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EMS IN WORCESTER: WHO SHOULD PROVIDE IT?

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EXECUTIVE SUMMARY

This report addresses the issue of what factors should be considered in deciding who will provide emergency medical services (EMS) in Worcester after the current contract expires.

1. EMS is presently provided in the city by the University of Massachusetts Medical Center (UMMC). However, the contract for this service between the City and UMMC will expire in December 1997. Therefore, the City must make a decision shortly concerning future provision of EMS. UMMC has expressed its desire to continue providing this service. As well, the Worcester Fire Department has expressed interest in assuming the service. In June 1996, the City Manager formed a committee, chaired by the Chief of the Fire Department, to investigate this issue. This committee has yet to issue its recommendations.

2. UMMC provides emergency medical response and ambulance transport in Worcester; the Fire Department provides first response ("first responders" are personnel with certain basic skills who can rapidly arrive at an emergency medical scene ahead of the EMS personnel and ambulance). UMMC provides this service at no cost to the City. EMS is an integrated part of the hospital's emergency department, and hence is a physician-directed service, overseen by five of the department's senior physicians, with the full range of the hospital's training and other resources available to its paramedics. The Research Bureau found general agreement among officials interviewed for this report on the high quality of medical care being delivered by the UMMC paramedics.

3. The Fire Department argues that it should replace the current system operated by UMMC for two reasons: first, the department could provide a higher quality of EMS than is currently provided; and second, it could produce revenue for the City by providing ambulance transports.

4. The Fire Department has claimed that the quality of service being provided by UMMC has been compromised by the provider's failure to provide adequate ambulance coverage for the city. The department suggests that this failure is due to UMMC providing backup service for surrounding towns. However, the Director of UMMC EMS attributes deficiencies in coverage entirely to staffing shortages. Available data—the number of backups provided by UMMC in FY96, response time data, the number of coverage shortages over the past eight months, and comparative data from other cities—suggests that UMMC coverage seems to be reasonably adequate when it has 3 ambulances available to respond to calls, and somewhat thin when it only has 2 ambulances available. UMMC does not appear to be experiencing an excessive number of coverage shortages.

5. Given that the Fire Department has yet to issue a proposal for operating EMS, this report cannot give a detailed evaluation of whether the department can make money by providing this service. But any attempt to determine the revenue-producing potential of the Fire Department operating EMS should include analysis of the factors likely to affect those revenues, including the limitations urban EMS providers face in collecting user fees from the populations they serve and future uncertainties in the nature and availability of EMS revenues. Of equal importance, any analysis should

consider all expenses of providing EMS, including full personnel costs (including supervisory, support, and dispatch personnel), training, overtime, and injured-on-duty costs; capital equipment, medical supply, and operating costs; vehicle insurance, malpractice and liability insurance; and other costs associated with providing this service such as licensing, dues, and billing.

6. Any proposal for transferring EMS to the Fire Department should also address issues arising from the dissimilar character of, and functions involved in, emergency medical care and fire suppression, including the Fire Department's background and experience in EMS; integration of EMS into current Fire Department operations; ensuring the future availability of adequate resources for EMS operations; and the willingness and capacity of department rank and file to assume this new role.

7. In March 1996, the Research Bureau issued a report calling for a comprehensive examination of the Fire Department by an outside consultant, and for consideration in this context of possible provision of EMS by the department. To date, this study has not been undertaken. The Research Bureau continues to believe that this comprehensive examination should be done before any major addition to the role and duties of the department, including the addition of EMS.

8. The Research Bureau believes that it is necessary to answer the questions raised in this report before any informed decision can be made regarding future EMS provision in Worcester. The Research Bureau may issue a supplement to this report once the Fire Department proposal is more specifically defined and the City Manager's committee has issued its recommendations.

I. INTRODUCTION

The City of Worcester currently receives emergency ambulance service from the University of Massachusetts Medical Center (UMMC). In December 1997, the contract for this service between the City and UMMC expires. Therefore, the City must make a decision shortly concerning future provision of EMS in Worcester. Although there are a number of possible providers of this service, the practical alternatives are either to continue with the current provider, or to transfer EMS operation to the Worcester Fire Department.

The following report addresses the issue of what factors should be considered in deciding who will provide EMS in Worcester after the current contract expires.

