



Office of the City Auditor

CONSENT CALENDAR
June 24, 2008

To: Honorable Mayor and Members of the City Council
From: Ann-Marie Hogan, City Auditor
Subject: Audit: Response Times To Calls for Emergency Medical Services Could Be Improved

RECOMMENDATION

Request the City Manager report back by December 2009 (and every six months thereafter) regarding the implementation status of each recommendation in the attached audit report until all recommendations have been reported implemented.

SUMMARY

During fiscal years 2006 and 2007, the City responded to approximately 7,800 priority 1 medical calls (lights and sirens) annually. Approximately 7,500 – 7,600 of these calls were for emergency medical services (EMS) within the incorporated Berkeley City limits. The audit was performed to determine whether the City was timely responding to requests for EMS during those two years.

The following are noteworthy accomplishments identified during the audit:

- The City's EMS response time was better than required by the contract with Alameda County.
- The time for the first unit to arrive at the scene significantly improved from FY2006 to FY2007.
- Average time for the first EMS unit to arrive on-scene at an emergency in Berkeley was much better than the overall average time reported by other jurisdictions as reported by the International City/County Management Association Center for Performance Measurement in their reports for fiscal years 2004 and 2006.

Concerns identified during the audit are as follows:

- It appears the Police Department dispatch time and Fire Department turnout time for EMS could be improved. Turnout time starts when a unit being dispatched acknowledges notification of the emergency and ends when travel time starts. (Finding 1)
- The majority of Fire Department emergency responders reported a need for improvements to dispatch operations and indicated support for the establishment of an emergency medical dispatch program. (Finding 2)
- The criteria used by dispatchers to record the time when an EMS call is dispatched and the time when a unit is en-route to the emergency was not consistent. (Finding 3)
- Reports needed to effectively monitor EMS response time were not available. (Finding 6)
- EMS response times for non-city owned ambulances were often not timely. (Finding 4)
- Performance measures fell short of a patient focused approach. Specifically, the system does not measure the total time from placement of the call for help to time of patient contact. (Finding 5)

The audit report contains six findings (concerns or areas where it appears improvements can be made) and 12 recommendations. Implementation of the recommendations are aimed at improving EMS response time, the availability and accuracy of reporting, and the use of more performance monitoring to help guide ongoing improvements to service delivery.

FISCAL IMPACTS OF RECOMMENDATION

Care was taken to make audit recommendations that appeared to be cost effective to implement. The City Manager agreed to perform a cost-benefit analysis of the possibility of upgrading to a formal emergency medical dispatch system, which could involve significant costs if implemented.

Currently, not all trucks and engines are always staffed with advanced life support (ALS) capabilities. Council is discussing proposing a November 2008 ballot measure to enhance emergency medical response by adding advanced life support capabilities to all seven Fire stations.

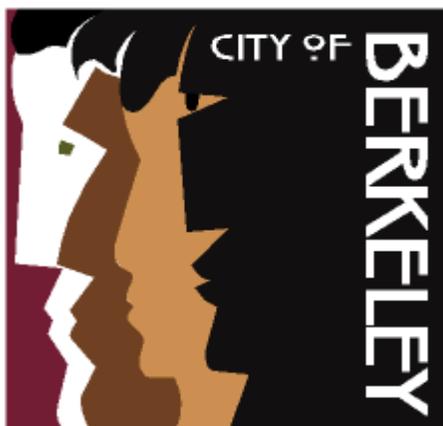
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Attachment:

1. Audit: Response Times To Calls for Emergency Medical Services Could Be Improved

City of Berkeley



Audit: Response Times To Calls for Emergency Medical Services Could Be Improved

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Presented to Council on June 24, 2008

Audit: Response Times To Calls for Emergency Medical Services Could Be Improved
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I. OBJECTIVES

The objective for this audit was to determine if the City is timely responding to requests for emergency medical services.

This performance audit was initiated by the Auditor's Office and was scheduled to be performed as part of the fiscal year (FY) 2008 audit plan. The FY2008 audit plan was presented to the City Council on June 26, 2007.

II. RESULTS

The tables in Appendix B show City EMS response times compared with requirements in the City's ambulance provider agreement with the County of Alameda, procedures recommended by the National Fire Protection Association (NFPA)¹, and as reported by other jurisdictions to the International City/County Management Association (ICMA)².

Positive Results of Audit

- The time for the first emergency medical services (EMS) responder to arrive on-scene at the emergency and the time for the first ambulance to arrive on-scene at the emergency, was better than the County of Alameda ambulance provider agreement requirements. See Appendix B, Table 4 and 5.
- The time for the first unit to arrive at the scene significantly improved from FY2006 to FY2007. See Appendix B, Table 4.
- Average time for the first EMS unit to arrive on-scene at an emergency in Berkeley was much better than the overall average time reported by other jurisdictions as reported by ICMA in their FY2004 and FY2006 reports.

1 NFPA's mission is "to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education" www.nfpa.org

2 ICMA is the professional and educational organization for appointed administrators and assistant administrators in local government. ICMA's Center for Performance Measurement is dedicated to helping local governments improved the effectiveness and efficiency of public services through the collection, analysis, and application of performance information.

Areas of Concern

- Dispatch time for priority 1 EMS calls (lights and siren) did not meet NFPA Standard 1221 and appears close to, but also did not meet, the average for other jurisdictions, indicating room for improvement. (Finding 1)

NFPA Standard 1221	Ambulance Provider Agreement (1)	City FY 2006 Performance	City FY 2007 Performance
Dispatched Within <u>60 Seconds</u> 95% of the Time		46%	48%
	Dispatched Within <u>120 Seconds</u> 90% of the Time	86% (2)	88% (2)

- (1) The City’s ambulance provider contract with the County of Alameda, paragraph 3.5.1, states EMS first responder resources are to be at the scene of priority 1 medical emergencies within 10 minutes, or 8 minutes if dispatch services are not provided by the City. Therefore, it appears the County is providing up to 2 minutes to answer, process, and dispatch each call.
- (2) Excludes the time to answer calls. According to Berkeley Police and Fire representatives, this telephone company data is not always accurate or available.

