

AUDIT REPORT

Department of Public Safety *Emergency Medical Response Time*

DECEMBER 2024



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City and County of Denver



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AUDITOR'S LETTER

December 19, 2024

We audited the Department of Public Safety to assess the extent to which the city effectively meets its goals for emergency medical response. I now present the results of this audit.

The audit found the city has not met its emergency medical response time goals and does not have a comprehensive view of the total time it takes to respond to medical emergencies. Additionally, the audit found the Emergency Medical Response System Advisory Committee should take steps to increase its effectiveness and strengthen policies and procedures for response time data.

By implementing recommendations for stronger policies and procedures and more effective meeting practices, the Department of Public Safety will be better able to comply with requirements, monitor performance, and align response time goals to meet the needs of the public.

I am disappointed that the Department of Public Safety disagreed with my recommendations for its future response time tracking systems to include all stages of the response time in its tracking, reporting, and documented procedures. These steps would work toward improvements to the overall emergency medical response system and would better align with industry standards.

This performance audit is authorized pursuant to the City and County of Denver Charter, Article V, Part 2, Section 1, "General Powers and Duties of Auditor." We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We appreciate the leaders and team members in the Department of Public Safety and at Denver Health and Hospital Authority who shared their time and knowledge with us during the audit. Please contact me at 720-913-5000 with any questions.

Denver Auditor's Office

A handwritten signature in black ink, appearing to read "Timothy M. O'Brien".

Timothy M. O'Brien, CPA
Auditor



Emergency Medical Response Time

DECEMBER 2024

Objective

To determine:

- The degree to which Denver's 911 response times align with leading practices.
- The extent to which staffing levels affect response times.
- Whether oversight and monitoring are adequate or effective.
- Whether the data used to make decisions is reliable.
- The extent to which contract requirements are complied with.

Background

The Department of Public Safety's Denver 911 Communications Center, also known as Denver 911, receives and processes 911 calls for police, fire, and medical services. When a call is triaged and deemed a medical emergency, Denver Fire and Denver Health dispatch and respond to those calls. The Denver Health and Hospital Authority leads the emergency medical response system efforts.

REPORT HIGHLIGHTS

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

From May 2023 through March 2024, Denver 911, Denver Fire, and Denver Health did not meet response time goals: call answering time of 15 seconds 90% of the time, alarm-processing time of one minute and 30 seconds 90% of the time, and assign-to-arrive time of five minutes for Denver Fire and nine minutes for Denver Health. The agencies need to assess staffing levels and response time goals to ensure quality delivery of emergency medical services.

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

The total response time does not match the caller or patient experience with emergency medical services. The city's response time goals are not comprehensive and do not meet national standards.

The Emergency Medical Response System Advisory Committee could be more effective

The advisory committee does not have structured meeting practices in place to ensure its responsibilities are carried out. The lack of formalized policies and procedures prevents the necessary collaboration and communication needed to identify issues within Denver's emergency medical response system.

Emergency medical response time policies and procedures lack sufficient detail and are not complete

Policies and procedures on response time data analysis and reporting are not detailed enough that the processes can be replicated by someone unfamiliar with the processes. Data reporting review procedures are not documented and contractual oversight procedures on data exclusions are not reviewed.

WHY THIS MATTERS

The Department of Public Safety and Denver Health provide emergency medical services to the City and County of Denver. The agencies have a duty to ensure medical emergencies are responded to fast and efficiently. This requires collaboration among Denver 911, Denver Fire, and Denver Health to identify problems within the system, support each other's efforts, and build a sound foundation to deliver quality emergency medical services. Not doing so could cause people to not receive the medical care they need in a timely manner and reduce the public's trust in the emergency medical response system.

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BACKGROUND

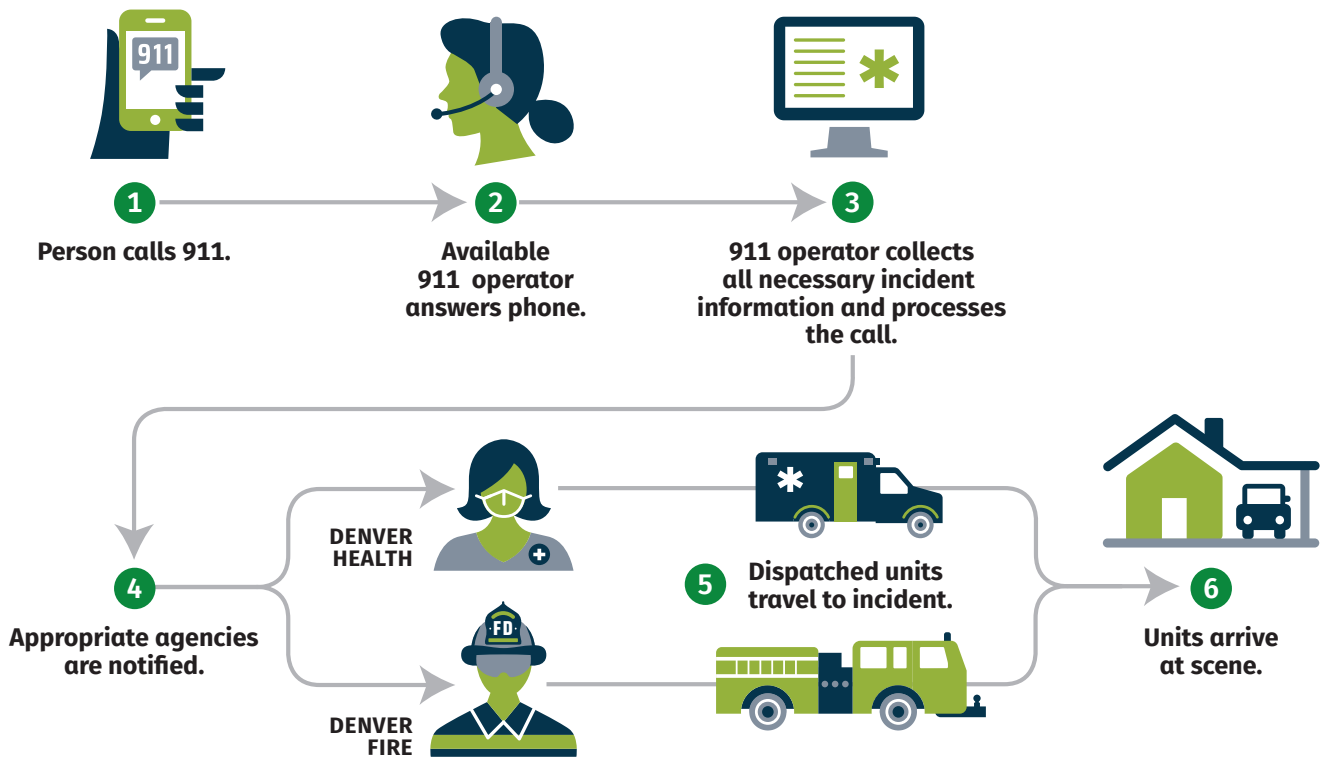
The Denver 911 Communications Center, also known as Denver 911, receives more than 40,000 calls each month for police, fire, and medical services. When a call for emergency medical services is received, the caller is routed through a tiered, multi-agency emergency medical response system that requires coordination among city agencies and the Denver Health and Hospital Authority to identify, prioritize, and respond to incidents as fast as possible.

Denver’s emergency medical response system

Denver 911, the Denver Fire Department, and Denver Health collaborate to deliver emergency medical services to Denver residents and visitors. Denver Health provides paramedic and ambulance services through an operating agreement with the city that began in 1997.

Figure 1 shows how 911 emergency medical response services are triaged and provided:

FIGURE 1. Denver 911 call process flow



Source: Created by Auditor’s Office staff.

THE DEPARTMENT OF PUBLIC SAFETY – The Department of Public Safety provides oversight, guidance, management, and support to all public safety agencies including Denver 911 and Denver Fire. Because of this, it is part of Denver’s emergency medical response system.

DENVER 911 COMMUNICATIONS CENTER – Denver 911 manages its communications center, processes emergency and non-emergency calls, and maintains all 911 call records in its dispatch system. The communication center houses all 911 operators and accommodates police, fire, and Denver Health’s paramedic dispatchers. Having representatives from all agencies in one building allows for collaboration in ensuring emergency and non-emergency services are delivered in a timely manner.

DENVER FIRE DEPARTMENT – Denver Fire responds to emergency medical calls and provides basic life support services, which involve keeping the patient stable until Denver Health responders arrive. Denver Fire became accredited in 2018 and is nationally accredited by the Commission on Fire Accreditation International which provides agencies the accreditation model, various accreditation publications and trainings.

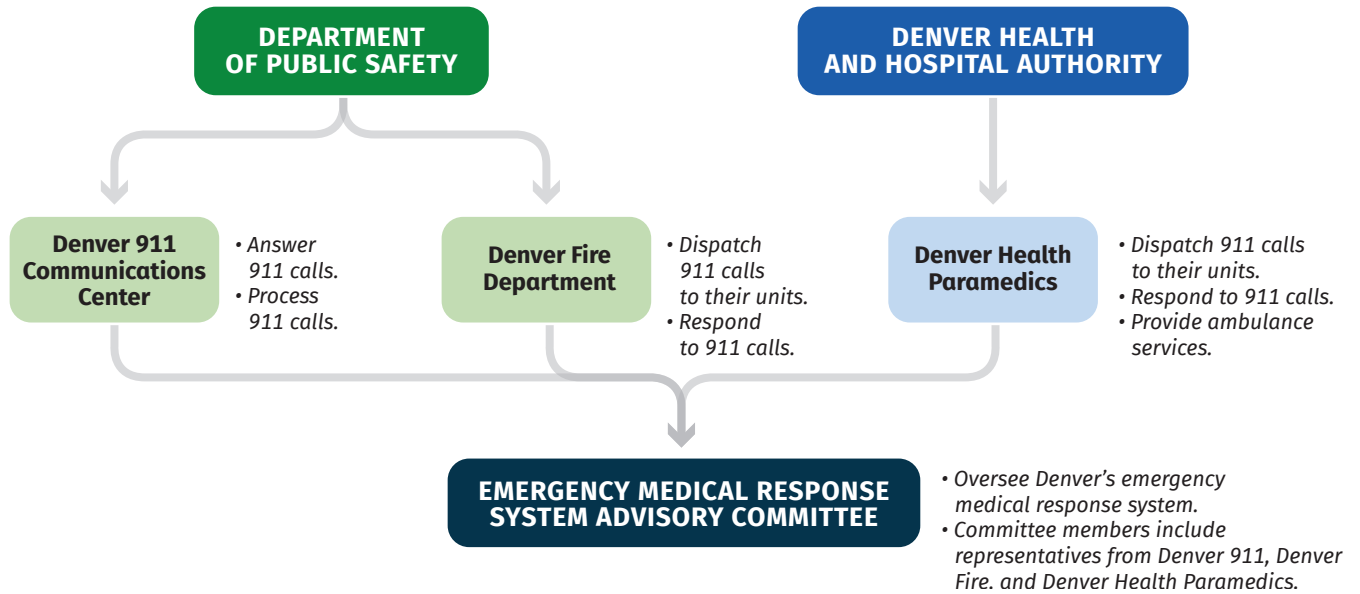
DENVER HEALTH AND HOSPITAL AUTHORITY – While Denver Health is not a city agency, the city contracts with Denver Health to be the sole provider of emergency medical transportation and paramedic services for the city. Denver Health employs dispatchers at the Denver 911 Communication Center and provides transport and advanced life support services. These services can include administering medications and deploying advanced medical procedures such as cardiac monitoring.

EMERGENCY MEDICAL RESPONSE SYSTEM ADVISORY COMMITTEE – The committee was developed based on an audit recommendation made by the Denver’s Auditor’s Office in 2008. The recommendation was made because auditors identified a “lack of comprehensive city oversight and monitoring process for emergency medical response.” The operating agreement between the city and Denver Health says the committee’s responsibilities include:

- Monitoring and reviewing emergency medical response time performance.
- Identifying and recommending strategies for innovation and improvement.
- Providing collaboration and accountability for emergency medical response delivery.

As shown in Figure 2, on the next page, the committee includes representatives from Public Safety, Denver 911, Denver Fire, and Denver Health.

FIGURE 2. Agency interactions within Denver’s emergency medical response system



Source: Created by Auditor’s Office staff.

FINDING 1 AND RECOMMENDATIONS

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

At the Denver 911 Communications Center, 911 operators and dispatchers from Denver Fire and Denver Health work together to provide emergency medical services to the city.

The agencies follow response time goals based on nationally accepted standards from the National Emergency Number Association and the National Fire Protection Association that are meant to ensure each medical emergency is responded to in a timely manner. These goals lay out how quickly a 911 call should be answered, processed, and dispatched, and how long first responders should take to travel to the emergency.

We reviewed the city's compliance with these goals from May 2023 through March 2024 and found that Denver 911, Denver Fire, and Denver Health did not meet these response time goals during the entire period we reviewed. We found that in many cases, people in need of emergency medical services in Denver could wait much longer than the goals say they should.

Denver 911 cannot meet call answering time goals

The time from when a caller places a 911 call to when a 911 operator answers is known as the "call answering time." When a 911 call arrives at the emergency communications center, the call could be for police, fire, or medical. Until a call is answered, 911 operators cannot know what the situation is; therefore, call answering time measurements include all emergency calls. Denver 911's goal is to answer 90% of all 911 calls within 15 seconds and 95% of all calls within 20 seconds. These goals are based on the National Emergency Number Association's call answer time standards. The time from when a caller places a 911 call to when a 911 operator answers is known as the "call answering time."

CALL ANSWERING TIME GOALS NOT MET – From May 2023 through March 2024, the Denver 911 Communications Center answered and processed 500,279 emergency calls, which averages about 45,000 calls each month. During this period, Denver 911 did not meet call answering time goals.

NATIONAL EMERGENCY NUMBER ASSOCIATION STANDARDS

Accredited by the American National Standards Institute, the National Emergency Number Association standards are developed by public safety and emergency services industry professionals for emergency response services. They are designed to provide operating procedures for 911 communications centers. Denver 911 managers said there are no other standards they are aware of for call answering times and the standards apply to all emergency communications centers regardless of a call center's size. The call answering time standard says that 90% of all 911 calls should be answered within 15 seconds and 95% of all 911 calls should be answered within 20 seconds.

We removed calls that are disconnected or otherwise abandoned before they are answered from this metric as abandoned calls do not have a call answering time.

Table 1 shows the percentage of 911 calls that were answered within 15 and 20 seconds for each month during our review period. Out of about half a million calls that Denver 911 answered – 71%, about 356,000 calls, were answered within 15 seconds and 73% of these calls, about 366,000 calls, were answered within 20 seconds – missing the agency’s 90% and 95% goals, respectively.

Despite not achieving these goals, we did see an upward trend with Denver 911 moving closer to achieving its answering time goals of 90% within 15 seconds and 95% within 20 seconds.

TABLE 1. Percentage of 911 calls answered within 15 seconds and within 20 seconds

Review period	Percentage of calls answered within 15 seconds	Number of calls answered within 15 seconds	Percentage of calls answered within 20 seconds	Number of calls answered within 20 seconds
May 2023	61.4%	33,993	63.8%	35,319
June 2023	55.7%	23,439	57.9%	24,344
July 2023	63.7%	32,446	65.7%	33,463
August 2023	53.2%	24,230	55.8%	25,436
September 2023	55.2%	19,053	57.7%	19,945
October 2023	73.4%	35,558	75.7%	36,665
November 2023	81.2%	36,100	82.8%	36,812
December 2023	86.7%	41,327	88.1%	42,008
January 2024	85.4%	38,729	86.9%	39,388
February 2024	83.7%	34,810	85.4%	35,484
March 2024	83.4%	36,899	85.0%	37,600
Total Percentage totals are the average of all months in the review period	71.3%	356,584	73.3%	366,464

Source: Based on information from the Denver 911 Communications Center.

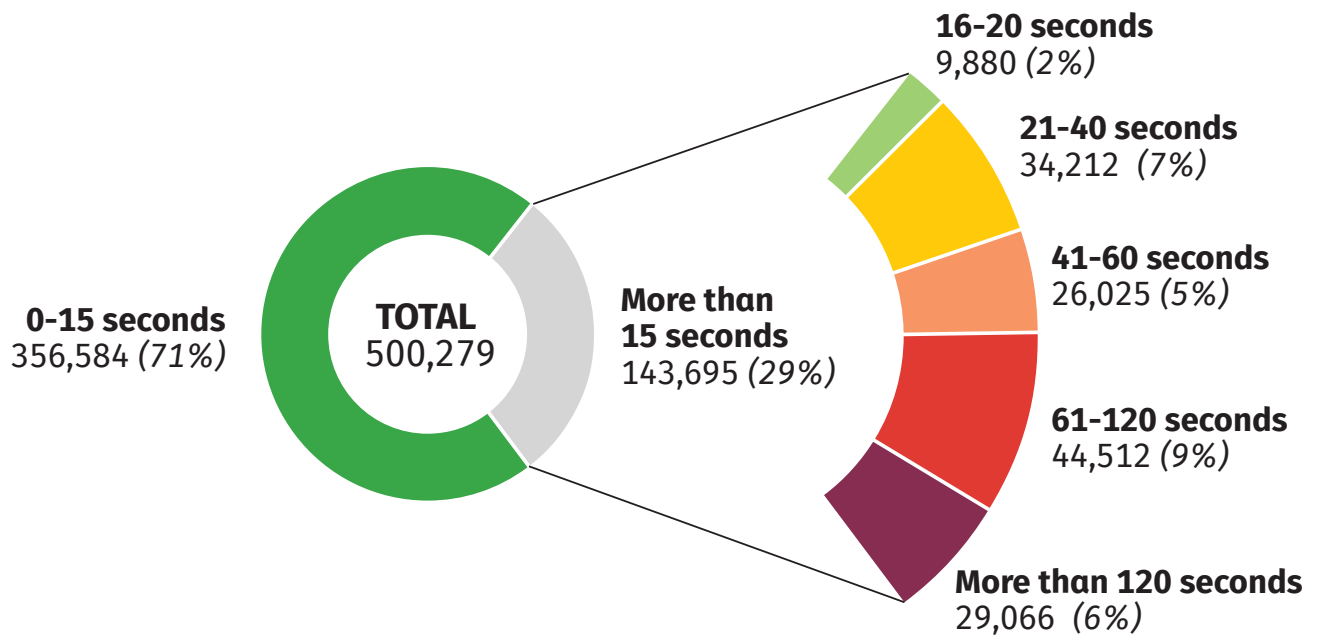
Almost 15% – or more than 73,000 callers – waited for a minute or longer for someone to answer their call.

SOME CALLERS MAY WAIT MORE THAN TWO MINUTES FOR THEIR CALL TO BE ANSWERED – We also reviewed the speed of answer, or how long callers had to wait before their emergency call was answered by a 911 operator.

Figure 3 shows how long callers waited before their calls were answered from May 2023 through March 2024. Over 25% of calls were answered after 20 seconds. Almost 15% – or more than 73,000 callers – waited for a minute or longer for someone to answer their call.

When emergency calls are not answered in a timely manner, callers may hang up. An abandoned call does not mean an emergency has ended. Because calls that are disconnected or abandoned are not included in the call answering time data, we reviewed the Association of Public-Safety Communications Officials International practices and found that analyzing how often 911 calls are abandoned can help assess whether Denver 911 can meet its call answering time goals.

FIGURE 3. How long callers waited before their calls were answered during the review period



Source: Created by Auditor’s Office staff from call-answered data.

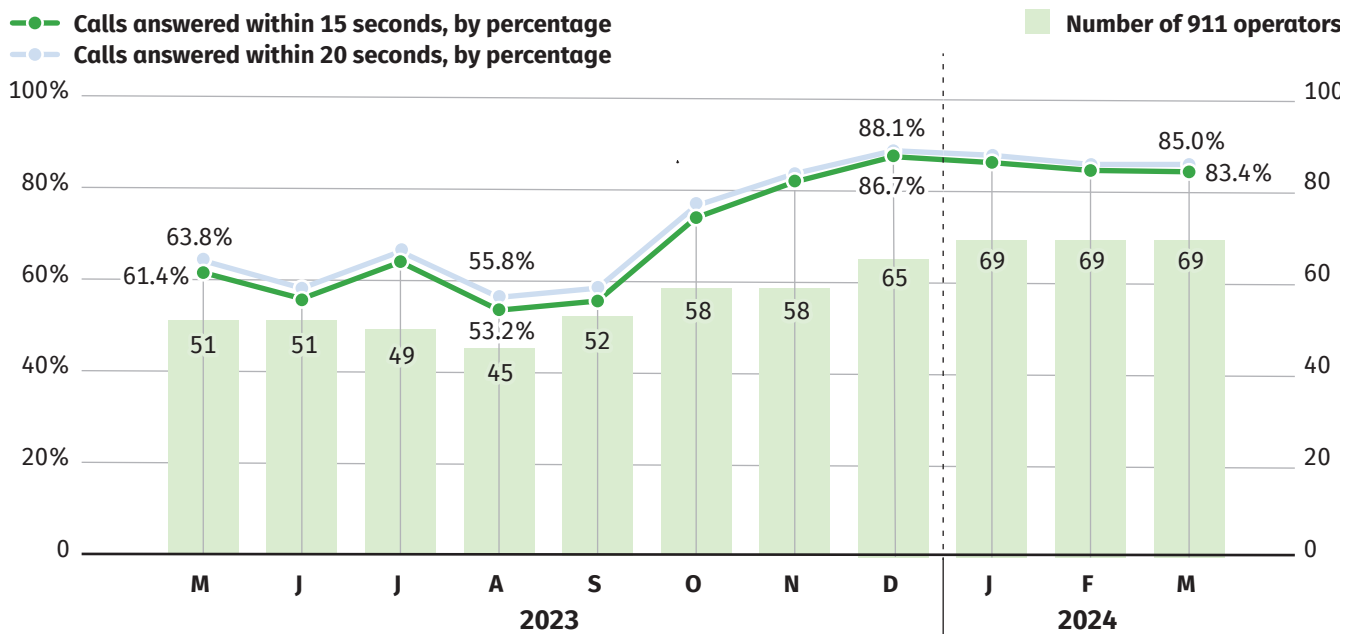
ABANDONED CALLS INDICATE NEED – The Association of Public-Safety Communications Officials International considers a 911 call abandoned when the caller ends the call before it is answered by a 911 operator. To understand what is happening in the city, we analyzed call abandonment rates from May 2023 through March 2024. Abandoned call calculations include all calls made to 911 for police, fire, and medical as the nature of the call is not known until a call is answered. During this period, Denver 911 received 598,822 emergency calls. 500,279 calls were answered by 911 operators.

But this means more than 98,000 calls, or about 16%, were abandoned before the call could be answered by a 911 operator. We found that of these, about 41,000 calls, or about 42%, were abandoned within 10 seconds. While it is not possible to determine the exact reason a caller may disconnect from a call, this short time spent waiting could indicate callers hung up because of an accidental dial. However, this does not reflect Denver 911’s ability to meet standards as calls must be answered within 15 seconds and 20 seconds.

ADDING STAFF CAN HELP LOWER CALL ANSWERING TIMES – The Association of Public-Safety Communications Officials International says, and we confirmed, that there is a direct relationship between staffing levels and call answering times with higher staffing levels generally resulting in faster call answering times.

As shown in Figure 4, the percentage of 911 calls answered within 15 and 20 seconds increased as staffing levels increased from 45 to 69 call operators from August 2023 through January 2024.

FIGURE 4. Denver 911 staffing levels and percentage of calls answered



Source: Created by Auditor’s Office staff from Denver 911 data.

Denver 911’s increase in staffing levels throughout our review period has resulted in more calls being quickly answered. Denver 911 managers said the COVID-19 pandemic was the leading cause of staffing shortages and turnover rates were as high as 77% during and after the pandemic.

We found 911 call operators worked an average of 180 hours of overtime during the 11 months we reviewed.

Denver 911 officials also said a three-year mandatory overtime policy that ended in fall of 2023, to compensate for low staffing levels, presented an ongoing challenge to fill vacant positions. This policy resulted in 911 operators being required to work additional hours beyond the end of their shifts — sometimes working up to 14 hours in a 24-hour period.

Staff working persistent overtime may experience burnout and mental health concerns, which can result in increased turnover. Even without the added stress of overtime, many call operators may also experience burnout due to the nature of the job. According to Denver 911 managers, operators have higher rates of severe health issues compared to firefighters and police officers.

From May 2023 through March 2024, Denver 911 staff worked more than 21,000 hours of overtime in total, including 911 operators, supervisors, and other Denver 911 staff working as call takers. We found 911 call operators worked an average of 180 hours of overtime during the 11 months we reviewed. Supervisors worked an average of 163 hours of overtime during the same period.

POSITIVE EFFORTS



Denver 911 created a non-emergency communication team to answer non-emergency calls. There are 15 call takers on the team who work Monday through Friday. The agency also performed a staffing analysis to help hire more staff. In addition, Denver 911 is working with Denver 311 to build a smart interactive voice response system, which is an automated system that directs callers to resources and not necessarily a call taker, to help reduce call volume.

In our analysis, we found staff worked more overtime when call volume was higher, and overtime decreased when staffing levels increased.

When we asked about staffing levels, Denver 911 officials said they had not requested additional staff since 2021 because they had been unable to fill the vacant positions they already had. Managers also said that even when fully staffed, they are unable to keep up with call demand during periods of high call volume.

Denver 911 did recently complete a staffing assessment and determined the agency needs 41 additional full-time staff to address call volume effectively.

According to the U.S. Census Bureau, Denver's population grew from about 600,000 in 2010 to about 715,000 in 2020. According to the Association of Public-Safety Communications Officials International, it is vital that communications centers, such as Denver 911, conducts regular staffing assessments to ensure adequate coverage as call demand increases.

Denver 911 completed a recent staffing assessment and determined the agency needs 41 additional full-time staff to address call volume effectively.

As a result of inadequate staffing levels to address call volume, some people who dial 911 may have to wait longer before their call is answered. This increases the time it takes for help to arrive, which could significantly impact the effectiveness of treating time-sensitive medical emergencies.

1.1

RECOMMENDATION

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

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.

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.

— Department of Public Safety

IMPLEMENTATION EXPECTED BY JUNE 1, 2024

Total response time goals do not factor in risks that could prevent the city from achieving those goals

The time it takes to process, dispatch, and travel to an emergency incident is called the total response time. Denver 911, Denver Fire, and Denver Health have failed to meet their emergency medical response time goals.

TOTAL RESPONSE TIME – Total response time starts when the 911 operator answers the 911 call and ends when the responding unit arrives at the scene of the incident. Total response time is tracked using two different intervals:

- **ALARM-PROCESSING TIME** – This is the time from when the 911 call is answered to when the first responding unit is assigned to the incident.
- **ASSIGN-TO-ARRIVE TIME** – This is the time from when the first responding unit is assigned to the incident to when it arrives at the scene.

There are separate assign-to-arrive time goals based on the type of treatment a unit can provide.

For example, Denver Fire is trained and equipped to deliver basic life support services and is meant to be on scene first to evaluate and stabilize the patient. Meanwhile, Denver Health is trained and equipped to provide both advanced life support and transport services.

Because emergency medical incidents are responded to by two separate agencies that can provide different levels of care, the city has two separate measures for total response time – one that focuses on Denver Fire and one that focuses on Denver Health.

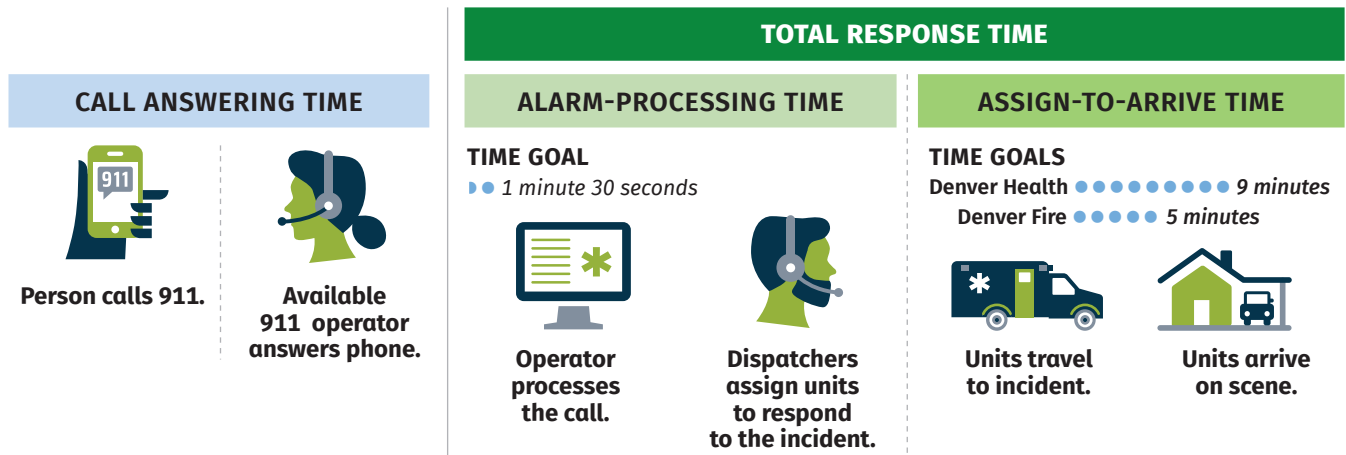
Total response times are based on standards from the National Fire Protection Association. On the next page, Figure 5 shows how total response time is measured and which agencies are involved in each time interval. It also shows how call answering time is considered a separate process and is not included as part of the total response time.

Both Denver Fire and Denver Health have an alarm-processing time completion goal of one minute and 30 seconds. This means that the 911 operator must obtain enough information from the caller about the situation to establish the nature and location of the incident for dispatchers to assign a unit to respond.

BASIC LIFE SUPPORT AND ADVANCED LIFE SUPPORT

- **BASIC LIFE SUPPORT** – Denver Fire is equipped and trained to provide only basic life support, such as evaluating and stabilizing the patient, and cannot transport people to a hospital.
- **ADVANCED LIFE SUPPORT** – Denver Health is contracted to provide advanced life support, such as advanced airway management, cardiac monitoring, administering medications, and is the primary provider of transport services.

FIGURE 5. Total response time includes alarm-processing time and assign-to-arrive time



Source: Created by Auditor's Office Staff.

Once a Denver Fire unit is assigned, Denver Fire has five minutes to travel to the scene. However, once Denver Health has assigned a paramedic unit, it has nine minutes to arrive on scene. This means the total response time for:

- Denver Fire, or basic life support, is six minutes and 30 seconds.
- Denver Health, or advanced life support, is 10 minutes and 30 seconds.

The goal is to meet these times 90% of the time.

To determine whether the agencies were meeting their goals, we analyzed the Department of Public Safety's data for 71,423 Denver Fire incidents and 64,868 Denver Health incidents for May 2023 through March 2024.

We found that neither Denver Fire nor Denver Health met its total response time goal:

- For Denver Fire, 90% of calls should be meeting six minutes and 30 seconds; however, we found 90% of calls were responded to within 10 minutes and seven seconds. 49% of calls, about 34,000 incidents, were compliant with this goal.
- For Denver Health, 90% of calls should be meeting 10 minutes and 30 seconds; however, we found 90% of calls were responded to within 14 minutes and six seconds. 70% of calls, about 45,000 incidents, were compliant with this goal.

We analyzed each interval of total response time and found the city did not meet alarm-processing time and assign-to-arrive time goals.

ALARM-PROCESSING TIME – Denver 911 call operators are responsible for most of the time spent during this interval because they answer and triage calls to determine the nature of the emergency. Denver Fire and

Both Denver Fire and Denver Health missed the alarm-processing time goal about 80% of the time.

Denver Health dispatchers wait until sufficient critical information has been obtained by Denver 911 operators before assigning their units where needed. For both agencies, the alarm-processing time goal is one minute and 30 seconds. This goal should be met 90% of the time.

To determine whether this goal is being met, we evaluated alarm-processing time by dispatching agency.

- For Denver Fire, 90% of calls should be meeting one minute and 30 seconds; however, we found 90% of calls were processed within four minutes and 53 seconds. 22% of calls, about 15,000 incidents, were compliant with this goal.
- For Denver Health, 90% of calls should be meeting one minute and 30 seconds; however, we found 90% of calls were processed within five minutes and one second. 17% of calls, about 11,000 incidents, were compliant with this goal.

ASSIGN-TO-ARRIVE TIME – As mentioned, this goal tracks the time it takes for an assigned unit to travel to an incident from when it was assigned.

Two separate intervals are tracked, depending on the type of support provided – five minutes for Denver Fire and nine minutes for Denver Health. Both agencies’ assign-to-arrive time goals should be met 90% of the time.

- For Denver Fire, 90% of calls should be meeting five minutes; however, we found for 90% of calls, units arrived within six minutes and 11 seconds after being assigned. 74% of calls, about 53,000 incidents, were compliant with this goal.
- For Denver Health, 90% of calls should be meeting nine minutes; however, we found for 90% of calls, units arrived within 10 minutes and 14 seconds after being assigned. 84% of calls, about 54,000 incidents, were compliant with this goal.

Figure 6 on the next page shows the goals that each agency should meet 90% of the time in blue, while the actual times 90% of calls took for each interval are shown in red.

All agencies must work together to meet time goals. If time goals are consistently not met, the city faces reputational harm and the public will lose faith in the services being provided. Critically, patients are put at risk when there is a delay in treating time-sensitive medical emergencies.

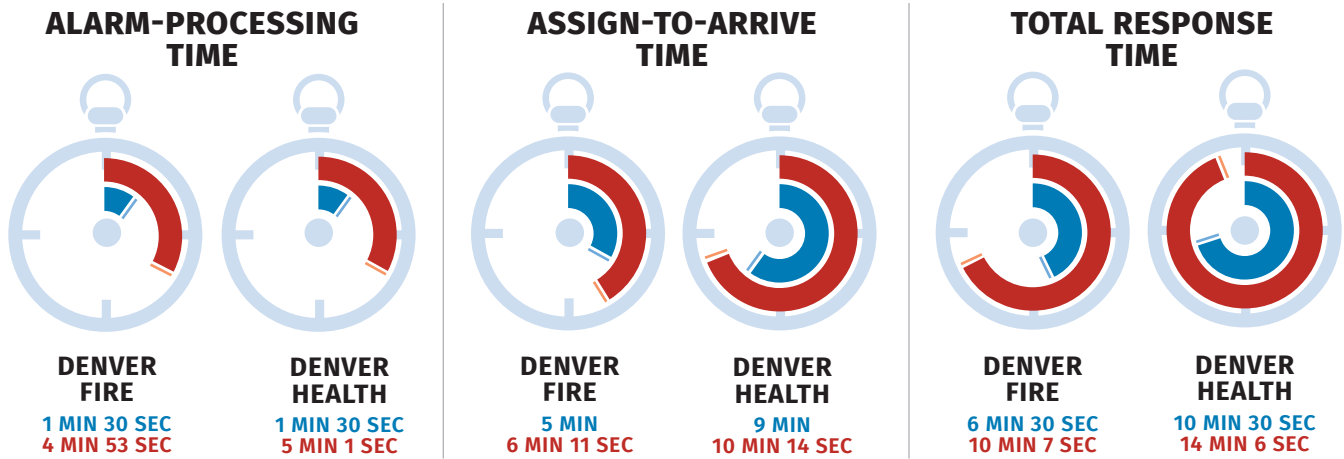
The city’s emergency medical response time goals are flawed

During our analysis of the alarm-processing and assign-to-arrive time goals, we also reviewed the processes associated with them. We found several factors that could prevent agencies from meeting their goals.

During alarm-processing, 911 operators focus on obtaining a “snapshot.” This is the information they need to identify the nature of the incident before alerting dispatchers. As discussed, the alarm-processing time goal is one minute and 30 seconds from answering a call to dispatching a unit.

FIGURE 6. Response time compliance

■ Goal to meet 90% of the time ■ Actual time met 90% of the time



Source: Created by Auditor's Office staff.

But when we reviewed the data from May 2023 through March 2024, we found 911 operators took about one minute and five seconds to obtain a snapshot, leaving only 25 seconds to triage and dispatch the call. Having just one element of the alarm-processing time account for about 72% of that interval indicates there may be a problem with the realistic attainability of the goal.

The city's total response time standards, along with the alarm-processing and assign-to-arrive time requirements, are based on standards from the National Fire Protection Association. We found the time requirements being used match industry standards as written. However, emergency medical response time goals may be unachievable if factors that could impact the ability to meet them are not considered.

The National Fire Protection Association says agencies should collect data and determine their ability to meet time goals based on that information. Therefore, agencies should consider numerous factors and circumstances that could affect the ability of agencies to achieve these performance objectives such as staffing, acceptable travel times, complexity of the area, and other hazards. The association also recommends conducting a risk assessment to identify potential barriers to meeting performance objectives.

A 911 CALL SNAPSHOT

A snapshot is required information such as incident location, a callback number, and the medical issue. However, a snapshot may not include details needed to further process the call and may require additional information before dispatchers assign units. 911 operators may also need to instruct callers on how to take medical action as needed or ensure the incident scene is safe for first responders.

Agency officials said their dispatchers must wait to assign a unit to an incident until after the call has been triaged and that the decision to wait was decided by Denver Fire and Denver Health.

Department of Public Safety leaders said the decision to wait to assign units was made for various reasons, including public and first responder safety and to use limited resources more effectively. This means that even after obtaining the snapshot, 911 operators must obtain additional information from callers using triage protocols to identify and finalize the nature of each incident before Denver Fire and Denver Health units can be dispatched.

The time it takes to complete these protocols varies and may depend on the situation. Some incidents are dispatched immediately, such as situations involving children. But the average snapshot taking one minute and five seconds to obtain, leaves little time for operators and dispatchers to complete their triage and dispatch processes.

OTHER RESPONSE TIME FACTORS – We found several external factors that can also impact how quickly first responders arrive on scene. Many of these factors are inherent to the industry and cannot be avoided. Some examples include:

- Road and building construction resulting in street closure or other unknown obstacles.
- Inclement weather.
- Traffic conditions.
- The location of the incident relative to where an ambulance, firetruck, or fire station is located such as situations where multiple units are required to respond or may be responding to an incident outside of their normal district.
- Situations where the safety of the patient and first responders are a concern, or where responders must wait for police to arrive before administering help.

In addition, we surveyed 10 cities and counties, some with population sizes comparable to Denver that we judgmentally selected and some that were suggested by Denver Fire officials, to understand their processes. We found five that used National Fire Protection Association emergency medical response performance standards — but had changed or adjusted the standards to address factors such as urban and rural areas and geography.

In contrast, Denver 911, Denver Fire, and Denver Health use the standards as written and have not considered other factors, risks, or hazards that could limit their ability to achieve the city’s response time goals.

BENCHMARKING

The 10 cities and counties surveyed include Las Vegas; San Francisco; Orange County, California; San Diego; Nashville, Tennessee; Tulsa, Oklahoma; Vancouver, Canada; Palm Beach County, Florida; Metro South, Colorado; and Oklahoma City.

It is imperative the Department of Public Safety assess whether its emergency medical response time goals should be changed to better account for external and internal factors that may impact the city's ability to meet response times.

Setting goals that are unrealistic can result in continued noncompliance, which can lead to the appearance to the public that emergency response is not adequate. This can lead to an erosion in the public's confidence in the city's provision of emergency medical services. This pressure on staff to achieve unrealistic goals could also contribute to staff turnover and health-related issues.

1.2

RECOMMENDATION

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

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.*

— **Department of Public Safety**

IMPLEMENTATION EXPECTED BY JUNE 30, 2026

FINDING 2 AND RECOMMENDATIONS

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

The city's method for measuring total response time for medical emergencies does not align with what 911 callers experience and does not follow industry guidelines. By failing to provide a complete view of the time it takes from when a 911 call is placed to when emergency responders begin patient care, the city lacks valuable information that could be used to identify potential risks and issues.

The way the city calculates total response time can also skew the public's understanding of how long an emergency response realistically takes. This can lead to public dissatisfaction with emergency medical services, especially when response times are longer than expected.

It is valuable for agencies to have a full picture of how long responses take because it allows them to identify potential delays and other issues that could affect the safety of those in need. By not considering the entire timeline of an emergency medical response, it may also be difficult to determine root causes and address identified issues.

Articles in the Journal of Emergency Medical Services from January 2010 and the National Library of Medicine from August 2005 both emphasize the importance of tracking response times from the point a 911 call is made to the point patient care is administered because it provides a comprehensive overview of the effectiveness of emergency medical responses services and considers the experience from the patient's perspective.

Furthermore, according to the National Fire Protection Association's "1710" standard published in 2020, emergency medical response times should comprise the time from when a 911 call is received through to the time when first responders begin administering care.

Specifically, the association advises the following intervals to be included in total response time:

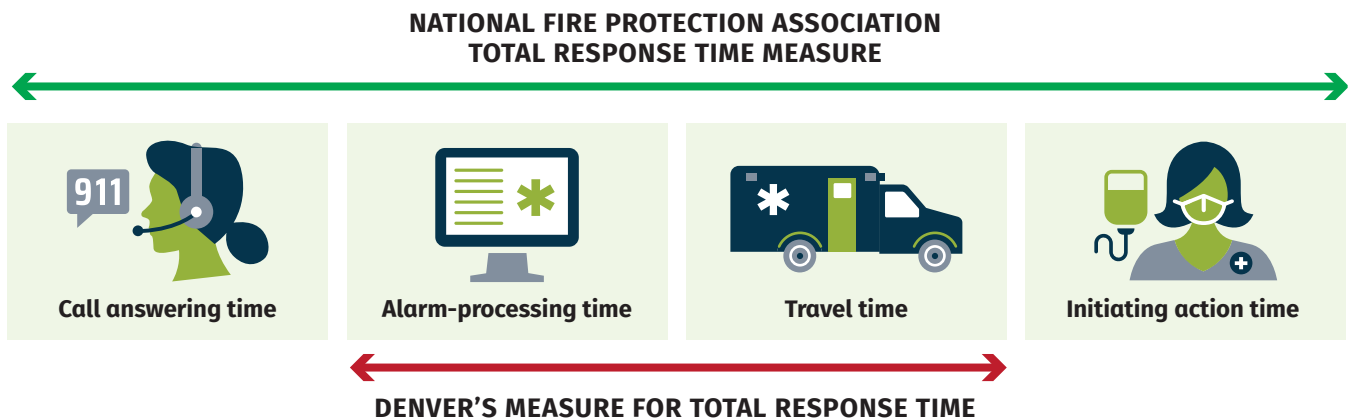
- **CALL ANSWERING TIME** – The time from when a 911 call is received at a 911 communications center to the time the call is picked up by an operator.
- **ALARM-PROCESSING TIME** – The time from when a call is picked up by an operator to the time the operator notifies first responders of the emergency.
- **TRAVEL TIME** – The time from when first responders are notified of the emergency to the time they arrive on scene. Denver 911 calls this assign-to-arrive time.

The city's method for measuring total emergency medical response times does not capture what 911 callers experience.

- **INITIATING ACTION TIME** – The time from when first responders arrive on scene, to the time they reach the patient and begin administering care.

As shown in Figure 7, when we compared industry guidance to how the city calculates total response time, we found the city does not include call answering time and initiating action time in its calculation.

FIGURE 7. Total response time: National Fire Protection Association compared with Denver



Source: Created by Auditor's Office staff.

But as discussed on page 10, the city only includes alarm-processing and assign-to-arrive or travel time to calculate the city's total emergency medical response time. The time it takes for a 911 call to be answered and the time it takes for first responders to get to the patient and begin providing care after arriving on scene are not included.

According to Denver 911 officials, call answering time is recorded within its own system called the emergency call tracking system. But this system does not link or transmit data to the dispatch system, which tracks the time it takes to dispatch responders and for them to arrive on scene. Furthermore, the two systems come from two different vendors and do not share any unique identifiers that would allow the data to be combined. Although the Department of Public Safety is aware of the city's total response time for each medical emergency incident, it is unable to also include how long a specific caller waits before their call is answered.

When we asked about why the city does not track initiating action time, agency officials said, "it is difficult to measure the time in a consistent and objective manner." There are many factors that might prevent a responder from reaching a patient quickly after they arrive on scene. For instance, at a high-rise building, responders might need to wait for elevators or climb multiple flights of stairs. Additionally, in certain situations responders may need to wait for additional support, such as a police presence in dangerous situations, or may need additional equipment to reach a patient behind locked doors.

Agency officials said they record the time from when a first responder arrives on scene in the dispatch system because no other method of recording time is available.

Because of these system limitations, the city’s total response time cannot follow national standards and cannot provide the public with a complete picture of the city’s total emergency medical response time. Consequently, the city’s documented total response time does not reflect 911 caller and patient experiences. Without insight into all sides of an emergency medical response, the city cannot provide the emergency medical services the public expects, and leaders may miss opportunities to improve processes or identify gaps and efficiencies that may help improve response times.

2.1

RECOMMENDATION

Measure and track the complete total response time – from the time a call is placed to when help arrives at a patient’s side

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 a central repository.

AGENCY RESPONSE – DISAGREE

The Department of Public Safety (DOS) disagrees with this recommendation for the following reasons:

- *Data is collected by multiple agencies, in asynchronous systems, with no present ability to coalesce data.*
- *The “time at patient” timestamp is captured in a different data system.*
 - *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).*
 - *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-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.*

— Department of Public Safety

AUDITOR'S ADDENDUM TO AGENCY RESPONSE: The Department of Public Safety disagreed with Recommendation 2.1, citing system limitations that prevent the integration of call answering and initiating action times in total emergency medical response time measurements. We acknowledge this limitation but recommend the Department of Public Safety consider selecting a system capable of including these metrics when evaluating new database systems.

Further, the department also disagreed with our statement that its methodology is not compliant with industry standards. However, as shown in Figure 7, on page 17 of our report, the department's approach excludes call answering and initiating action times, conflicting with the National Fire Protection Association Standard 1710, Section 3.3.64.6. This standard defines total response time as the interval from the alarm receipt at the public safety answering point (the Denver 911 Communications Center) to the first emergency intervention. The 1710 standard further breaks this into three phases:

1. Alarm handling time (transfer, answering, and processing times).
2. Turnout and travel time.
3. Initiating action/intervention time.

Public Safety's methodology excludes call answering time and the time to reach a patient's side after arrival. If timestamps are inaccurate, we recommend the department develop a way of ensuring accurate recording. Aligning response time measurements with industry standards provides a complete view of emergency response performance, enabling process improvements and efficiency gains in response times.

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 Public Safety should use this data to identify potential delays, inefficiencies, and other issues that may impact a patient's safety.

AGENCY RESPONSE – DISAGREE

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.

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.).

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.

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.

— Department of Public Safety

AUDITOR'S ADDENDUM TO AGENCY RESPONSE: In disagreeing with Recommendation 2.2, the Department of Public Safety claims that tracking the time from initial call placement to reaching the patient's side is of low clinical importance and subject to uncontrollable factors that would possibly lead to inaccurate data.

While we acknowledge that external factors can affect data validity, this does not remove the fact that the department is currently not collecting and analyzing total medical emergency response time compliant with the National Fire Protection Association Standard 1710. Specifically, section A.3.3.64.5 of that standard emphasizes tracking and evaluating these times to identify delays and inefficiencies — something that is not being done.

This recommendation is intended to ensure data collection and analysis align with industry standards to enhance decision-making, improve patient safety, and address potential inefficiencies in response times.

FINDING 3 AND RECOMMENDATION

The Emergency Medical Response System Advisory Committee could be more effective

The Emergency Medical Response System Advisory Committee is responsible for overseeing Denver’s emergency medical response system performance. But we found the committee lacks proper organizational structure, which is reflected in its meetings. It has also not documented its activities.

When a committee lacks structure, members cannot effectively collaborate on issues and cannot make improvements together. Similarly, when a committee lacks formalized meeting practices, it cannot ensure it is fully meeting its responsibilities. Denver’s Emergency Medical Response System Advisory Committee is in this position. The lack of structure may be affecting the delivery of high-quality emergency medical services to Denver.

The committee was created in 2009 as part of a 2008 recommendation our office made to provide oversight and monitor the city’s emergency medical service operations. The committee’s responsibilities include:

- Monitoring and reviewing emergency medical response time performance.
- Identifying and recommending strategies for innovation and improvement.
- Providing collaboration and accountability to ensure high-quality emergency medical response delivery.

The committee is composed of Denver leaders and representatives that include the Department of Public Safety, Denver 911, the Denver Fire Department, and Denver Health. The committee has 31 members.

As of October 2023, the committee meets quarterly, and an agenda is prepared. Meetings predating October 2023 have limited documentation to help us determine the meeting frequency and topics discussed.

A Denver Fire official said this change happened because of Denver Health and the Public Safety committee member turnover. However, some members said the committee meetings are informal, the committee does not have a chair, does not have a formal process for meetings, and has only limited discussions with the agencies represented.

Some committee members said they feel the committee does not have the authority to make decisions and can only make recommendations.

We confirmed that, even though the committee has existed since 2009, it has no formal written policies and procedures that can provide structure

to these meetings or to the committee itself. And we found there was insufficient meeting documentation to assess whether the committee is carrying out its responsibilities effectively or even at all.

The 1972 Federal Advisory Committee Act says it is critical for advisory committees to have effective governance and transparency in place to be successful. In particular, a simple way to create more effective meetings is to:

- Designate a meeting leader.
- Have an agenda.
- Keep detailed meeting minutes.
- Provide relevant materials to meeting members, such as previous meeting minutes, reports, or background information on discussion items.

Even though the committee has started to implement good meeting practices, such as using an agenda and meeting regularly, the lack of formalized written procedures and meeting minutes prevents the Emergency Medical Response System Advisory Committee from effectively monitoring and reviewing response time performance, identifying and recommending strategies, and fostering collaboration and accountability.

3.1

RECOMMENDATION

Develop and implement written policies and procedures for conducting committee meetings

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:

- **Setting agendas.**
- **Providing relevant materials to committee members, such as previous meeting minutes, reports, compliance items, and background information on discussion items.**
- **Designating a committee chair, other roles, and member responsibilities.**
- **Keeping meeting minutes for each meeting.**

AGENCY RESPONSE – AGREE

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.

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. 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.

— Department of Public Safety

IMPLEMENTATION EXPECTED BY DEC. 31, 2025

FINDING 4 AND RECOMMENDATION

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

To more effectively support the agencies that comprise the emergency medical response system, it is critical for the Department of Public Safety to have and maintain accurate response time data for decision-making and to ensure all agencies effectively achieve standards in responding to medical emergencies in the community.

But we found the policies and procedures the department uses to analyze and validate the accuracy of response time data lack sufficient detail and appear incomplete. In addition, changes made to the data analysis process are not formally reviewed.

Furthermore, we found noncompliance issues around the operating agreement the city has with Denver Health, because one person is assigned the role of maintaining and reporting accurate response time data with little oversight or guidance.

We found weaknesses in the policies and procedures that guide response time data analysis used by the department's emergency medical response system data analyst to provide systemwide support and analysis of data for Denver 911, Denver Fire, and Denver Health emergency medical response efforts.

Specifically, we found the analyst's policies and procedures are incomplete and do not describe key processes the analyst uses to analyze and create reporting. The data analyst is the only person in charge of creating these reports, and they also developed the policies and procedures we reviewed.

Guidance from the Government Accountability Office says management should design and implement controls through policies and procedures to achieve objectives and respond to risks. Furthermore, policies and procedures should be documented in the appropriate level of detail to help management monitor operating effectiveness.

Because the data analyst is the only person able to run the response time data reports, it is imperative the department ensures it retains the analyst's institutional knowledge through sufficiently detailed policies and procedures should they leave the position.

INCOMPLETE POLICIES AND PROCEDURES – We learned that when the current data analyst position was hired, there was limited procedural documentation available to them. As a result, the analyst developed the policies and procedures currently in use on their own.

Reviewing processes and using sufficiently detailed policies and procedures are important internal controls that can help minimize the risk of errors.

The policies and procedures describe the response time performance metrics outlined in the operating agreement between the city and Denver Health and includes general information about where the data comes from, definitions for key system fields, and where reporting is published. But we found the documentation lacks detail on the specific steps the analyst should take to analyze the data and create required compliance reporting. For example, the documentation does not discuss how exclusions should be applied to the response time data analysis or how the data is combined into reports and uploaded to the internal dashboard the Emergency Medical Response System Advisory Committee uses.

The data analyst's responsibilities for emergency medical response time analysis and reporting are defined in the operating agreement. The data analyst is responsible for analyzing emergency medical response time data to provide performance information to management. This includes ensuring inaccurate data is identified and filtered out, and identifying data that should be excluded from compliance reporting based on requirements from the operating agreement.

In addition, the operating agreement describes several reasons the analyst can exclude certain calls from compliance reporting. This includes calls where a bad address was received or input into the system, where a priority change was made due to new or updated information, and where the call was determined to be outside of the city.

The agreement also requires the analyst to provide performance reports on emergency medical response times to the advisory committee that includes information on compliance with response time goals, time performance, and the count of excluded calls.

The analyst maintains and reports on emergency medical response time performance using an internal dashboard. Exclusions and inaccurate data are automatically identified and processed by a computer script that contains code designed to analyze and return results used to fulfill reporting requirements.

While most of the analyst's work has been automated, the analyst should also be taking additional steps to conduct a manual review of a sample of exclusions to identify the root cause of why the call was excluded, which is required by the operating agreement. We found that this process is also not documented in policies and procedures.

Without detailed and complete policy and procedure documentation that includes all the steps the analyst should take to analyze and develop reports, data analysis and reporting may be performed inconsistently which could increase the likelihood of errors and mistakes. As a result, Public Safety risks making decisions based on inaccurate, incomplete, and inconsistent data.

Because only one staff member is assigned to analyze response time data and prepare reports that are used by all agencies providing Denver's emergency medical system services, having complete and robust policies

and procedures can help ensure data analysis and reporting can continue uninterrupted during a future change in staff.

Furthermore, additional work revealed that this manual review of exceptions has not been completed even though it is required by the agreement.

NONCOMPLIANCE WITH REQUIRED REVIEW – As discussed, the operating agreement requires the data analyst to verify the accuracy of performance data by identifying and excluding certain calls for medical emergencies from analysis and compliance reporting.

Specifically, the operating agreement says the data analyst is tasked with identifying the root cause of at least a representative sample of calls that were excluded from the data. Furthermore, any root cause determined to be outside the control of either the city or Denver Health may be excluded in the calculation but included in compliance reporting.

For example, excessively long response times, which includes total response times more than 60 minutes, are excluded from the response time compliance calculation, but according to the contract a representative sample should be reviewed to understand why the response time was excessively long when considering them as an exclusion.

In addition, we identified 34 incident exclusions that were excluded from the response time reporting because the city data field was blank. According to the data analyst, exclusions are automatically flagged and excluded because the scripts used to compile and run response time reporting are setup to exclude incidents where the city field is blank or is not Denver.

When we reviewed the information associated with each incident, which included street addresses in some cases, we found eight of the 34 incidents were located within Denver city limits and should have been included in compliance reporting.

Although the eight incidents are a small percentage of the number of incidents city agencies responded to during our audit period, the agreement requirement to conduct an exclusion review is an important step in the analysis process to help ensure accurate reporting.

Executive Order No. 8, which establishes the city's policy for contracts and other written instruments, says that contracts, when executed, create a legally enforceable obligation or duty of the city, financial or otherwise. Each department must ensure compliance throughout the life of the contract.

The data analyst said this review has not been completed because they believe they do not have the expertise and knowledge to conduct such a review. The Government Accountability Office says that managers should demonstrate a commitment to recruit, develop, and retain competent personnel. This can be accomplished through training which should be tailored to the needs of the role. By ensuring the data analyst has the

required knowledge and training to review exclusions and identify root causes, management can reduce the risk of noncompliance.

4.1

RECOMMENDATION

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.

AGENCY RESPONSE – DISAGREE

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).*

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 policies, 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.*

— Department of Public Safety

AUDITOR’S ADDENDUM TO AGENCY RESPONSE: In response to Recommendation 4.1, the Department of Public Safety says it has developed policies and procedures for analyzing response

time data. However, we found weaknesses in these policies and procedures. Specifically, they are incomplete, lack sufficient detail to enable users to fully understand the required tasks and how to perform them, and detailed steps necessary for the analyst to analyze the data and create compliance reporting.

We also found the policies and procedures lacked key processes for data analysis, including the process to review a sample of exclusions and identify root causes. This is the responsibility of the data analyst and is required by the operating agreement. The enhancement of the policies and procedures is critical to capture institutional knowledge and ensure data analysis and reporting can continue if there are staff changes.

OBJECTIVE, SCOPE, AND METHODOLOGY

Objective

To determine:

- The degree to which Denver’s 911 response times align with leading practices.
- The extent to which staffing levels affect response times.
- Whether oversight and monitoring are adequate or effective.
- Whether the data used to make decisions is reliable.
- The extent to which contract requirements are complied with.

Scope

As part of assessing emergency medical response time operations, we reviewed whether Denver 911, Denver Fire Department, and Denver Health complied with response time goals. We also reviewed the procedures used to evaluate response times and how the emergency medical response system is overseen and structured.

We reviewed data and documentation from May 2023 through March 2024.

Methodology

We used several methods to gather and analyze information related to the audit objectives. These included:

- Interviewing staff from the Department of Public Safety, Denver 911, Denver Fire Department, and Denver Health, as well as a former Emergency Medical Response System Advisory Committee member.
- Reviewing applicable federal, state, and local laws and regulations.
- Reviewing applicable city executive orders, annual budgets, financial reports, agency plans, and 311 data — as well as annual reports from Denver Health and Hospital Authority.
- Reviewing relevant emergency medical response time audits from the Denver Auditor’s Office, the cities of Austin, Texas; Pittsburgh, Pennsylvania; Chicago, Illinois; Durham, North Carolina; Santa Clara, California; Sacramento, California; Berkely, California; Salt Lake City, Utah; Nashville, Tennessee; and San Antonio, Texas.
- Reviewing the operating agreement between the city and Denver Health, including associated amendments and other memorandums of understanding.
- Reviewing applicable policies and procedures on response time data analysis and reporting, and Denver 911 staff training.
- Conducting on-site walkthroughs of the Denver Fire Department Fire Station 4 and the Denver 911 Communications Center.
- Observing the 911 call processing and dispatching and response time data reporting.

- Analyzing leading practices from the U.S. Government Accountability Office, the National Emergency Number Association, the National Fire Protection Association, the International Academies of Emergency Dispatch, and the Association of Public-Safety Communications Officials International.
- Conducting various analysis relevant to our audit objectives including assessing time compliance for call answering, alarm-processing, assign-to-arrive, and total response times; assessing completeness and accuracy of response time data; assessing quality assurance compliance of Denver 911 and Denver Health dispatchers; surveying several fire departments in other jurisdictions such as Nevada, California, Tennessee, Oklahoma, and Colorado on response time goals used; assessing overtime hours worked of Denver 911 personnel; and comparing various agency and committee activities with leading practices.

Office of the Auditor

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We deliver independent, transparent, and professional oversight in order to safeguard and improve the public's investment in the City and County of Denver. Our work is performed on behalf of everyone who cares about the city, including its residents, workers, and decision-makers.
