Fire Department / AMT Review
City Council Briefing

March 26, 2019
Introduction & Methodology
Process Overview

- Meetings with stakeholders
  - City Council
  - City administration
  - Fire Department
  - Labor Group (IAFF)
  - AMT
  - 9-1-1 Dispatch
  - Peoria Area EMS Office
  - Unity Point – EMS
  - OSF Healthcare
  - Peoria County Health Department

- Collect & Analyze Data
  - Solicit feedback on initial data analysis
  - GIS validation & modeling
  - Define policy alternatives – Bookend options
  - Policy decision by City Council - 2019 Budget
Process Overview

- Engage Stakeholders to revise medical response system
  - EMS System Medical Director
  - Peoria Fire Department
  - AMT
  - 911 Dispatch

- Analyze 911 Dispatch & recommend changes to facilitate implementation of revised medical response protocols
Methodology: Draft Data Report

5-years of CAD data from both Peoria 911 & AMT
- Built into a single database

- Mostly focused on 2017 data (January thru December)

- Averages versus 90th Percentile
Various national groups endorse or mandate the use of percentile / fractile evaluations when assessing public safety departments.

- National Fire Protection Association (NFPA)
  - NFPA 1221
  - NFPA 1710
- National Emergency Number Association’s Standard
  - NENA 56-005
- Center for Public Safety Excellence’s Standard of Cover document.

By framing the performance goal at a 90th percentile, policy makers are ensuring that 9 out of 10 times the performance will be achieved.
Data analysis was done by one of the Firm’s three doctoral-level statisticians – Dr. Erwin Stedronsky, PhD

- A graduate of MIT
- Previously served as the Senior Research Specialist for the Monsanto Corporation and as a special consultant to NASA.

Analysis was reviewed by the Firm’s Fire Practice Partner, Dr. Steven Knight, PhD; Project Consultant, Dr. Bruce Moeller, PhD; and Chief Operating Officer Guillermo Fuentes, MBA

- Combined experience of over 70 years leading large fire departments & EMS agencies
- University teaching experience at several public institutions
- Experience accrediting fire rescue and 911 agencies
November 2018 - Draft data report provided to Fire Department

- Requested to “identify any obvious / suspected errors or omissions in the” data report
- Department replied they had “no way of confirming or denying any of the [response] times”, though they did question:
  - Effective response force calculations – we replied a different methodology would work better and employed such in the GIS analysis

In January 2019 Fitch requested internal analysis from the Fire Department related to their accreditation efforts.

- Fire Department utilized a different data source – RMS (retrospective view), rather than original CAD data (prospective view), which has only been in use since October 2016
- Fire Department analysis yielded unusual findings for 2017:
  - Call processing times for “Low-Risk EMS” was reported as \(1:07\) at 90\(^{th}\) percentile (n=13,797)
  - Call processing times for “Moderate-Risk EMS” was reported as \(3:18\) at 90\(^{th}\) percentile (n=332)
  - Fitch’s reported time for EMS call processing was \(3:01\) at 90\(^{th}\) percentile (n=11,646)
Current System Assessment
• 27,122 Total Incidents

<table>
<thead>
<tr>
<th>Program</th>
<th>Number of Incidents</th>
<th>Vehicles Arrived</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS</td>
<td>22,978</td>
<td></td>
</tr>
<tr>
<td>EMS AMT vehicles</td>
<td></td>
<td>20,479</td>
</tr>
<tr>
<td>EMS PFD vehicles</td>
<td></td>
<td>16,956</td>
</tr>
<tr>
<td>Fire</td>
<td>2,721</td>
<td>6,118</td>
</tr>
<tr>
<td>Rescue</td>
<td>371</td>
<td>779</td>
</tr>
<tr>
<td>NonFire/NonMed</td>
<td>164</td>
<td>199</td>
</tr>
<tr>
<td>Hazmat</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>
Distribution of Call Types

- EMS: 87.1%
- Fire: 10.8%
- Rescue: 1.4%
- NonFire/NonMedical: 0.7%
- HazMat: 0.0%
Temporal Distribution

• Similar pattern seen across nation

• Typical for fire, police or EMS
<table>
<thead>
<tr>
<th>Measure</th>
<th>Average [mm:ss]</th>
<th>90th Percentile [mm:ss]</th>
</tr>
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<tbody>
<tr>
<td>Dispatch Interval</td>
<td>01:45</td>
<td>03:02</td>
</tr>
<tr>
<td>Turnout Interval</td>
<td>01:24</td>
<td>02:06</td>
</tr>
<tr>
<td>Travel Interval</td>
<td>02:35</td>
<td>04:32</td>
</tr>
<tr>
<td>Response Interval</td>
<td>06:00</td>
<td>08:53</td>
</tr>
</tbody>
</table>

Response Times
Unit Hour Utilization

• For 24-hour shifts
  • Upon reaching 25% UHU need to consider mitigating strategies
  • Upon reaching 30% UHU deploy mitigating strategies
Fire Department vs. AMT Arrival Offset

![Graph showing the distribution of AMT Offset instances over time. The x-axis represents AMT Offset [mm:ss], with time intervals from 09:00 to 15:00. The y-axis represents Instances, with a range from -50 to 500. The graph indicates a peak around 12:00, with AMT Arrived 1st and PFD Arrived 1st marked.]
Significant Findings

System is performing well!

- Responses times are generally strong - especially travel times
- Significant capacity in current system
- AMT averages 1:46 behind fire department arrival
Science Behind System Design
Fire Operational Timeframes

Figure 27: Fire service arrival times versus fire development


EMS Timeframes

- Association of response time and clinical outcome varies depending on the severity of the injury or the illness.

- Research has demonstrated that the overwhelming majority of requests for EMS are not time sensitive between five minutes and 11 minutes for emergency responses, and 13 minutes for non-emergency responses.
Total responses times (discovery, call processing; turnout; travel) generally must be within 5 minutes from when the event begins at the 90th percentile to provide the best possible outcomes in critical fire & EMS related events – these represent less than 15% of incidents.

For the majority of incidents (approximately 85% of incidents), total response times up to 12 minutes have been shown to not impact a patient’s clinical outcome.
GIS & Marginal Utility Modeling
5-Minute Modeling

- Considers *only travel time*
- Closely aligns with actual performance of 4:32 @ 90th
  - Fire Central Station geographically redundant
- Modeling assumes normal traffic impedance
- Captures 87.12%
### 6-Minute Modeling

<table>
<thead>
<tr>
<th>Rank</th>
<th>PostNumber</th>
<th>PostCapture</th>
<th>TotalCapture</th>
<th>PercentCapture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F03</td>
<td>7160</td>
<td>7160</td>
<td>38.51%</td>
</tr>
<tr>
<td>2</td>
<td>F04</td>
<td>3074</td>
<td>10234</td>
<td>55.04%</td>
</tr>
<tr>
<td>3</td>
<td>F16</td>
<td>2964</td>
<td>13198</td>
<td>70.98%</td>
</tr>
<tr>
<td>4</td>
<td>F13</td>
<td>1664</td>
<td>14862</td>
<td>79.93%</td>
</tr>
<tr>
<td>5</td>
<td>F10</td>
<td>1572</td>
<td>16434</td>
<td>88.39%</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>F15</td>
<td><strong>652</strong></td>
<td><strong>17086</strong></td>
<td><strong>91.89%</strong></td>
</tr>
<tr>
<td>7</td>
<td>F12</td>
<td>256</td>
<td>17342</td>
<td>93.27%</td>
</tr>
<tr>
<td>8</td>
<td>F19</td>
<td>211</td>
<td>17553</td>
<td>94.41%</td>
</tr>
<tr>
<td>9</td>
<td>F20</td>
<td>91</td>
<td>17644</td>
<td>94.90%</td>
</tr>
<tr>
<td>10</td>
<td>F08</td>
<td>53</td>
<td>17697</td>
<td>95.18%</td>
</tr>
</tbody>
</table>
FD – 5 vs. 6 minutes
# Units Impact on Response Time

- Total response interval is minimally impacted by increased workload
  - Not statistically significant until 12 units are unavailable
  - In current system, loss of:
    - 1 unit = 8 seconds on average
    - 2 units = 16 seconds on average
    - 3 units = 42 seconds on average
    - 4 units = 52 seconds on average
Effective Response Force Analysis

• ERF defined as 5 apparatus with 3-person staffing each
• Drawing from national recommendations, analysis was done based on 8, 10, 12, and 14-minute travel times
• Two options were defined by the Fire Department and assessed:
  • Option 1 closed Station 8 and rebuilt Station 4 at a new location
  • Both Options reduced 2 apparatus

Table 7: Comparisons of Effective Response Force Configurations

<table>
<thead>
<tr>
<th>Travel Time Objective</th>
<th>Current ERF</th>
<th>Option 1 ERF</th>
<th>Option 2 ERF</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-Minute</td>
<td>31.95%</td>
<td>30.76%</td>
<td>28.62%</td>
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<tr>
<td>10-Minute</td>
<td>58.91%</td>
<td>57.99%</td>
<td>58.15%</td>
</tr>
<tr>
<td>12-Minute</td>
<td>79.99%</td>
<td>79.88%</td>
<td>79.55%</td>
</tr>
<tr>
<td>14-Minute</td>
<td>96.21%</td>
<td>96.21%</td>
<td>96.21%</td>
</tr>
</tbody>
</table>
Medical Response System
The Peoria Fire Department; Advance Medical Transport (AMT), 911 Director; Medical Director, and facilitated by Fitch, developed a white paper to update the medical response system in the community. Specific members of the committee included:

- Dr. Mathew Jackson - System Medical Director
- Assistant Chief Anthony Ardis – Peoria Fire Department
- Battalion Chief Roland Tenley – Peoria Fire Department
- Greg Chance - AMT Vice-President of Development
- Tom Geraci - AMT Vice-President of Operations
- David Tuttle – 911 Director
Research has demonstrated that the overwhelming majority of requests for EMS services are not time sensitive between five minutes and 11 minutes for emergency and 13 minutes for non-emergency responses. The 12-minute upper threshold is only the upper limit of the available research and is not a clinically significant time measure, as patients were not found to have a significantly different clinical outcome when the 12-minute threshold was exceeded.

ALS vs. BLS

- Scientific literature has produced different results when comparing ALS vs. BLS care
  - Generally, ALS has been shown to be of greater value in non-traumatic cardiac arrest
  - Trauma victims receive greater benefit from rapid transport – rather than delay to provide advanced care in the field
Medical Response System Revisions

- System does not currently reflect the current complexity of EMS – a more granular assessment & response system is needed

- 9-1-1 already employs MPDS system – though not fully utilized

- Revisions move from existing 121 dispatch codes to a system built off 1,326 determinant codes with 14 response options
Medical Priority Dispatch System

- Classifies EMS calls into 1 of 37 different complaints
- Then classifies the complaint into 1 of 6 determinants based on severity
  - Ω and A through E, with E being the most life-threatening
- Finally, further classifies the call into sub-determinates which provide more specific information
- In total, 1,326 MPDS codes were reviewed and assigned into 1 of 14 response protocols
Medical Priority Dispatch System

NON-LINEAR RESPONSE LEVELS

ECHO (E) definition:
Conditions requiring very early recognition and immediate dispatch of the absolute closest response of any trained crew such as police with AEDs, fire ladder or snorkel crews, HazMat units, or other specialty teams not in the standard medical response matrix.

OMEGA (Ω) definition:
Approved low acuity conditions qualifying for non-EMS response referrals to quality-assured nurse assessment systems, and other external specialty agencies such as Poison Control Centers, Rape Crisis Lines, Suicide and Mental Help Lines, social services, and clinics.

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Ω: MPDS OMEGA determinant level. C: MPDS CHARLIE determinant level.
A: MPDS ALPHA determinant level. D: MPDS DELTA determinant level.
B: MPDS BRAVO determinant level. E: MPDS ECHO determinant level.
### Net Impact of Updated EMS Response Policy on Fire

- Lower severity calls are reduced
- Fire Department has increased availability for high-priority incidents

<table>
<thead>
<tr>
<th>Complain Severity</th>
<th>CY2017</th>
<th>CY2017 %</th>
<th>Proposed</th>
<th>Proposed %</th>
<th>Difference</th>
<th>Difference %</th>
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</thead>
<tbody>
<tr>
<td>Omega</td>
<td>141</td>
<td>0.86%</td>
<td>0</td>
<td>0.00%</td>
<td>(141)</td>
<td>-100.00%</td>
</tr>
<tr>
<td>Alpha</td>
<td>2,780</td>
<td>16.93%</td>
<td>454</td>
<td>3.25%</td>
<td>(2,326)</td>
<td>-83.67%</td>
</tr>
<tr>
<td>Bravo</td>
<td>4,173</td>
<td>25.41%</td>
<td>4711</td>
<td>33.73%</td>
<td>538</td>
<td>12.89%</td>
</tr>
<tr>
<td>Charlie</td>
<td>5,413</td>
<td>32.96%</td>
<td>4884</td>
<td>34.97%</td>
<td>(529)</td>
<td>-9.77%</td>
</tr>
<tr>
<td>Delta</td>
<td>3,640</td>
<td>22.16%</td>
<td>3640</td>
<td>26.06%</td>
<td>-</td>
<td>0.00%</td>
</tr>
<tr>
<td>Echo</td>
<td>278</td>
<td>1.69%</td>
<td>278</td>
<td>1.99%</td>
<td>-</td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16,425</strong></td>
<td><strong>100%</strong></td>
<td><strong>13,967</strong></td>
<td><strong>85.04%</strong></td>
<td><strong>(2,458)</strong></td>
<td><strong>-14.96%</strong></td>
</tr>
</tbody>
</table>
Medical Priority Dispatch System

- Right Resource to the Right Call
  - Fire Department will eliminate low acuity calls – which will be handled by AMT alone.
  - Fire Department will focus on higher-priority incidents where quicker response times are shown to be more important
  - System reflects greater effectiveness and efficiency with the following impacts:
    - Fire Department has greater availability and quicker response times
    - Introduce more efficient BLS transport units to handle low acuity calls
    - Transport component performance target is adjusted from 8:59 to 10:59
Next Steps – 911 Dispatch Center

- **Analyze**
  - Analyze full workload & demands

- **Specify**
  - Specify staffing requirements

- **Identify**
  - Identify process changes required to implement Revised Medical Response System protocols

- **Support**
  - Support implementation