- Turnout time for emergency medical calls does not meet the NFPA standard 1710. Turnout time starts when a unit acknowledges notification of an emergency to the beginning point of en-route time (unit is moving). The NFPA standard states turnout is to be completed within 60 seconds 90% of the time. Ambulances responding to priority 1 calls in Berkeley only met the 60-second standard 32% of the time in FY2006 and 34% of the time in FY2007. The engines and trucks only met the 60-second standard 23% of the time in FY2006 and 25% of the time in FY2007. (Finding 1)

NFPA response time standards are suggested practices, not regulations or laws. Berkeley Fire has not adopted NFPA standards for dispatch or turnout.

- The majority of Fire Department responders were not satisfied with dispatch services. One reason for this appeared to be that the City’s dispatch was not Fire focused. Questionnaire results from Fire staff show first responders perceive dispatchers need more training in general fire operation, such as calls to a fire, and EMS. Difficulties with equipment was also mentioned. (Finding 2.1)

- Fire Department responders indicated support for establishing a formalized emergency medical dispatch (EMD) program. (Finding 2.2)

- Not all dispatchers were using the same criteria to determine when to record the time of EMS dispatch and the time each unit was en-route (beginning the drive to the emergency location) in the computer aided dispatch (CAD). As a result, the time recorded in CAD by one dispatcher can be different from the time recorded in CAD by another dispatcher for these activities for the same event. (Finding 3)
- EMS response time for non-City of Berkeley ambulances operating in Berkeley was often not timely. These ambulances often did not arrive on-scene within the 12 minutes required by the City's ambulance provider contract with the County of Alameda. (Finding 4)
- EMS performance measures fall short of a patient-focused approach. From the patient's perspective, the clock for response time starts the moment a call for EMS assistance is made and ends when there is patient contact (an emergency medical technician (EMT) or paramedic at their side to give medical aid). The City reports to the County the time from the point the call is answered to the time the first unit arrives at the scene. (Finding 5)
- Reports needed for Fire and Police to adequately monitor EMS response time were not available. (Finding 6)

New Public Safety Technology System

The Police Department has been working with the Fire Department and the Information Technology Department (project lead) to implement a new Public Safety technology system. Recommendations in this report specifically tied to the components of response time and the availability of monitoring reports should provide timely assistance in designing systems for performance measurement tracking and monitoring.

The Berkeley PSAP dispatchers provide emergency medical *service* (EMS). They do not evaluate injury or illness severity, do not prioritize calls, and do not provide life support or medical aid instruction over the phone.

III. BACKGROUND

Public Safety Answering Point (PSAP)

The Berkeley Police Department Central Communication Unit is a Public Safety Answering Point (PSAP), a physical location where emergency telephone calls for police, fire, and medical service in Berkeley are received and from which fire and police units are dispatched.

The PSAP is located in the Public Safety building at 2100 Martin Luther King Jr. Way. Operating costs for the unit were reported at \$4,077,446 for FY2007. During FY2007 the PSAP was authorized to have 28 Public Safety Dispatcher II (PSD II) positions and 4 Supervising Public Safety Dispatcher (Supervising PSD) positions. A Police Lieutenant manages this unit.

From one to three PSD IIs are always on duty to answer the police, fire, and emergency medical services (EMS) calls received at the PSAP. The EMS calls are relayed to the Fire Desk where the assigned PSD II radios and/or calls the EMS units being dispatched with information about the emergency. All medical calls are dispatched as priority 1 calls (lights and sirens) except for type 51-50 which are non-medical transport events. American Medical Response Inc. (AMR) handles the 51-50 transports. AMR also handles priority 1 EMS calls when Berkeley ambulances are not available.

Dispatchers maintain radio contact with EMS staff from the dispatched units until the event ends and the units are again available. Information about the EMS event, including the times specific EMS tasks are initiated and completed, are input into the City's computer aided dispatch (CAD) system by dispatchers as this information is received from the units. Included in the information being recorded for each EMS event is the time the call for each EMS event was answered, the time units were dispatched, the time most units reported they were en-route to the emergency, and the time most units arrived on-scene at the emergency. CAD automatically records the time when a 9-1-1 call is answered.

Public Safety Answering Point (PSAP) Call Volume

An emergency medical *dispatch* (EMD) program is a medically approved system that includes: systematized caller interrogation, systematized pre-arrival instructions including life support instructions, and protocols to evaluate injury or illness severity with vehicle response mode and configuration.

A Police Department report shows that for the first 7 months of calendar year 2007, the Berkeley PSAP received 108,426 calls, or an average of 15,489 calls per month. For calendar year 2007, an AT&T telephone company report shows that the Berkeley PSAP received 35,089 emergency 9-1-1 calls, which is an average of 2,924 calls per month.

City CAD data shows the City responded to approximately 7,800 calls categorized as priority 1 “MED” or medical calls each of the last two fiscal years. Approximately 7,500 – 7,600 of these calls were for EMS within the incorporated Berkeley City limits. Some of these became closed events, meaning they ended before completion of the entire chain of events. PSAP management stated almost all emergency medical calls are categorized as “MED” or medical calls. However, the medical call volume numbers above do not include EMS events coded as types 1181 (traffic accident with injuries), “Both” (Fire and Police calls), and a few others.

Berkeley Public Safety Answering Point (PSAP) Operating Procedures

Berkeley does not have an Emergency Medical Dispatch (EMD) program. The Journal of Emergency Services (JEMS) reports that 80% - 90% of the cities that responded to their national surveys reported having an emergency medical dispatch program. The California EMS Authority states an EMD Program should include an EMD protocol reference system, “...a medically approved protocol based system used by emergency medical dispatchers to interrogate callers, dispatch aid, and provide dispatch life support instructions during medical emergencies.”

The Berkeley PSAP dispatches all emergency medical calls as priority 1 calls with lights and sirens. Since the Berkeley PSAP does not have an emergency medical dispatch program, calls are not prioritized, and no dispatch life support instructions, such as how to give CPR, are provided over the phone. Call takers at the PSAP ask the following questions for EMS calls:

- How old is the patient?
- Sex of patient?
- Medical complaint?
- Someone able to answer the door?

There are no federal or state regulations governing Berkeley PSAP’s answering and dispatching of 9-1-1 medical calls.

Police Dispatch Training for Public Safety Dispatchers

The Berkeley Police Department is a member of the Commission on Peace Officer Standards and Training (POST). POST is an agency established by the State Legislature that sets the minimum selection and training standards for California law enforcement. The POST program is voluntary, but participating agencies agree to abide by the standards established by POST.

Berkeley dispatchers attend a POST 120 hour Public Safety Dispatcher's Basic Course. The course provides police dispatch instruction. It does not cover fire or EMS dispatch.

In addition to the POST training, all Berkeley dispatchers participate in a 20-week in-house training. The Police Captain that formerly managed the Berkeley PSAP stated that four of these weeks focus on fire department dispatch (both fire and EMS events). According to the Deputy Fire Chief, all dispatchers also participate in ride-alongs with Fire. None of the dispatchers receive EMD training.

The City has 7 engines, 2 ladder trucks, and 3 ambulances in regular service throughout the City.

Fire Department – Units Responding to Emergency Medical Services (EMS) Calls

The Berkeley Fire Department provides emergency ambulance service and advanced life support (ALS) services within the incorporated areas of Berkeley under an agreement with the County of Alameda. During FY2007, the Fire Department had a total budget of approximately \$25 million and 136.75 full time equivalent employees, including support staff.

An ambulance, and either a ladder truck or engine, are dispatched to emergency medical calls. The truck or engine generally arrives first. According to Fire management, all sworn firefighters are trained to the level of emergency medical technician (EMT), and some are trained to the more advanced paramedic level (qualified to provide advanced life support (ALS)).

All personnel assigned to a first responding company will be either an EMT or paramedic. Engines and trucks are generally staffed with EMTs. These individuals provide basic life support to the patient until the ambulance arrives. Each ambulance is staffed with two paramedics to provide ALS to the patient.

Staff on the three ambulances provide advanced life support (ALS).

Council is discussing proposing a November 2008 ballot measure to enhance emergency medical response by adding advanced life support capabilities to all seven Fire stations.

Currently, not all trucks and engines are always staffed with ALS capabilities.

The City of Albany and the City of Piedmont Fire Departments provide ambulance service within the Berkeley City limits when City of Berkeley ambulances are not available. A private ambulance provider, American Medical Response (AMR), also provides ambulance service when Berkeley ambulances are not available, as well as non-emergency transport. The City also has an automatic aid agreement with Lawrence Berkeley National Laboratory to respond to priority 1 EMS calls with an engine in a small portion of the UC campus and a small portion of the City just beyond the campus.

Emergency Medical Services (EMS) Unit Response Time Requirements in County Contract

Under section 3.5 of the agreement with the County of Alameda, Berkeley emergency medical responders, and those authorized to provide EMS in Berkeley, must meet the following emergency medical response time requirements:

Basic Life Support – At the Scene Time Requirement	Advanced Life Support – At the Scene Time Requirement
First unit (usually engine) at the scene of priority 1 medical emergency within 10 minutes of the call being received at the City’s PSAP. Time requirement must be met 90% of the time.	Ambulance at the scene of priority 1 medical emergency within 12 minutes of the call being received at the City’s PSAP. Time requirement must be met 90% of the time.

EMS Response Time Standards Vary by Jurisdiction and Provider

Currently there are no Federal or State regulations that dictate how EMS elapsed response time is to be calculated. The Journal of Emergency Services (JEMS) reports that different jurisdictions and private ambulance providers use different methods for measuring EMS response time. From the patient’s perspective, the clock for response time starts the moment a call for EMS assistance is made and ends at the point of patient contact. The City’s contractual response time measure begins when the call is received and ends when an EMS unit arrives at the scene of the emergency (excludes actual patient contact).

Many EMS systems, including Berkeley’s, use performance measures which fall short of a patient – focused approach.

A lack of consistency in EMS terminology among various entities was also observed. Terminology was not always used or understood in the same way. The auditors took care to only compare Berkeley’s performance with like standards or actuals.

The National Fire Protection Association (NFPA) uses the terminology in the table below to describe three main components of EMS response time that were examined during this audit.

Dispatch Time	Time PSAP receives a call until units are notified of emergency.
Turnout Time	Time when unit acknowledges notification of emergency to the beginning point of response time (unit is moving).
Travel Time (1)	Begins when a unit is en-route to an emergency and ends when the unit arrives at the scene.

(1) NFPA refers to this phase of time as “response time”. However, this term is not used in this table, to avoid confusion. Section 1.39 of the County of Alameda contract defines “response time” as the time measured from the time of call until arrival on-scene.

In cities where defibrillation is provided within 5 to 7 minutes, the survival rate from sudden cardiac arrest is reportedly as high as 30-45%.

New CAD System Is Being Implemented

The Police Department has been working with the Fire Department and the Information Technology Department (project lead) to implement a new Public Safety technology system. On September 3, 2007, the City entered into a contract with New World Systems Corporation for the planning, procurement, and implementation of such a system. The new system will include new computer aided dispatching (CAD), records management, and in field reporting. This new system and how it may effect the Berkeley PSAP was not included in the scope of this audit. Our recommendations should provide useful guidance for reports development. According to Information Technology staff, the new CAD system is expected to be operational by the end of calendar year 2008.

Fast Emergency Medical Care Can Save Lives

The American Heart Association reports “brain death and permanent death” start to occur in just 4 to 6 minutes after someone experiences cardiac arrest. They also report cardiac arrest can be reversed if treated within a few minutes with an electric shock to the heart to restore a normal heartbeat, a process called defibrillation. Additionally, they report that a victim’s chances of survival are reduced by 7 to 10 percent with every minute that passes without CPR and defibrillation.

IV. FINDINGS AND RECOMMENDATIONS

Finding 1 Police Dispatch Time and Fire Turnout Time for EMS Could Be Improved

It appears dispatch times and turnout times can be shortened, improving arrival time for EMS responders. Although the time for the first unit to arrive on-scene is significantly better than the County of Alameda contract requirement and ICMA’s FY2004 and FY2006 average, it does not meet NFPA standards 1221 and 1710.

Dispatch Time

City dispatch time did not meet NFPA Standard 1221 and appears close to, but also did not meet, the average for other jurisdictions, indicating room for improvement.

1. NFPA Standard 1221 states EMS events should be dispatched within 1 minute 95% of the time and within 1½ minutes 99% of the time. For FY 2007 the COB PSAP dispatched only 48% of calls within 1 minute and only 75% of calls within 1½ minutes. See Appendix B, Table 1.
2. EMS calls dispatched by the City appeared to take 3 – 8 seconds longer than the average reported by other jurisdictions to ICMA. See Appendix B, Table 1.

Although the County of Alameda imposes no specific dispatch time requirement on the City, the contract implies it should be within two minutes 90% of the time, and include call answer time at the Berkeley PSAP (ring time). The COB PSAP dispatches within two minutes 86%-88% of the time, missing the 90% dispatch benchmark. In addition, COB dispatch time does not include ring time. See Appendix B, Table 1. It appears ring time would add approximately 10 seconds to the Berkeley dispatch time, and COB PSAP dispatch time would fall further behind the implied contract standard.

Berkeley PSAP representatives indicated that they thought their dispatch time was good. They also stated that they believed the NFPA standard was not achievable and was not being met by other jurisdictions. However, a Supervising Public Safety Dispatcher also stated that dispatch time could be shortened if calls were dispatched before all information was obtained from the caller. Representatives also indicated staffing levels had a direct effect on dispatch time.

For FY2007 and FY2008 the Berkeley PSAP was authorized to have 28 dispatchers, plus 4 supervisory dispatchers. However, during a February 2008 meeting, Police representatives stated that currently only 21 dispatchers were available to work, 3 were in training, 1 was on parental leave, and there was 1 job offer being made to a perspective employee. A supervising dispatcher stated the PSAP had only been fully staffed 3 times in their 25 years employed at the Berkeley PSAP, and never for more than a month to a month and a half³.

Turnout Time

The City's ambulance provider contract imposes no specific turnout time⁴ requirement on the City. However, the City's turnout time was not meeting the NFPA standard of 90% of the time completion within one minute. During fiscal years 2006 and 2007, EMS turnout time for Berkeley responders was within 2 minutes 30 seconds approximately 90% of the time. Ambulances operating within Berkeley met the 1 minute turnout standard only 32% of the time in FY2006 and only 34% of the time in FY2007. Engines and trucks only met the 1 minute standard 23.3% of the time in FY2006 and 25% of the time in FY2007.

Recommendation for Police

- 1.1 Once the new Public Safety technology system is in operation, but within one year's time, Police should routinely examine EMS events that took significantly longer than 1 minute (or other reasonable performance measure) to dispatch, and identify areas where dispatch time can be shortened. Update written policies and procedures to correct problems found. Consider hiring a consultant to perform this analysis and make recommendations for improvement.

3) An audit report on Police lost time and overtime, including dispatch, is currently being finalized.

4) Time unit acknowledges notification of the emergency until start of travel time.

Recommendation for Fire

- 1.2 Once the new Public Safety technology system is in operation, but within one year's time, Fire should routinely examine EMS events that took significantly longer than 1 minute (or other reasonable performance measure) for turnout, and identify areas where turnout time can be shortened. Update written policies and procedures to correct problems found. Consider hiring a consultant to perform the analysis and make recommendations for improvement.

Finding 2 Majority of Fire Department Emergency Responders Reported Dissatisfaction with Dispatch Services and Support for Establishing an EMD Program

The POST training provided to the dispatchers, which address only police calls, the four-week in-house training focused on fire department dispatch, and the ride along with Fire, might not be sufficient training.

- 2.1 A majority of Berkeley Fire staff (first responders to Fire and EMS calls) indicated in a November 2006 survey that they were not satisfied with COB dispatch services.
- 53% responded that the effectiveness of the COB Fire dispatch system was unsatisfactory.
 - 66% disagreed or strongly disagreed that COB safety dispatchers had an adequate understanding of the concepts of fire operations.
 - 47% disagreed or strongly disagreed that the COB PSAP accurately reported their out-of-service status.
 - 54% disagreed or strongly disagreed with the statement, "During my shift a safety dispatcher is always available for us to talk to by radio".

One reason for the high level of dissatisfaction with the dispatch of Fire services may be a perception that the COB dispatch is not Fire focused. Responses from first responder Fire staff show they perceive dispatchers are not properly trained in general fire operation, such as calls to a fire, and EMS. Problems with equipment were also mentioned.

- 2.2 The COB PSAP is not authorized to provide emergency medical dispatch (EMD). Emergency medical dispatch is a medically approved system used to provide aid for medical emergencies that includes: systematized caller interrogation questions, systematized pre-arrival instructions including life support instructions (such as how to provide CPR), and protocols matching the dispatcher's evaluation of injury or illness severity with vehicle response mode and configuration.

Fire Department first responder personnel appeared to support an EMD program. The lack of a formal EMD program may also be a factor in Fire Department first responder dissatisfaction with dispatch services.

- 68% disagreed or strongly disagreed that dispatchers provide them with sufficient and accurate information when dispatching them to an EMS call.
- 83% agreed with the statement that more lives would be saved if dispatchers had emergency medical dispatch training.

Call takers at the PSAP generally are prohibited from doing little more than asking the following questions for emergency medical calls:

- How old is the patient?
- Sex of patient?
- Medical complaint?
- Is someone able to answer the door?

The Journal of Emergency Services (JEMS) reports that 80% - 90% of the cities responding to their national surveys reported having an emergency medical dispatch program. However, according to the Police Chief, EMD might not significantly improve service because, in Berkeley, the time to arrive on scene is shorter than in many other cities. This is because Berkeley has seven fire stations in approximately an eleven square mile radius, so the distance traveled is not as great as some rural areas where EMS has to travel half an hour to get to the patient. In areas where EMS would have to travel a greater distance, EMD would be more important. According to Police representatives, a doctor would have to develop and oversee the program, and additional dispatchers would be required.

Recommendations For Police and Fire

- 2.1 Fire and Police should jointly identify outside training, or develop adequate training internally, to assist Berkeley call takers and dispatchers to more effectively meet the needs of Fire personnel, as well as police field staff. To determine these needs, consider periodically performing a “customer service” survey of fire staff and police patrol staff.
- 2.2 Once the new Public Safety technology system is in operation, but within 18 months, prepare a cost-benefit analysis to determine if the City should establish an emergency medical dispatch (EMD) program.

Finding 3 Inconsistent Criteria Was Used to Determine When to Record Some EMS Response Times

The criteria used by dispatchers to record the time when an EMS call was dispatched and the time when a unit was en-route was not consistent. There were no written policies and procedures establishing specific criteria. As a result, when elapsed dispatch and elapsed en-route times were calculated using CAD data, elapsed time data was not as accurate as it could have been.

A Supervising PS Dispatcher stated dispatchers were using one of three criteria to determine when to record dispatch time: 1) when contacting (ringing down) the units on the radio and/or the phones, 2) while talking with the units while on the radio and/or the phones, or 3) after disconnecting with the units from the radio and/or phones.

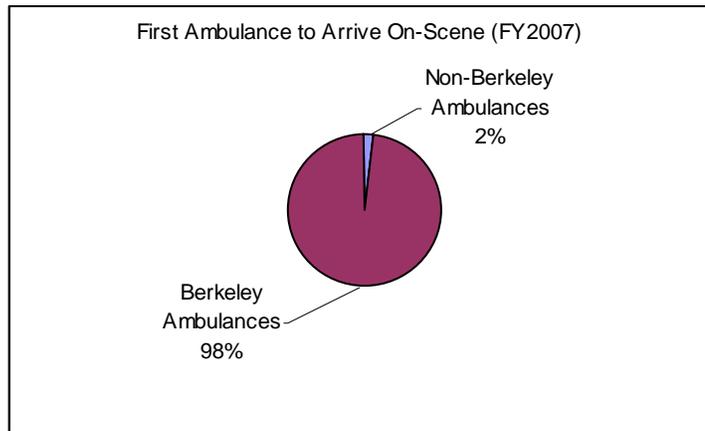
Regarding en-route time, one Supervising PS Dispatcher stated en-route time was recorded in CAD when responders on the unit being dispatched told them they were en-route. Another Supervising PS Dispatcher stated they recorded en-route time after they disconnected the call. They further stated that they did this because too often the Fire units would not notify them when they were en-route.

Recommendations for Police

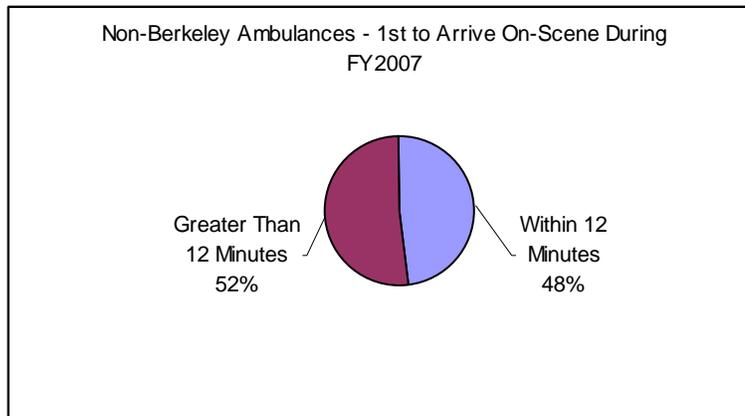
3. Once the new Public Safety technology system is in operation, but within one year's time, update PSAP written policies and procedures, and the training manual, to include the specific criteria as to when dispatch time and en-route time are to be recorded in CAD.

Finding 4 EMS Response Times for Non-City Owned Ambulances Were Often Not Timely

The City's ambulance provider contract with the County of Alameda requires that advanced life support service response times (which the ambulance units provide) be within 12 minutes 90% of the time. During FY 2007, ambulance units operated by American Medical Response Inc. (AMR), the City of Albany, and the City of Piedmont, were the first ambulance units to arrive on-scene for 2.2% of the priority 1 events in Berkeley.



However, they accounted for 19.2% of the FY2007 priority 1 medical events that exceeded the City’s ambulance provider response time requirement of 12 minutes. In other words, more than half the time that non-COB ambulances responded to a priority 1 medical emergency call, they did not arrive at the scene of the emergency within the required 12 minutes.



Almost all the non-COB ambulance responses were from the City of Albany and AMR. Fire management stated that response times were longer for non-Berkeley ambulances because they had to travel further. Fire management also stated that non-COB ambulances respond to EMS calls in Berkeley under a separate contract with the County of Alameda.

Recommendation For Fire

- 4.1 Determine whether anything can be done to reduce response times for priority 1 medical calls handled by non-Berkeley ambulances. Provide this information to City Council with the Fire Department’s recommendations for corrective action, if any.

- 4.2 Even if there is no opportunity to improve response times for priority 1 medical calls handled by non-Berkeley ambulances, clearly identify in reports to Council the response times attributed to non-Berkeley ambulances versus times attributed to Berkeley's EMS first responders.

Finding 5 Performance Measures Fell Short of a Patient-Focused Approach

Many EMS systems, including Berkeley's, use performance measures that fall short of a patient-focused approach. From the patient's perspective, the clock for response time starts the moment a call for EMS assistance is made and ends when there is patient contact (an EMT or paramedic at their side to give medical aid). This is referred to as the "patient expectation of response". The City's contractual response time measure begins when the call is received at the Berkeley PSAP and ends when an EMS unit arrives on-scene (excludes actual patient contact). The City does not measure to the point where an EMS responder is at the patient's side.

According to JEMS, not using a patient-focused approach is problematic because the reported response times may give the impression that response time is better than it actually is. Also, only a portion of the EMS response is being captured, limiting the opportunity to improve performance. "Not including all of the intervals involved in the process limits the information available and can leave managers blind to areas in need of improvement". According to Police and Fire representatives, currently 1) the telephone company does not have a system that always accurately records when a call is received, and 2) some 911 cell calls are initially routed to Vallejo highway patrol or other call centers and then subsequently routed to the Berkeley PSAP, and the time the call was received at the first call center is not available.

Recommendations For Fire

- 5.1 Once the new Public Safety technology system is in place, but within 12 months, consider establishing and reporting on performance measures that are more patient focused. Each segment of time: call handling, dispatch, turnout, travel, on-scene, and patient contact should be measured as part of total response time. Each segment should be monitored to identify areas for improvement. If changes in technology allow, begin reporting on the time the call is placed.
- 5.2 Since the delay in ring time at the Berkeley PSAP can be several minutes when an emergency call is initially received at a location other than the Berkeley PSAP, continue community outreach efforts to inform the public of the importance of directly dialing (510) 981-5911 from cell phones in case of emergency.

Finding 6 Reports Needed to Effectively Monitor EMS Response Time Were Not Available

The Fire and Police Departments did not have reports with the EMS response time data that they need to effectively monitor EMS response time performance including dispatch time, turnout time, and first unit at scene time. Performance measures, or useful performance measures, for dispatch time and en-route time also were not available. Having measures that encourage dispatchers and responders to perform at their best, and reports that can be used to compare performance measures with actual activity, helps improve service delivery.

1. Reports that would permit EMS dispatch time, turnout time, and first unit to arrive on-scene time to be adequately monitored were not available. For example, a report to monitor compliance with section 3.5 of the City’s ambulance provider contract, which requires that the first unit at EMS emergencies must arrive on-scene within 10 minutes 90% of the time, is not available. Summary reports that are available report on the overall average time, for example, the overall average time for the first units to arrive on-scene. However, the City’s contract with the County of Alameda uses the more accurate fractile method to measure response time.
2. The five-minute dispatch performance measure established for the Berkeley PSAP and applied to EMS calls is too generous. For FY2007, the City dispatched 88% of the priority 1 EMS calls within 2 minutes. Having a five-minute elapsed dispatch time performance measure does not convey a message to dispatchers that management expects the dispatch of EMS calls to be done as quickly as possible. There is also no performance measure for turnout time.
3. The Berkeley Fire Department was not tracking patient outcomes for patients with a condition in which a successful outcome relies on a quick EMS response time, such as patients with cardiac arrest. JEMS reported in their 2007 national survey results that 84% of the survey respondents measured their performance by tracking the clinical outcomes of cardiac arrest patients. JEMS also reported that almost two thirds of the survey respondents track whether patients received bystander CPR prior to the arrival of EMS responders arrival and report that an average of 24.9% patients do.

The preferred fractile method measures an established response time goal and the level of compliance in meeting that goal (e.g., arrived on-scene in under 10 minutes 90% of the time).

Recommendation For Fire and Police

- 6.1 Using the fractile method, establish performance measures for elapsed dispatch time, elapsed turnout time, etc. that sufficiently challenge dispatchers and EMS responders to perform their duties as quickly and

efficiently as is practical.

Recommendations For Fire, Police, and Information Technology

- 6.2 During implementation of the new Public Safety technology system, work with the vendor to ensure that reports are designed to enable implementation of our recommendations for better monitoring and improved patient-focused information. Produce reports that permit the Fire Department to effectively monitor EMS response time, including dispatch time, turnout time, and first unit to arrive on-scene time. Actual performance should routinely be compared with established performance measures and industry standards. Reports should also permit the Fire Department to effectively monitor compliance with the County of Alameda ambulance provider contract and to quickly identify and correct areas of contract non-compliance.

- 6.3 Track patient outcomes for patients with a specific condition in which a successful outcome relies on a quick EMS response time, such as patients with cardiac arrest. Use data gathered to evaluate performance and to consider new procedures that could improve patient outcome.

V. CONCLUSION

We commend the Fire Department for responding to EMS calls within the time requirements established in the ambulance provider agreement with the County of Alameda. We also want to commend both the Police and Fire departments for notable improvement from FY2006 to FY2007 in the City's time for the first unit to arrive at the scene of the emergency. In an effort to further reduce service delivery times, we recommend establishing specific criteria as to when to record the time for some activities, generating better reports, strengthening oversight of EMS response time components (including dispatch time and turnout time), and reviewing procedures and training for possible areas of improvement, possibly with assistance from a consultant. Implementation of our audit recommendations should result in improved response times.

If funds are available, the City should also consider implementing an EMD Program as a means of improving emergency medical services. It appears such a program may result in provision of better information about emergency medical events to EMS responders, improvements in EMS vehicle response mode and vehicle response configuration, and availability of emergency medical instruction, such as CPR, to callers.

The Police Department has been working with the Fire Department and the Information Technology Department (project lead) to implement a new Public Safety technology system. It is anticipated that the new systems will facilitate monitoring and reporting on response time, as well as permitting some tasks to be performed more quickly.

Beginning to implement several of our recommendations will require working with the new software vendor now, during installation, to determine what new reports are needed. Other recommendations can more effectively be addressed after the new system is up and running. The auditors recognize that establishing a new system takes time. However, if the new system is not operational within a reasonable amount of time, alternative methods currently available should be used to implement our recommendations.

Appendix A: Scope and Methodology

Audit scope was limited to:

- The length of time taken by the Berkeley Police Department to dispatch priority 1 (lights and sirens) emergency medical services (EMS), and
- The length of time taken by the Berkeley Fire Department (or other assigned responder) to arrive on-scene at the medical emergency.

This audit covered only EMS response time data within the incorporated areas of Berkeley during the period July 1, 2005, to June 30, 2007.

Audit methodology largely entailed using the EMS time data in the City's computer aided dispatch (CAD) system to calculate and analyze EMS response time data for FY2006 and FY2007. Calculations and analysis were based solely on type "MED" (medical) calls in CAD. According to a Supervising Public Safety Dispatcher, almost 100% of the emergency medical calls are type "MED" calls. Berkeley EMS response time data was compared with response time requirements in the City's Ambulance provider agreement (with the County of Alameda), other jurisdictions, and a standard setting body. A general understanding of the Berkeley Police Department's PSAP dispatch operations was also obtained. Audit fieldwork largely concluded during February 2008.

A review of the adequacy of the Berkeley Fire Department's EMS procedures, and whether or not they are being followed, was not included in the scope of this audit. The quality of the medical service being provided was also not reviewed.

The information used to perform this audit was obtained primarily through:

- Conducting a walkthrough at the Police Department Central Communications unit. The walkthrough focused on identifying what EMS time data was available in CAD, and the source of this information.
- Using data extract and analysis software (ACL and Microsoft Excel software) to compile and analyze City of Berkeley EMS response time data from CAD.
- Discussions with Police Department Central Communication Unit staff, Information Technology Department staff, Fire Department staff, and an outside consultant who was knowledgeable about the City's CAD system.
- Reviewing Police and Fire Department written policies and procedures, and training manuals, pertaining to EMS dispatch.
- Surveying Fire Department employees with questions pertaining to their satisfaction with the Central Communications Unit.
- Obtaining EMS response time benchmark data from various sources including the internet and City staff.

Our review was conducted in accordance with 2003 Generally Accepted Government Auditing Standards for a performance audit and was limited to those areas specified in the scope and methodology section of this report.

Appendix B: Summary Schedules With Emergency Medical Response Time Data

Table 1

Dispatch Time (1st Unit Dispatched for Each Event)

Dispatch	City FY2006	City FY2007	NFPA Standard	Contract With County (3)	FY2004 ICMA Average (4)	FY 2006 ICMA Average (4)
Count - EMS Events With Elapsed Dispatch Time Data	7,361	7,530				
EMS Events That Have an Elapsed Dispatch Time of Zero	53	49				
EMS Events Dispatched Within 1 Minute (60 Seconds)	46.4% (1)	48.0% (1)	95% (1)			
EMS Events Dispatched Within 1½ Minutes (90 Seconds)	71.5% (1)	74.7% (1)	99% (1)			
Events Dispatched Within 2 Minutes (120 Seconds)	85.8% (1)	87.7% (1)		90% (2)		
Average Dispatch Time (5)	1:18 (1)	1:15 (1)			1:12 (1)	1:10 (1)

- (1) Excludes the time from receipt of each call at the PSAP until it is answered (ring time).
- (2) Includes the time from receipt of each call at the PSAP until it is answered (ring time).
- (3) The Alameda ambulance provider contract (paragraph 3.5.1) states EMS first responder resources are to arrive on the scene of priority 1 medical emergencies within 10 minutes, or 8 minutes if dispatch services are not provided by the City. Therefore, it appears the County is providing up to 2 minutes to answer, process and dispatch each call.
- (4) International City/County Management Association (ICMA) - Comparative Performance Measurement. Average dispatch time provided by US Cities and Counties responding to an ICMA questionnaire.
- (5) Average is approximate based on CAD data.

Table 2

Turnout Time (Ambulances)

Turnout Time - Ambulances	City FY2006	City FY2007	NFPA Standard
Occurrence Count	7,239	7,443	
Turnout Time Was Within 1 Minute (60 Seconds)	31.6%	33.9%	90%
Turnout Time Was Within 2 Minutes (120 Seconds)	73.8%	75.3%	
Turnout Time Was Within 2½ Minutes (150 Seconds)	87.1%	87.8%	
Average Turnout Time*	1:31	1:27	

* Average is approximate based on CAD data.

Table 3

Turnout Time (Engines and Trucks)

Turnout Time – Engines and Trucks	City FY2006	City FY2007	NFPA Standard
Occurrence Count	6,946	7,077	
Turnout Time Was Within 1 Minute (60 Seconds)	23.3%	25.2%	90%
Turnout Time Was Within 2 Minutes (120 Seconds)	70.0%	70.5%	
Turnout Time Within 2½ Minutes (150 Seconds)	86.7%	87.0%	
Average Turnout Time*	1:38	1:36	

* Average is approximate based on CAD data.

Table 4

First Unit At the Scene -Arrival Time (Engine, Truck, or Ambulance)

First At the Scene	City FY2006	City FY2007	County Contract	NFPA Standard	FY2004 ICMA	FY2006 ICMA
Count – Priority 1 EMS Events With a Unit At the Scene	7,086	7,310				
1 st Unit Arrives On-Scene Within 6 Minutes	63.0% (1)	66.6% (1)		90% (1)		
1 st Unit Arrives On-Scene Within 10 Minutes	95.8% (1)	96.6% (1)				
1 st Unit Arrives On-Scene Within 10 Minutes (Additional 10 Sec. Added To Allow For Answering the Call) (2)	95.5%	96.3%	90%			
Average 1 st On-Scene Arrival Time (3)	5:50 (1)	5:38 (1)			6:47 (1)	6:30 (1)

(1) Does not include ring time.

(2) An AT&T report shows that for calendar year 2007 the COB PSAP answered 93.4% of 9-1-1 calls within 10 seconds. Inclusion of 10 seconds for ring time had very little impact on arrival time. According to Berkeley Police and Fire Department representatives, ring time data is not always accurate or available.

(3) Average is approximate based on CAD data.

Table 5

First Ambulance At the Scene (Arrival Time)

Ambulance On-Scene	City FY2006	City FY2007	County Contract	NFPA
Count – Priority 1 EMS Events With an Ambulance At the Scene	6,579	6,839		
1 st Ambulance Arrives On-Scene Within 10 Minutes	85.0% - 86.8% (1),(3)	86.6% - 88.2% (1),(3)		90% (1)
1 st Ambulance Arrives On-Scene Within 12 Minutes	91.5% - 93.3% (1),(3)	92.3% - 94.0% (1),(3)	90% (2)	

- (1) Does not include ring time.
- (2) Includes ring time.
- (3) There were 2 or more first on-scene times in CAD for the first arriving ambulance approximately 3%-4% of the time. The first number in the range above represents the last “first” to arrive on-scene time recorded and the second number, the earliest “first” to arrive on-scene time recorded for this same ambulance.
- (4) County contract includes the time to answer the EMS call; however, this time is not included in the COB first ambulance at the scene arrival time.

**City Manager's
Response**

Finding 1 Police Dispatch Time and Fire Turnout Time for EMS Could Be Improved

City Manager's Response -Agree

The Police Chief notes that dispatch times have already shown improvement and the Berkeley 2007 average dispatch time is within 3 seconds of the 2004 ICMA average and 5 seconds of the 2006 ICMA average.

Recommendation for Police

1.1 Once the new Public Safety technology system is in operation, but within one year's time, Police should routinely examine EMS events that took significantly longer than 1 minute (or other reasonable performance measure) to dispatch, and identify areas where dispatch time can be shortened. Update written policies and procedures to correct problems found. Consider hiring a consultant to perform this analysis and make recommendations for improvement.

City Manager's Response - Agree

The Police Department has already begun examining dispatch times by individual personnel to determine if there is an overall trend, or if individual dispatchers have significantly different average dispatch times. Staff also believes that consistent recording of EMS dispatch and response times (see finding #3) will provide more accurate data and may show that dispatch times are shorter than what is shown with the current data.

Recommendation for Fire

1.2 Once the new Public Safety technology system is in operation, but within one year's time, Fire should routinely examine EMS events that took significantly longer than 1 minute (or other reasonable performance measure) for turnout, and identify areas where turnout time can be shortened. Update written policies and procedures to correct problems found. Consider hiring a consultant to perform the analysis and make recommendations for improvement.

City Manager's Response - Agree

When the new system is in place it will have an integrated dispatching of all apparatus. This recommendation will be implemented by June 2009.

Finding 2 Majority of Fire Department Emergency Responders Reported Dissatisfaction with Dispatch Services and Support for Establishing an EMD Program

City Manager's Response- Agree

The Police Chief notes that the firefighter survey data should be viewed with caution since it is not unusual for there to be friction between field staff and dispatchers in public safety settings due to their different responsibilities, separate work locations and limited face to face interactions.

Recommendations For Police and Fire

- 2.1 Fire and Police should jointly identify outside training, or develop adequate training internally, to allow Berkeley call takers and dispatchers to more effectively meet the needs of Fire personnel, as well as Police field staff. To determine these needs consider periodically performing a "customer service" survey of fire staff and police patrol staff.
- 2.2 Once the new Public Safety technology system is in operation, but within 18 months, prepare a cost-benefit analysis to determine if the City should establish an emergency medical dispatch (EMD) program.

City Manager's Response - Agree

- 2.1 *In August 2007, additional training was developed for fire dispatch, which focused on updating dispatchers on structure fire protocols. After the new training is complete, Police will consider performing periodic surveys of fire and police staff to identify the effectiveness of the new training and additional dispatch training needs.*
- 2.2 *A cost-benefit analysis will be performed by December 2009 to determine whether the City should move toward establishing an EMD program. However, the intent of enhancing emergency medical response may be more effectively addressed by the proposed November 2008 ballot measure, which would fund adding advanced life support capabilities to all stations.*

Finding 3 Inconsistent Criteria Was Used to Determine When to Record Some EMS Response Times

City Manager's Response - Agree

Recommendations for Police

3. Once the new Public Safety technology system is in operation, but within one year's time, update PSAP written policies and procedures, and the training manual, to include the specific criteria as to when dispatch time and en-route time are to be recorded in CAD.

City Manager's Response - Agree

The Police Department will update the PSAP written policies and procedures and training manual by June 2009.

Finding 4 EMS Response Times for Non-City Owned Ambulances Were Often Not Timely

City Manager's Response - Agree

Recommendation For Fire

- 4.1 Determine whether anything can be done to reduce response times for calls handled by non-Berkeley ambulances. Provide this information to City Council with the Fire Department's recommendations for corrective action, if any.
- 4.2 Even if there is no opportunity to improve response times for calls handled by non-Berkeley ambulances, clearly identify in reports to Council the response times attributed to non-Berkeley ambulances versus times attributed to Berkeley's EMS first responders.

City Manager's Response

Fire agrees with the recommendations. Since it is likely that nothing can be done to reduce response times for calls handled by non-Berkeley ambulances, alternatively, Fire will clearly identify in reports to Council the times attributed to non-Berkeley ambulances versus times attributed to Berkeley's EMS first responders.

Finding 5 Performance Measures Fell Short of a Patient Focused Approach

City Manager's Response - Agree

Recommendations For Fire

- 5.1 Once the new Public Safety technology system is in place, but within 12 months, consider establishing and reporting on performance measures that are more patient focused. Each segment of time: call handling, dispatch, turnout, travel, on-scene, and patient contact should be measured as part of total response time. Each segment should be monitored to identify areas for improvement. If changes in technology allow, begin reporting on the time the call is placed.
- 5.2 Since the delay in ring time at the Berkeley PSAP can be several minutes when an emergency call is initially received at a location other than the Berkeley PSAP, continue community outreach efforts to inform the public of the importance of directly dialing 510 981-5911 from cell phones in case of emergency.

City Manager's Response - Agree

- 5.1 *The Fire Chief notes that the new CAD system will not be able to track ring time. Once reliable technology is available to accurately record ring time and patient contact, Fire will incorporate these segments into their performance monitoring system. Fire will determine whether to develop and report on additional performance measures that are more patient-focused by December 2009.*
- 5.2 *The Police Department has emphasized the use of 981-5911 as an emergency number for cell phone users since the current City telephone system became operational almost eight years ago. 981-5911 is listed as the cell phone emergency number in the AT&T White Page Directory, on the Police Department web site and in other police publications. The Police Department will continue to encourage the use of this number in their community outreach such as publications and community meetings.*

Finding 6 Reports Needed to Effectively Monitor EMS Response Time Were Not Available

City Manager's Response - Agree

Recommendation For Fire and Police

- 6.1 Establish performance measures for elapsed dispatch time, elapsed turnout time, etc. (using the fractile method) that sufficiently challenge dispatchers and EMS responders to perform their duties as quickly and efficiently as is practical.

Recommendations For Fire, Police, and Information Technology

- 6.2 During implementation of the new system, work with the vendor to ensure that reports are designed to enable implementation of our recommendations for better monitoring and improved patient-focused information. Produce reports that permit the Fire Department to effectively monitor EMS response time, including first unit to arrive on-scene time, dispatch time, and turnout time. Actual performance should routinely be compared with established performance measures and industry standards. Reports should also permit the Fire Department to effectively monitor compliance with the County of Alameda ambulance provider contract and to quickly identify and correct areas of contract non-compliance.
- 6.3 Track patient outcomes for patients with a specific condition in which a successful outcome relies on a quick EMS response time, such as patients with cardiac arrest. Use data gathered to evaluate performance and to consider new procedures which could improve patient outcome.

City Manager's Response - Agree

The Police, Fire, and Information Technology acknowledge the need for these reports. The recommendations will be implemented after the new Public Safety CAD system has been successfully implemented. A report on the status of the implementation of these recommendations will be provided to Council by December 2009.

