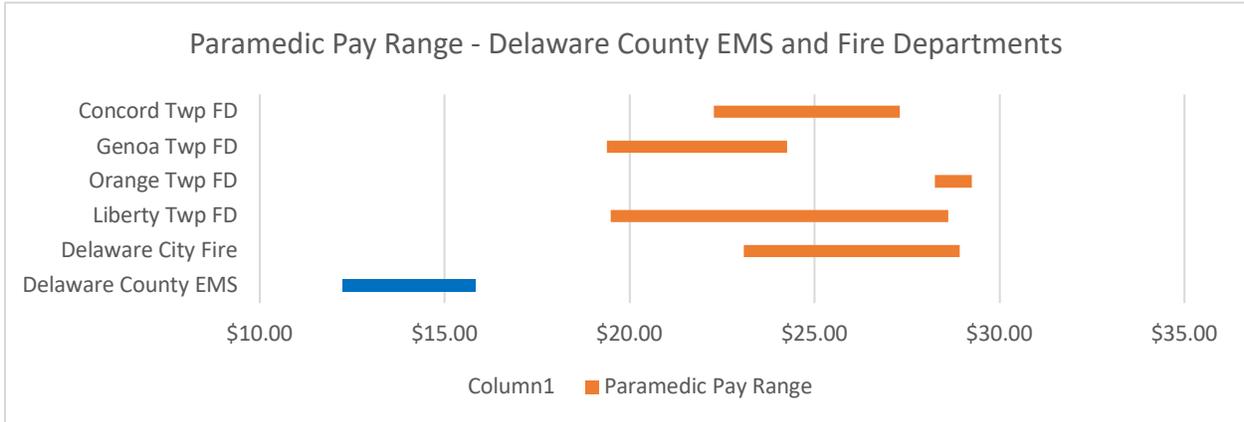
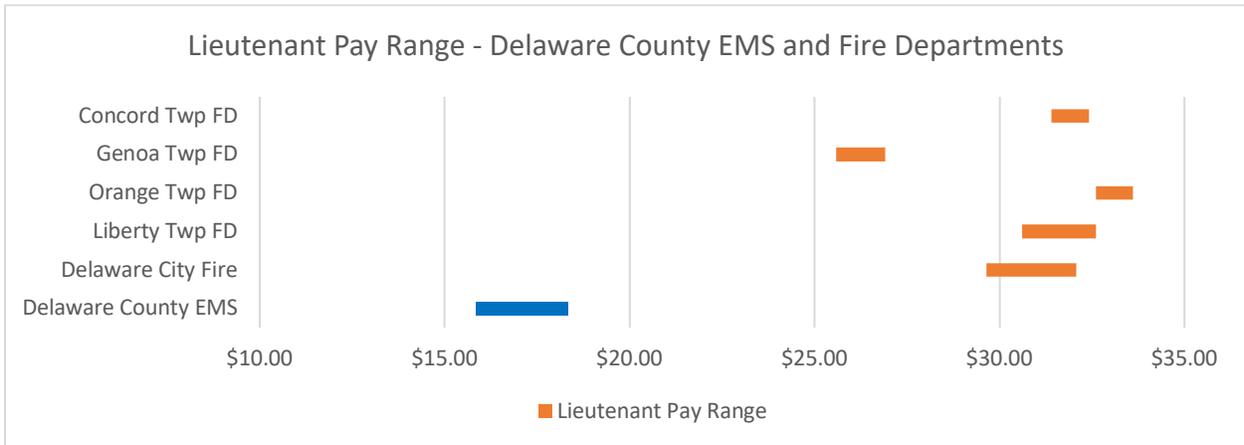
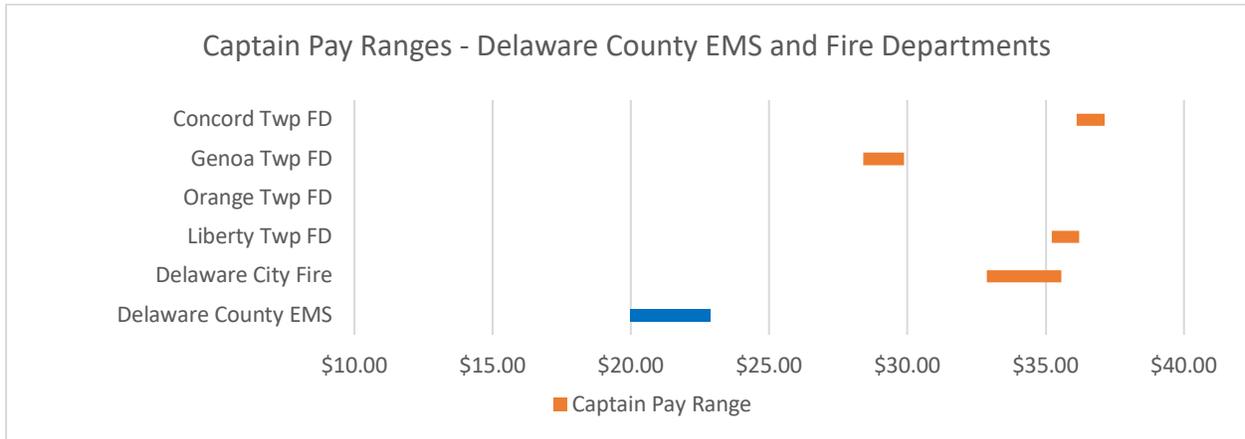


Figure 23



ATTACHMENT C: Public Safety Hourly Wage Comparisons

Figure 24

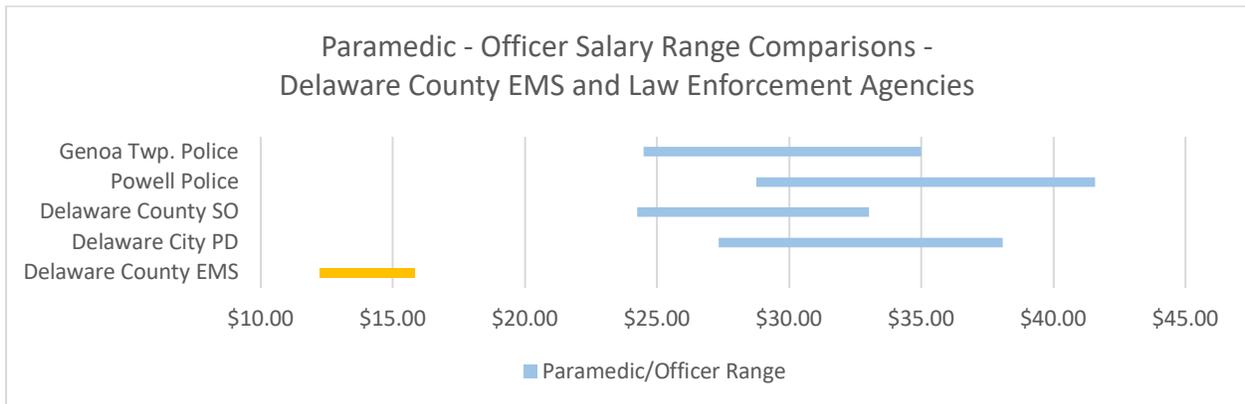


NOTES:

1. Where only one salary was reported, a salary range of \$1 was utilized to illustrate a range.
2. Orange Township FD does not utilize the rank of Captain.
3. Genoa Township FD pays an additional \$0.35 per hour for employees with an associate degree and \$0.60 per hour for employees with a baccalaureate degree.

EMS – LAW ENFORCEMENT SALARY RANGE COMPARISONS

Figure 25



ATTACHMENT C: Public Safety Hourly Wage Comparisons

Figure 26

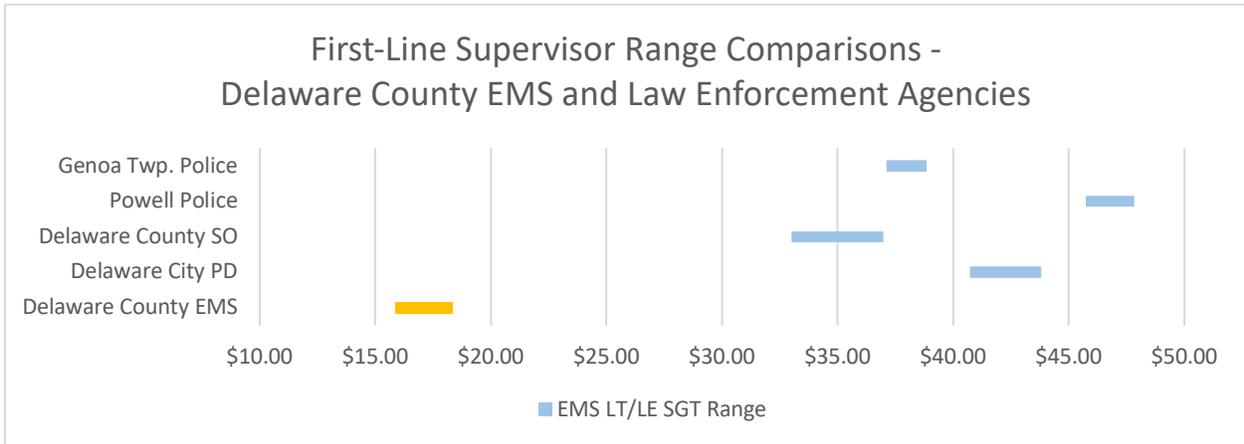
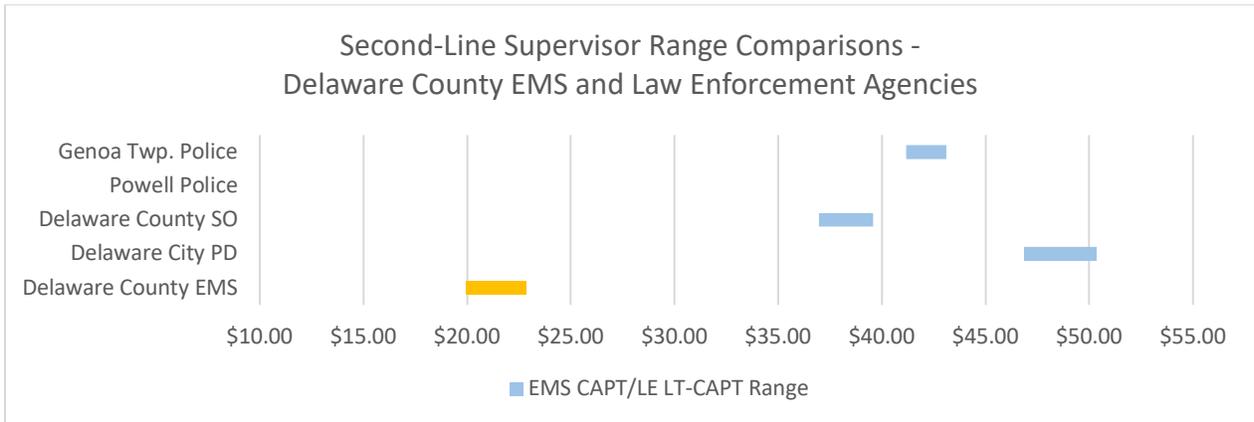


Figure 27



ATTACHMENT C: Public Safety Hourly Wage Comparisons

DATA TABLES

EMS – Fire Data Tables

Figure 28

Municipality	Lowest Paid Paramedic	Highest Paid Paramedic	Pay Range
Delaware County EMS	\$12.24	\$16.28	\$4.04
Delaware City Fire	\$23.08	\$28.92	\$5.84
Liberty Twp FD	\$19.49	\$28.61	\$9.12
Orange Twp FD	\$28.25	\$28.45	\$1.00
Genoa Twp FD	\$19.38	\$24.26	\$4.88
Concord Twp FD	\$22.28	\$27.31	\$5.03

Municipality	Lowest Paid Lieutenant	Highest Paid Lieutenant	Pay Range
Delaware County EMS	\$15.85	\$18.34	\$2.49
Delaware City Fire	\$29.65	\$32.07	\$2.42
Liberty Twp FD	\$30.61	\$32.61	\$2.00
Orange Twp FD	\$32.61	\$32.61	\$1.00
Genoa Twp FD	\$25.59	\$26.91	\$1.32
Concord Twp FD	\$31.41	\$31.41	\$1.00

Municipality	Lowest Paid Captain	Highest Paid Captain	Pay Range
Delaware County EMS	\$19.97	\$22.86	\$2.89
Delaware City Fire	\$32.88	\$35.57	\$2.69
Liberty Twp FD	\$35.22	\$35.22	\$1.00
Orange Twp FD	n/a	n/a	\$0.00
Genoa Twp FD	\$28.41	\$29.87	\$1.46
Concord Twp FD	\$36.12	\$36.12	\$1.00

ATTACHMENT C: Public Safety Hourly Wage Comparisons

EMS – Law Enforcement Data Tables:

Figure 29

Municipality	Lowest LEO/Paramedic	Highest LEO/Paramedic	Range
Delaware County EMS	\$12.24	\$16.28	\$4.04
Delaware City PD	\$27.33	\$38.09	\$10.76
Delaware County SO	\$24.24	\$33.01	\$8.77
Powell Police	\$28.75	\$41.57	\$12.82
Genoa Twp. Police	\$24.50	\$35.00	\$10.50

Municipality	Lowest EMS LT/LE SGT	Highest EMS LT/LE SGT	Range
Delaware County EMS	\$15.85	\$18.34	\$2.49
Delaware City PD	\$40.73	\$43.79	\$3.06
Delaware County SO	\$33.01	\$36.97	\$3.96
Powell Police	\$45.74	\$47.82	\$2.08
Genoa Twp. Police	\$37.10	\$38.85	\$1.75

Municipality	Lowest EMS CAPT/LE LT-CAPT	Highest EMS CAPT/Police LT-CAPT	Range
Delaware County EMS	\$19.97	\$22.86	\$2.89
Delaware City PD	\$46.85	\$50.36	\$3.51
Delaware County SO	\$36.97	\$39.56	\$2.59
Powell Police	n/a	n/a	n/a
Genoa Twp. Police	\$41.18	\$43.12	\$1.94



www.fitchassoc.com