1. Elements of EMS. The term "emergency medical services," commonly abbreviated to "EMS," refers to a locality's system for providing pre-hospital emergency medical care. An EMS system provides for the rapid arrival of trained medical personnel at the scene of medical emergencies occurring outside of a hospital, and for the transportation of injured or ill individuals to the nearest appropriate hospital. For the purposes of this report, such a system is composed of three basic elements:[1]

1) Communications and dispatch, that is, personnel and equipment for receiving

[1]A more comprehensive view of a total EMS system would include other elements such as public education and prevention efforts, medical directors, and hospital emergency departments.

requests for emergency medical service and dispatching personnel and vehicles in response, as well as for communicating among responders in the field and between responders and medical personnel at a receiving hospital;

2) Equipment and personnel for responding to medical emergencies;

3) Vehicles for transporting victims to a hospital.

2. Levels of EMS. The types of medical care provided through an EMS system are divided into two general categories: Basic Life Support (BLS) and Advanced Life Support (ALS). BLS refers to techniques such as CPR and first aid, provision of oxygen and basic airway management and, increasingly, basic defibrillation. ALS includes advanced airway management techniques, use of intravenous fluids, administration of medications, and other procedures. Emergency medical technicians (EMTs) have training only at the BLS level, while paramedics have training in the full range of ALS techniques and procedures. Often, a state will also designate and certify one or more intermediate grades, such as EMT-I, EMT-Cardiac, or EMT-IV (Intravenous); such personnel have received training in certain specific areas or techniques of advanced life support. Massachusetts certifies personnel with advanced skills in airway management and intravenous fluid therapy as EMT-Intermediates.

The level of ambulance, or transport service also follows this division. Thus, a BLS-level ambulance service has vehicles and personnel equipped to provide BLS response and transport to the hospital; and similarly for an ALS-level service.

3. Types of EMS providers. EMS systems are configured in many different ways and operated by many different types of providers in the United States. EMS is provided by fire departments; by police departments; by separate municipal (or county) agencies (commonly referred to as "third-services"); by non-profit agencies; by hospitals; and by private companies. In some cities, a single agency provides EMS; in others, two agencies (typically, the fire department and a private company) provide the service jointly.[2] Some cities have a mixed system which uses both BLS and ALS personnel and ambulances, and typically relies on screening of calls by dispatch personnel to determine which type of unit to send in response. Other cities (including Worcester) use an all-ALS system, in which ALS-level personnel and ambulances respond to both

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[2]According to the latest (1995) data from the *Journal of Emergency Medical Services* annual survey of EMS systems in the 200 largest American cities, fire departments provide EMS in 49.5% of the cities surveyed (fire department provides the entire function in 34% and provides it jointly with private company in 15.5%); private companies in 40% (private company provides the entire function in 25.5% and provides it jointly with fire department in 15.5%); third services in 15%; hospitals in 6%; and "others" (nonprofit, police department, and volunteer) in 4%. Geoffrey Cady and Ty Mayfield, "Budget Tightening, Technology Affect EMS Systems in 200 Largest Cities," *JEMS: Journal of Emergency Medical Services* 21:1, January 1996, p. 77.

A more comprehensive survey conducted in 1995 found that fire departments represent 45.3% of EMS delivery agencies, third-services 9.3%, for-profit agencies 6.1%, hospitals 5%, and non-profit agencies 17.1%. Presumably, the differences between this and the 200-city survey arise from the fact that this survey included smaller cities, towns, and rural areas. This survey also found that in the northeastern region of the country, the largest provider group is nonprofit agencies (35% of total). A.J. Heightman, "The U.S. EMS Market Report," *JEMS: Journal of Emergency Medical Services* 21:3, March 1996, p. 53.

ALS and BLS situations.[3] In some cities, a single agency provides both on-scene treatment and transport; in others, on-scene treatment may be provided by one agency and transport by another, or BLS on-scene treatment and transport by one agency and ALS on-scene treatment and transport by another. In some cities, a certain number of ambulances are dedicated to emergency response. In others, the (usually private) provider operates ambulances that are used for emergency and non-emergency transport within the locality; in such cases, the provider does not have ambulances dedicated to emergency response, but operates a fleet of vehicles of sufficient size to handle all emergency and non-emergency work.

Many municipalities use "first responders" in addition to an ambulance provider—personnel with certain basic skills who can rapidly arrive at an emergency medical scene ahead of an EMS ambulance. The first responder's role is to perform a lifesaving skill—CPR, basic airway intervention, stopping arterial bleeding—within the first few minutes of a medical emergency. Thus, the emphasis here is on "first" response, on ensuring that personnel arrive within a critical time span from notification of the emergency (the figure cited is usually 4–5 minutes). Because their personnel are dispersed throughout a community, fire and police departments often perform this role. First responders have training in at least CPR and first aid, and increasingly, in the use of semi-automatic defibrillators; some localities use first responders with BLS or ALS training.

It is important to note that there is not a single "correct" type of EMS provider. Fire departments, third services, and private companies are all in principle equally capable of providing quality EMS. Rather, the key to ensuring quality EMS lies in the overall design of the system—whether the system provides for the reliable delivery of an acceptable standard of medical care and for rapid response to medical emergencies, and whether it does both of these things in a cost-effective manner.[4]

4. Recent trends. In recent years, the EMS field has been characterized by two notable trends. First, there has been a tremendous amount of consolidation of private ambulance companies, to the point that the industry is now dominated by three companies: American Medical Response, MedTrans and, to a lesser extent, Rural/Metro. Second, fire departments across the United States have exhibited great interest in, and a willingness to lobby strongly for, the opportunity to provide EMS in their jurisdictions. This interest in EMS is attributable in large part to the fact that the level of fires has been steadily falling for the last twenty years; taking over EMS provides a means of maintaining staffing levels in the face of this decrease in fire activity. As well, if the fire department provides transport to a hospital, it is able to charge fees for this service, which help offset operating costs (and hence, effectively subsidize higher levels of staffing made possible by providing EMS).[5] A recent *Journal of Emergency Medical Services* article notes that public EMS providers,

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[3]In principle, a municipality could opt for an all-BLS system, but this appears to be an increasingly rare configuration. In the latest *JEMS* 200-city survey, only one city appears to have such a system.
[4]Robert Poole, Jr., "Privatizing Emergency Medical Service: How Cities Can Cut Costs and Save Lives," How-to Guide No. 14, Los Angeles: Reason Foundation, December 1995, p. 5; Ryan Gresham, "Does EMS Belong in the Fire Service?," *Emergency Medical Services* 23:3, March 1994, p. 51.
[5]Poole, p. 5.

including fire departments, are increasingly "seeking system configurations that will permit them to collect fee-for-service revenues to offset operating costs."[6]

II. EMS IN MASSACHUSETTS

1. Ambulance regulations. Ambulance services in Massachusetts are governed by established state regulations, and are licensed and overseen by the state Department of Public Health. All ambulance services must be licensed by the Department, and relicensed every year if they provide ALS or every two years if they provide BLS. They must meet regulatory standards for vehicles, equipment, and procedures, and for training, certification, and biannual recertification of their personnel. The regulations specify the number of hours and types of training for three levels of emergency medical personnel: EMT-Basic (110 hours), EMT-Intermediate (400 hours), and EMT-Paramedic (1,200 hours). They establish standards for both BLS and ALS emergency ambulance services (BLS being the minimum level that ambulance services must provide to be licensed). Services are licensed to provide advanced life support either at the intermediate level or at the paramedic level. An intermediate-level ALS service must staff its ambulances with a minimum of two personnel, at least one of whom must be certified at the EMT-I or higher level; a paramedic-level service must staff its ambulances with at least two personnel, both of whom must be certified as paramedics (a BLS service must staff its vehicles with a minimum of two EMT-B's). An ALS service must also have a written contract with an area hospital that establishes 1) a plan for medical control of the service, including treatment protocols, and 2) medical direction, via radio or telephone, of the service's emergency personnel by one of the hospital's physicians.

State regulations establish no performance standards for ambulance services—for example, minimum response times, or minimum number of ambulances per size of population served. However, the regulations do include the following mandates. First, every ambulance provider must ensure that BLS emergency ambulance service is available in its operating area at all times, either through its own vehicles and personnel or via written arrangements for first and second backup service from other providers. Second, every provider of ALS service must ensure that the level of advanced life support it is licensed to provide is available at least 8 hours a day, 7 days a week, either through its own service or through adequate ALS backup. Third, if a provider does not have an ambulance available to respond to a call within five minutes of receipt of the call, the provider's dispatcher must contact the appropriate backup service for response.

2. Regional Councils. The ambulance regulations also provide for the establishment of regional EMS councils, which are responsible for the coordination of emergency medical services programs within their regions and for the development of a regional EMS plan. In the Worcester area, the regional council is the Central Massachusetts Emergency Medical Systems Corporation, a private, non-profit 501c3 corporation. CMEMSC develops EMS protocols used in its region, and trains and certifies EMTs and paramedics (all personnel higher than EMT-Bs must be certified by the corporation). It operates a communications center which establishes a radio link between an ambulance and a receiving hospital or between an ambulance and its

[6]Cady and Mayfield, p. 75.

medical director. The communications center also receives and logs information on every EMS response and transport.

3. First-responder Regulations. Massachusetts law also stipulates that certain public personnel be trained as first responders, and specifies the content of that training. Non-administrative and non-clerical members of all police and fire departments, lifeguards, park rangers, and certain other personnel are required to receive 24 hours of training in CPR (8 hours) and first aid (16 hours), and periodically to receive refresher courses. Such personnel are also authorized, but not required, to receive training in the use of automatic or semi-automatic defibrillators.

4. What the Ambulance and First-responder Regulations Do Not Mandate. It should be noted that the ambulance regulations **do not** require a municipality to provide EMS, either directly or through an outsider provider. **If** a municipality decides to provide this service, then the provider is subject to the applicable state regulations, licensing process, etc.; but a municipality is under no obligation to provide any level of EMS.[7]

Similarly, the first-responder law requires only that the specified personnel be trained as first responders; it does not require that such personnel, or the agency to which they belong, provide first-responder service. This, too, is a choice that is made at the municipal or agency level. In Worcester, the decision to have the Fire Department provide first response appears to have been made when the first-responder law was passed in 1974.

III. EMS IN WORCESTER

In Worcester, ALS response and transport is provided by the University of Massachusetts Medical Center,[8] and systematic first response is provided by the Worcester Fire Department.

1. UMMC Ambulance Service

UMMC began providing EMS in 1991 as a consequence of the transfer to it of ownership of City Hospital, which had been providing EMS in the city. As part of that transfer agreement, UMMC contracted with the City to assume operation of EMS; it agreed to operate three ALS-level ambulances in the city on a 24-hour-a-day basis. In accordance with state regulations, the UMMC ambulances have heated garage space at three fire stations, although they spend a substantial portion of their operating time in the field. Upon assuming operation of the service, UMMC spent approximately $1 million on 6 new ambulances, new equipment and radios, and on upgrading the

[7]The State Enhanced 911 regulations do require that a municipality with E-911 notify the Statewide Emergency Telecommunications Board of who will be providing police, fire and EMS so that incoming calls are directed to the appropriate agencies. However, in the opinion of the Director of SETB, this mandates only that a municipality name an EMS provider, not that it directly or indirectly provide EMS. The Director adds, however, that SETB would be reluctant to implement E911 without a provider being named, and that it would have to review the applicable regulations if this situation ever arose.

[8]That is, UMMC is licensed to operate ambulance service at the ALS level. UMMC also provides BLS-level service: that is, it responds to all calls for emergency medical service, whether they require ALS or BLS treatment.

training of its personnel. UMMC also operates the EMS dispatch console in the City's emergency communications center. UMMC provides these services at no cost to the City, nor is there an indirect cost to Worcester taxpayers; although UMMC is a state institution, the hospital and EMS are operated on an enterprise basis, and therefore are self-paying. The City's contract with UMMC expires in December 1997; senior hospital management personnel have stated unequivocally that they wish to continue to provide EMS in Worcester, and in March of this year indicated, in a letter to the City Manager, their desire to initiate the process of renegotiating an EMS contract with the City.

UMMC is currently finalizing a contract with a private provider, American Medical Response (AMR), through which it is attempting to reduce costs and make improvements in its EMS operation by having AMR provide billing services, fleet purchases, and primary responsibility for transport of patients discharged from UMMC. In addition, the contract gives UMMC medical control over AMR ambulances when they function as primary backup for UMMC.

Hospital-based EMS. UMMC EMS is an integrated part of the UMMC emergency department, and hence is a physician-directed service, overseen by five of the department's senior physicians. The full range of training and other resources of one of the premier teaching hospitals in the state are thus available to the ambulance service paramedics. The Research Bureau found general agreement among officials interviewed for this report on the high quality of medical care being delivered by the UMMC paramedics.

Providing EMS service brings several substantial benefits to the hospital. First, offering a variety of emergency services such as emergency department work, lifeflight helicopters, and pre-hospital EMS for physicians in training enables UMMC to be a full-service training facility and thus to attract the best residency candidates. Second, the state Attorney General has mandated that non-taxpaying hospitals must demonstrate community service, which UMMC does in part by providing EMS. Third, the hospital gains some fiscal and institutional benefits by providing ambulance service, which brings with it a certain amount of control over where EMS patients are transported,[9] that is, over one source of patient supply. Additionally, the hospital wants to continue to provide this service because it has made a significant capital investment in the operation.

System Configuration and Performance. UMMC EMS currently uses 24 full-time equivalent paramedics to operate its ambulances (23 full-time and 2 part-time employees) along with 9 per diems. It is also now in the process of hiring 6 additional full-time paramedics and three additional full-time dispatchers. In FY96, the service made 17,186 responses to emergency calls. Of those 17,186 responses, 11,683, or 68%, resulted in transport to a hospital; 3,394 (29%) of transports required ALS-level treatment, while 8,289 (71%) required BLS-level treatment. 344, or 2%, were Priority 1

[9]It should be emphasized that this control is limited: there are standing protocols governing where victims are transported, depending on the nature and extent of the injury, and when these protocols do not come into play, the receiving hospital is often determined by the patient's choice or by insurance requirements.

calls; 6,359, or 37%, were Priority 2 calls; and 10,312, or 60%, were Priority 3 calls.[10] The ambulance service responded to 392 requests for mutual aid from communities outside of Worcester in FY96 (2.3% of its total responses inside the city); it passed 1,245 calls to its primary and secondary backup services (7.2% of total call volume[11] within the city).

Based on its most recent audit[12] of response times (for the months of February and July 1996), UMMC EMS is responding to 89.2% of all Priority 1 calls received within 8 minutes; to 96.4% of Priority 1 calls within 9 minutes; and to 100% of Priority 1 calls within 10 minutes. It is responding to 88.6% of Priority 2 calls received within 8 minutes; to 93% of Priority 2 calls within 9 minutes; and to 95.6% of Priority 2 calls within 10 minutes. The average response time for Priority 1 calls was 4.21 minutes; for Priority 1 and 2 calls combined, 6.12 minutes; and for Priority 3 calls, 6.22 minutes.[13] These response times fall well within the established standard for ALS service, which was formulated in 1994 by the Commission on the Accreditation of Ambulance Services and the American Ambulance Association. The standard is 8 minutes, 59 seconds for 90% of responses, measuring response time from when dispatchers obtain information on the nature of the complaint and the location of the caller to arrival at the scene.[14] Since UMMC measures response time from when the dispatcher receives the call, it starts the clock earlier than the recommended standard.

Revenues and operating costs According to the Director of EMS, operating costs for EMS service in FY96 were just under $2 million. The service billed a total of

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[10]The priority level of a call is determined using standards established by CMEMSC. Three priority levels are defined as follows. Priority 1: immediate life-threatening, cardiac arrest, respiratory arrest, multiple trauma, acute pulmonary edema, anaphlaxia, unstable cardiac, unstable gastro-intestinal bleeding, airway obstruction, and major head injuries. Priority 2: life-threatening, suspected cardiac, stable trauma, unstable medical (for example, diabetic reactions), symptomatic cervical spine injuries, suspected fracture or dislocation of major joints, coma, and cerebral vascular accidents (strokes). Priority 3: non-life-threatening, minor lacerations and other soft tissue injuries, minor fractures without circulatory or nervous system compromise, and all other non-acute medical complaints.

There is a discrepancy between the total number of responses (17,186) and the total categorized by priority (17,015), because UMMC EMS was unable to accurately code the remaining (171) calls.

[11]That is, responses by UMMC EMS (17,186) + responses by backups (1,245). The vice-president for operations of American Medical Response (UMMC's designated primary backup service) estimates that AMR has been responding to approximately 15 calls for backup each week, which projects to around 800/year.

[12]It should be kept in mind that these figures are based on data compiled by UMMC. EMS providers are not required to report response-time data to an outside agency, nor does any outside agency routinely monitor response times. The only data that UMMC reports to an outside agency is the number of transports (not responses): for each transport, UMMC reports to CMEMSC where it transported the patient to and the treatment and medication given to the patient.

For its part, the Fire Department does not report first-response runs to any outside agency; all first-response data are collected by the department itself.

[13]"Fractile response time"—a requirement that a specified fraction, or percentage of all responses must be made within a certain time limit—is generally recognized as a preferable response time standard, since use of an average response time as a standard means that half of all responses *will* take longer, possibly a great deal longer, than the average. A fractile standard provides a means of controlling/measuring all, or nearly all, of a provider's responses.

[14]Cady and Mayfield, p. 77.

approximately $5 million; the amount payable after contractual adjustments[15] was approximately $3.2 million. Net revenue totaled approximately $2 million (that is, about the same as operating costs).[16] The service's collection rate was therefore roughly 40% of total billed, and 62.5% of the adjusted amount. These collection rates reflect the relatively high proportion of bad debt to which urban EMS providers are subject; UMMC EMS writes off about 19% of the total amount it bills in bad debt, i.e., for transporting and treating uninsured or self-paying patients.

Free Care Pool Reimbursements Because the institution to which it belongs is an acute-care hospital, UMMC EMS is eligible for reimbursement of part of its bad debt from the Massachusetts free care pool. The free care pool was created by state legislation in 1988 to provide a means of compensating hospitals that were providing large amounts of medical care to patients who were uninsured, indigent, or otherwise unable to pay. The pool is funded by a set proportion of the total revenues generated by contributing hospitals; these funds are then distributed back to the hospitals based on the amount of free care they provide. Only bills that have undergone "reasonable collection efforts"—billing for three months, and then referring to a contractual collection agency—are eligible for reimbursement from the pool.[17]

Free care pool reimbursement for EMS-generated bad debt is in addition to EMS net revenues. UMMC recovers approximately 40% of its overall bad debt from the pool. Although the proportion of EMS reimbursed bad debt is not separated out from the hospital's reimbursements, it seems reasonable to assume that the EMS division recovers more or less the same proportion, which would be roughly $380,000 (assuming EMS total bad debt to be 19% of $5 million). Fire Department EMS would not be eligible for reimbursement from the pool.

2. Fire Department First Response

As noted above, the Fire Department performs the first-responder function in Worcester. The department is sent to all calls determined to be life-threatening by 911 calltakers (using protocols developed by the Fire Department). The department sends an engine or ladder company in response. It is important to note the nature of the Fire Department's function here. The role of firefighter first-responders is the initial provision of CPR, first aid, oxygen, and patient stabilization prior to the arrival of a UMMC ALS ambulance. The Fire Department is not providing, nor is it licensed to provide, BLS-level emergency medical care.

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[15]The amount payable after contractual adjustments represents the difference between what an ambulance provider charges for its services, and what third-party insurers will actually pay. Private health insurers and HMOs usually pay a contractually agreed-upon rate. Medicare pays 80% of its standard approved rates for ambulance services. Medicaid pays approximately $90 for ambulance service, no matter what the amount billed or the services actually provided. Just under 20% of UMMC EMS transports are submitted to Medicaid, which thus accounts for a significant portion of the difference between the total amount billed and the adjusted amount.

[16]Figures for total billed and net revenue are estimates by the EMS Director based on billing and collections for the period May–October 1995; during that period, UMMC EMS billed a total of $2,541,972, and collected $996,044.

[17]City of Boston Finance Commission, *Boston's Emergency Medical Services*, November 20, 1994, p. 7.

In a July 16 memo to the City Manager, the Chief reported that the Fire Department made 4,997 responses in 1995, and 3,859 responses in the first half of 1996. According to the Chief, the department is currently making roughly 10,000 first-responder responses yearly.

IV. THE FUTURE OF EMS IN WORCESTER

Who should provide EMS in Worcester once the current contract with UMMC expires in December 1997? Theoretically, the City has a range of options from which to choose. It could leave the service with UMMC, give it to the Fire Department, create a third service, or solicit bids from private companies. However, since UMMC currently provides this service at no cost to the City, and since the Fire Department believes that it may be able to produce revenue by operating EMS, practically speaking, the City seems to have two alternatives: to renew the contract with UMMC, or to turn the entirety of EMS over to the Fire Department. The Fire Department is interested in providing this service. The Chief of the department expressed his interest in EMS to the Research Bureau as early as the summer of 1995; the firefighter union has developed a proposal for Fire Department EMS; and the Chief has chaired a committee formed by the City Manager in June of this year to investigate this issue, which is due to make a recommendation shortly.

Fire Department Proposal. According to the Chief of the Fire Department, the exact configuration of the EMS system that the Fire Department would institute is still somewhat undetermined and tentative. The Chief stated to the Research Bureau that this configuration would depend in part on expected revenue; the configuration outlined below assumes that the department would break even with a collection rate of 50%. That is, according to the Fire Department, the proposed system would cost roughly $2.5 million annually to operate, since UMMC is currently billing approximately $5 million.

Essentially, the Fire Department would continue to provide first response in the city, but would staff 15 of its engines with a cross-trained firefighter/paramedic, and would operate 4–5 ambulances. The department would thus have a paramedic on most, if not all of its first-responding units. The department would staff its ambulances in the following manner. In each of the fire stations housing an ambulance, two paramedic positions would be added to an engine company. One of these paramedics would accompany the engine on first-responder (and other) runs, and the other would remain behind to respond to calls for an ambulance (one paramedic would remain behind when his engine company went on fire runs as well). The department would thus have a single paramedic responding to calls in its ambulances; once the ambulance reached the scene of the emergency, that paramedic would be joined by a paramedic who arrived at the scene on a first-responding engine. To provide this service, the department would hire some 16 new firefighter/paramedics, and would train 80 of its current staff as paramedics. The department would implement this system over a five-year period. During the first year or possibly the first two years of implementation, the department would not transport patients, but would concentrate on training personnel.

Rationale for Replacement. The Fire Department argues that the configuration outlined above should replace the current system operated by UMMC for two reasons. First, the department argues that in a number of respects, this configuration would

result in a higher quality of EMS than is currently provided. Second, the department argues that it would produce revenue for the City. Because the department currently does not transport patients, it receives no reimbursements for providing first-response service; first response, like the other services it provides, is funded by tax dollars. The department claims that by providing the entirety of EMS, it can expect to recover the costs of that service from user-fee charges and even produce a surplus, thus reducing or eliminating the use of tax levy money for EMS first response.

Because the Fire Department's argument for taking over EMS in Worcester rests upon these two claims, a thorough and objective evaluation of them is critical to determining the future of EMS in Worcester.

1. Quality of Service. There have been allegations made by Fire Department and firefighter union personnel that UMMC is not providing adequate coverage for the city. By contract, UMMC is required to have 3 ambulances available for response in Worcester at all times. The Fire Department alleges that UMMC has been compromising its coverage in Worcester by providing mutual aid/backup for surrounding towns. If this is true, it would likely be reflected in the response times of UMMC EMS, as well as the number of times that UMMC EMS in turn had to rely on its backup providers to provide coverage in Worcester.

However, the Director of UMMC EMS attributes deficiencies in coverage —that is, situations where UMMC is operating only 2 ambulances—entirely to staffing shortages, caused both by injuries to paramedics and by difficulty in finding qualified paramedics to hire. According to the Director, UMMC has addressed this problem in two ways. First, the Director instituted a policy in early 1995 requiring that UMMC EMS have 3 trucks available[18] in Worcester in order to send one to another town as a backup. Second, as noted above, UMMC is currently hiring 6 additional full-time paramedics to rectify its staffing shortages.

In FY96, UMMC did 392 mutual-aid responses. It did 17,186 responses in Worcester. Therefore, of a total of 17,578 responses, 2.2% were mutual-aid responses outside the city. The UMMC policy on when it will provide backups to other towns seems to have had some impact on the number of backups done by UMMC; in FY94, for example, it provided 730 such responses. In FY96, UMMC required mutual aid from its backup services on 1,245 occasions; in other words, 7.2% of the total calls[19] in Worcester were responded to by a service other than UMMC. Finally, as noted above, the most recent response time data provided by the service falls well within the established standard for ALS response time.

In 1996, UMMC has experienced the following coverage shortages. The service is required by contract to operate 3 ambulances 24 hours/day, or 8,760 hours/year. For the period January–October (304 days), the service was in operation 7,296 hours. During that period, UMMC was operating at less than full strength for a total of 558 hours, or 7.6% of its total operating hours; 243 of those hours (3.3% of total operating

[18]Note that this is not equivalent to having 3 trucks **in service**. If 1 (or more) truck is responding to a call, then all 3 trucks are not available to respond to calls, and UMMC will not respond to a request from another town for backup.

[19]Total calls = UMMC responses (17,186) + backup responses (1,245).

hours) occurred during 11pm–7am (typically the slowest hours for call activity); 177 hours (2.4% of total operating hours) during 7am–3pm; and 138 hours (1.9% of total operating hours) during 3pm–11pm.[20]

UMMC EMS performance can also be compared with the data in a 1990 analysis of the characteristics of EMS systems in midsized American cities. The study examined a system's ratio of population per ambulance. It found a range from 30,928 to 93,750 per ambulance, and an average of 51,148 per ambulance. Assuming that Worcester's population is 170,000, the UMMC EMS ratio is 56,667, and 85,000 when only 2 ambulances are available. That is, UMMC EMS is about average when all 3 of its ambulances are available; however, compared to other cities, its coverage does seem stretched on those occasions when only 2 ambulances are available. The study also looked at yearly call load per ambulance, and found a range from 1,923 to 6,752 calls per ambulance, with an average load of 3,901. For FY96, UMMC EMS call load per ambulance was 5,729, which falls in the high end of the study's range.[21]

In short, UMMC coverage seems to be reasonably adequate when it has 3 ambulances available to respond to calls, and somewhat thin on those occasions when it only has 2 ambulances available. The service does not seem to be providing an excessive number of backups to other towns, nor does the number of backups provided **to** UMMC seem excessive. UMMC ambulance response times meet established norms for ALS service. Finally, UMMC does not appear to be experiencing an excessive number of coverage shortages. However, if the City feels that UMMC staffing shortages and the related coverage issue warrant some concern, it should address a number of questions in regard to this issue. How serious are these deficiencies, and to what extent do they affect EMS coverage in the city? Are the UMMC responses to the problem likely to rectify it? Do these deficiencies require that UMMC EMS be replaced by an entirely new provider, starting its own EMS operation from scratch? Or should the City raise any concerns it has with the current provider, and if necessary, include them among the subjects discussed in renegotiating the contract with UMMC EMS?

2. ALS First-Responders. The Fire Department also suggests that it will improve the quality of EMS service by placing a paramedic on most of its engines, which would enable it to provide ALS first response. This would increase the training and capabilities of (some) personnel arriving as first-responders to emergency scenes, but the ALS care that could be delivered would be limited in some respects. Although there would be one first-responding paramedic on scene, he would not be able to provide the full range of ALS functions, since to do so effectively requires 2 paramedics working in tandem (which is in part why state regulations require a minimum of two paramedics on an ambulance). Also, since the first-responding paramedic would not arrive on an engine capable of transporting patients, he would also obviously not be able to provide ALS transport until an ambulance arrived.[22]

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[20]The Director of UMMC EMS points out that on certain occasions—weather-related emergencies, holidays, and the like—UMMC runs 4 or even 5 ambulances.

[21]O. Braun, R. McCallion and J. Fazackerley, "Characteristics of Midsized Urban EMS systems," *Annuals of Emergency Medicine* 19:5, May 1990.

[22]These limitations also have some bearing on the issue of ALS response time. Since first-responding engines would not be providing complete ALS care or transport, it would be somewhat

A number of questions can be raised concerning the proposed configuration of first response in relation to ambulance transport. This configuration seems to be built on the assumption that a first-responding engine will always arrive ahead of an ambulance, but this is not currently the case, and likely would not be under the Fire Department's system either. If an ambulance arrives with a single paramedic at an emergency scene ahead of a first-responding engine, that paramedic could not begin to treat until another paramedic arrived; to do otherwise would violate the department's ALS license. Furthermore, it is unclear how the department will handle those cases where a first response is not necessary, and only an ambulance is dispatched. