December 10, 2024

Auditor Timothy M. O’Brien, CPA
Office of the Auditor
City and County of Denver
201 West Colfax Ave., Dept. 705
Denver, Colorado 80202

Dear Mr. O’Brien,

The Office of the Auditor has conducted a performance audit entitled “Emergency Medical Response Time.” This memorandum provides a written response for each reportable condition noted in the final draft of the Auditor’s report, which was sent to us on November 19, 2024. This response complies with Section 20-276 (c) of the Denver Revised Municipal Code.

Please see the subsequent pages for our responses to each recommendation and contact Armando Saldate, III at (720) 913-6020 with any questions.

Sincerely,

Armando Saldate III, Executive Director, Department of Safety
Desmond Fulton, Chief, Denver Fire Department
W. Andrew Dameron, Director, Denver 9-1-1
Dr. Shea Gilliam, MD, Department of Safety Medical Director, DHHA
Dr. Jacob Nacht, MD, Denver Health Paramedic Division Medical Director, DHHA
Shea Moore-Farrell, Senior Data Analyst, Department of Safety

cc: Valerie Walling, CPA, Deputy Auditor
Dawn Wiseman, CRMA, Audit Director
Patrick Shafer, Senior Audit Manager
Carl Halvorson, Audit Manager
Jeff Holliday, Chief of Staff, Department of Safety
Carl McEncroe, Compliance Administrator, Department of Safety

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## AUDIT FINDING 1

### *The city has not met its response time goals for emergency medical response services*

| RECOMMENDATION 1.1 | | |
|---|---|---|
| **Regularly assess Denver 911 staffing levels and use results to request more staff.** | | |
| The Department of Public Safety, including Denver 911, should document and implement a plan to regularly conduct staffing assessments. This plan should use a methodology that considers leading practices and should outline the steps that will be taken to complete the assessment, how often the assessment will be completed, and how gaps will be addressed. The Department of Public Safety should use that assessment to request additional staff and funding. | | |
| **Agency response** | | Agree |
| **Target date to complete implementation activities (Generally expected within 60 to 90 days)** | | 6/1/2024 |
| **Specific point of contact for implementation** | **Name:** | Andrew Dameron |
| | **Phone:** | 720-913-2025 |
| **Provide a written response** | | |
| Denver 9-1-1 agrees with this recommendation and is pleased to report that this has already been implemented. Use of the internationally recognized “Retains” tool from the Association of Public Safety Communications Officials (APCO) began in mid-2024 for the purpose of assessing staffing needs based on call volume, position coverage, average leave usage, and several other relevant data points. Based on that project, 19 additional FTE were requested and approved through the 2025 budget process. Denver 9-1-1 will, from time to time, continue to use the APCO Retains tool to reassess staffing needs. Any increase in FTE also requires a review of cost vs. revenue, including independent assessment of the 9-1-1 services fee levied by the City and County of Denver. Denver 9-1-1 does not have sufficient revenue to increase our FTE today, and therefore intends to increase the 9-1-1 services fee in mid-2025 to cover the cost.<br><br>Denver 9-1-1 also recognizes that while additional staffing is crucial, we must also contend with the historically high turnover rate 9-1-1 centers across the country experience every year. Therefore, we have prioritized the implementation of technology solutions meant to lower overall call volume, streamline the call-taking | | |

process, and otherwise support our efforts to answer every 9-1-1 call as quickly as possible. In July of 2024, we launched a smart interactive voice recorder (IVR) which has already decreased our non-emergency call volume by automatically transferring calls or referring callers to online reporting options, where appropriate. We have partnered with Technology Services, 311, and DPD to improve the online reporting experience, and we are in the early stages of overhauling our entire foundational technology suite, replacing the system with modern platforms that leverage artificial intelligence and machine learning to reduce workloads and further increase efficiency at Denver 9-1-1.

## RECOMMENDATION 1.2

**Ensure emergency medical response time goals are realistic**

The Department of Public Safety, including the Denver Fire Department and Denver 911, should conduct an assessment to determine how relevant factors, risks, and hazards can impact emergency medical response times. At a minimum, this assessment should consider the degree to which factors such as population size, geography, external barriers, and internal processes, such as those required to determine the nature of a call, can impact response times.

Managers should document these assessment results, use those results to determine whether response time goals should be revised, and use those results to inform and support any revisions made. Managers should also consider time frames for conducting future assessments. Managers should use these results to update and amend the operating agreement as needed.

| | | |
|---|---|---|
| **Agency response** | | Agree |
| **Target date to complete implementation activities (Generally expected within 60 to 90 days)** | | 6/30/2026 |
| **Specific point of contact for implementation** | **Name:** | Chief Desmond Fulton<br>Deputy Chief Kathleen Vredenburgh |
| | **Phone:** | (720) 913-3596 |

**Provide a written response**

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Since November of 2023, following the reaccreditation process of the DFD, department representatives have taken the initiative to request assistance from the DOS data analyst to begin looking at alternative response models based on the Center for Public Safety Excellence (CPSE) recommendation that external factors be analyzed, in addition to the National Fire Protection Association (NFPA) recommendations to determine appropriate response time goals specific to the City and County of Denver. The team has met on a monthly cadence to discuss current practices and compare them with other department practices from within the metro area and nationally. Over time, our team has grown to include the Executive Director of Safety (EDOS) and Denver Health Hospital Authority (DHHA) Medical Directors, 9-1-1 communications and Denver Health Paramedics Division representatives. We have begun narrowing toward a new Denver model that accounts for external barriers to response as well as considers a quality total response system as it relates to patient outcomes and ensuring deployment of the right resource for the right emergency.

A goal for 2025 is to clarify the Denver Health and City and County of Denver Operating Agreement (OA) to support this effort, with a goal of implementing a pilot program in 2026. The intent of the Denver model is to create a healthy pre-hospital response system that serves the Denver community efficiently and effectively.

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# AUDIT FINDING 2

## *The city does not have a comprehensive understanding of the total time it takes to respond to a medical emergency*

<table>
<tr><th colspan="3">RECOMMENDATION 2.1</th></tr>
<tr><td colspan="3">Measure and track the complete total response time — from the time a call is placed to when help arrives at a patient's side</td></tr>
<tr><td colspan="3">The Department of Public Safety should align the city's total response time measurement with industry standards to ensure total response time captures the total time callers and patients wait before help arrives — from the time an emergency call is placed to the moment when a responder reaches a patient's side. Managers should include call answering times and initiating action times in their analysis. When upgrading or implementing new record keeping systems, the Department of Public Safety should ensure the systems used to track emergency medical response are interoperable to allow tracking data to be collected and reviewed in central repository.</td></tr>
<tr><td colspan="2">Agency response</td><td>Disagree</td></tr>
<tr><td colspan="2">Target date to complete implementation activities (Generally expected within 60 to 90 days)</td><td>N/A</td></tr>
<tr><td rowspan="2">Specific point of contact for implementation</td><td>Name:</td><td>N/A</td></tr>
<tr><td>Phone:</td><td>N/A</td></tr>
<tr><td colspan="3">Provide a written response</td></tr>
<tr><td colspan="3">The Department of Public Safety (DOS) disagrees with this recommendation for the following reasons:<br>• Data is collected by multiple agencies, in asynchronous systems, with no present ability to coalesce data.<br>• The "time at patient" timestamp is captured in a different data system.<br>○ Per the Operating Agreement (OA), Computer Aided Dispatch (CAD) is the official data source for response time data. "Time at patient" is a timestamp recorded within the DFD and the Denver Health Paramedic Division (DHPD) emergency medical services software application, ESO (each agency has their own version of this system).<br>○ While the CAD and ESO are linked on the front-end, currently neither DFD nor DHPD has backend data access that would allow for large-</td></tr>
</table>

scale data pulls and/or construction of automated data pipelines to link these data for analysis/reporting.

- DFD (with the assistance of DOS and the EMRS data analyst) recently completed a trial of DFD ESO's backend solution and intends to advocate for purchase of this access.
- If purchased, this could be integrated with the City's Snowflake data warehousing tool and make it technically possible to link CAD and ESO data in such a way that "time at patient" could be added to the official response time profile.
- However, there is no guarantee that ESO's backend solution will be approved for purchase, or if purchased, that it would be obtained by all parties (to properly integrate, all parties would be required to implement the software).

- "Time at patient" is likely to be a generally inaccurate timestamp.
  - This timestamp is recorded manually by first responders. In most cases, the primary focus of first responders is the provision of treatment to a patient, not recording an accurate "time at patient". Additional work will be needed to ensure this timestamp is recorded accurately and can be trusted.
- The Department of Public Safety disagrees that it is not compliant with "industry standards." CCD EMRS complies with NFPA 1710 (which has historically been utilized as the industry standard).
  - To the extent that the Auditor's Office has utilized a different standard than NFPA 1710, DOS requests that the standard be disclosed, along with materials consulted.

| RECOMMENDATION 2.2 | |
|---|---|
| **Leverage total response time data for increased alignment with emergency medical response time standards** | |
| After the Department of Public Safety has implemented a system in place that can measure the time from the moment a call is placed to when a responder reaches a patient's side — the Department of Safety should use this data to identify potential delays, inefficiencies, and other issues that may impact a patient's safety. | |
| **Agency response** | Disagree |
| **Target date to complete implementation activities** | N/A |

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<table>
<tr><td colspan="2">(Generally expected within 60 to 90 days)</td><td></td></tr>
<tr><td rowspan="2">Specific point of contact for implementation</td><td>Name:</td><td>N/A</td></tr>
<tr><td></td><td>N/A</td></tr>
<tr><td colspan="3">Provide a written response</td></tr>
<tr><td colspan="3">We disagree that tracking the time interval from the moment a call is placed to when a responder reaches a patient’s side represents a meaningful data point.<br><br>There are countless factors outside a would-be responder’s control that would affect this metric (e.g. vertical access to an apartment with elevator broken, staging for police on a dangerous call, inaccurate or conflicting information from 911 callers regarding exact incident location, etc.).<br><br>Moreover, this data would not only be nearly impossible to track accurately due human and non-human factors, but also would be of low clinical significance without accounting for all the other causes of possible delay.  With that being said, other data points that have more significance are already being tracked.<br><br>Finally, the National Fire Protection Agency (NFPA) 1710 Standard outlines benchmarks for key response time metrics such as alarm answering time, turnout time, and travel time (which is defined as time in route to an emergency incident to the time the unit arrives on scene). The end goal is to ensure timely arrival at all emergency incidents all while optimizing efficiency. As a large metropolitan city that responds to over 153 square miles, with buildings as tall as 55 stories and warehouses nearing 1 million square feet in size, it would not be effective to use these specific criteria as a metric for a data gathering basis. This is a subjective approach which does not account for how patient care can be impacted by the emergency call taker, nature of the call itself, and other relevant factors. The proposed system would lend to the collection of inaccurate data daily. However, the use of data to identify specific types of delays, inefficiencies, and other issues that could impact patient care is very relevant, and efficient and effective patient care is always top priority.</td></tr>
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# AUDIT FINDING 3

## *The Emergency Medical Response System Advisory Committee could be more effective*

<table>
<tr><th colspan="3">RECOMMENDATION 3.1</th></tr>
<tr><td colspan="3">Develop and implement written policies and procedures for conducting committee meetings</td></tr>
<tr><td colspan="3">The Emergency Medical Response System Advisory Committee should develop and implement formal policies and procedures aligned with leading practices. At a minimum these should include:<br>• Setting agendas.<br>• Providing relevant materials to committee members, such as previous meeting minutes, reports, compliance items, and background information on discussion items.<br>• Designating a committee chair, other roles, and member responsibilities.<br>• Keeping meeting minutes for each meeting.</td></tr>
<tr><td colspan="2">Agency response</td><td>Agree</td></tr>
<tr><td colspan="2">Target date to complete implementation activities (Generally expected within 60 to 90 days)</td><td>12/31/2025</td></tr>
<tr><td rowspan="2">Specific point of contact for implementation</td><td>Name:</td><td>Armando Saldate III</td></tr>
<tr><td>Phone:</td><td>(720) 913-6020</td></tr>
<tr><td colspan="3">Provide a written response</td></tr>
<tr><td colspan="3">As the COVID pandemic recovery began, the DOS recognized that the EMRS suffered from turnover of key staff and participants, canceled and remote meetings due to the COVID emergency, and fiscal/resource constraints of the recovery. Overall, the EMRS group has made tremendous strides over the past 2 years, including: creating new processes for the advisory committee quarterly meetings; drafting governing documents; setting agendas; and providing relevant information to attendees in advance of meetings. In addition, EMRS representatives meet monthly regarding other areas of focus including, but not limited to: Data and clinical performance, strategic direction, and quality assurance/quality improvement. These collaborative meetings have identified actionable opportunities for the system.<br><br>The participants agree, however, that meetings could benefit from more defined structure, including formalization of roles/responsibilities, creation and retention of minutes, and consistent agenda distribution.</td></tr>
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It should also be noted that the Assistant Director of Clinical Performance (ADCP) role, which is a foundational role in EMRS, has been vacant since August 2024, and is currently undergoing a robust hiring process.

The DOS will lead a formal EMRS meeting policy and procedure as recommended.

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# AUDIT FINDING 4

## *Documented policies and procedures for emergency medical response time reporting are incomplete*

**RECOMMENDATION 4.1**

**Develop and implement policies and procedures**

The Department of Public Safety should work with the emergency medical response system data analyst to develop, document, and implement policies and procedures that provide a sufficient level of detail on all steps in the monitoring and analysis of data.

In addition to the requirements specified in the operating agreement, at a minimum, this documentation should include detailed procedures that:

- Specify the processes used to compile, clean, and analyze emergency medical response time data.
- Align with contract provisions, including provisions associated with identifying root causes of data excluded from compliance reporting
- Specify processes used to review and approve data and reporting, including identifying those responsible for carrying out such review.

The policies and procedures should be reviewed and approved by a supervisor or manager before being adopted.

Management should also ensure the data analyst has the required knowledge and training needed to carry out responsibilities required by the operating agreement, including exception review and root cause identification.

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|---|---|---|
| **Agency response** | | Disagree |
| **Target date to complete implementation activities (Generally expected within 60 to 90 days)** | | N/A |
| **Specific point of contact for implementation** | **Name:** | N/A |
| | **Phone:** | N/A |

**Provide a written response**

The DOS disagrees with this finding. Documentation for all data analysis steps (compiling, cleaning, analyzing, reporting) exists. This includes:

- Comprehensive, stand-alone documentation files for the DFD agency-level data, DHPD agency-level data, and overall system-level data. These files contain:
    - An overview summarizing relevant Operating Agreement language.
    - Identifying data sources.
    - Detailed data definitions for:
        - Base CAD incident data.
        - Supplementary (CAD and otherwise) data required for analysis and reporting.
        - Exclusions.
        - Response Time Compliance (RTC) and Time Performance calculations.
    - Appendices with additional relevant information.
        - Most significantly, within the system documentation file, citations to specific NFPA 1710 sections that describe the Operating Agreement specifications and any modifications required from 1710 for our system.
- Data processing scripts in the R coding language that perform most data processing. These are highly commented, chunked into logical pieces, and follow the R “tidyverse” coding approach.
    - Please note that some minor data processing occurs in the backend of the Power BI report.
- Within the official Power BI report containing all response time data:
    - Detailed definitions (Introduction and Definitions page)
    - Infographic (Introduction and Definitions page)
    - Clear and accurate data labels for all visualizations

It is agreed that there may be adjustments that can be made to improve readability and ease-of-use, these are subjective.

Data exclusions to be applied for response time analysis are defined in the OA. It is unclear what, or how, root cause analysis is to be performed.

- For example, there were 1,302 total exclusion criteria identified (impacting 1,259 agency incidents) in November 2024 alone. It is not feasible (due to limited time) nor appropriate (due to lack of required subject matter expertise), for the data analyst to review each of these individually for root cause.
- Currently, all exclusions are quantified and tracked (Exclusions page of the official EMRS response time dashboard).
- As we move forward with modifying our approach to system data and evaluation, we are exploring the removal of pre-defined exclusions. We may move to a system where exclusions are identified exclusively via mathematical principles (ex: statistical outlier removal).

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Processes used to review and approve data and reporting are not officially stated in the OA or any EMRS guiding documents.

- As part of the DOS data team, we are working on both department-wide data governance polices, as well as an internal review process. Ultimately these new policies will apply to the work of the EMRS data analyst if they sit as a member of the broader DOS data team.
- Please note that, though not reflected in policy or guiding documents, the EMRS data analyst completes review with stakeholders at each agency prior to publishing data or reports.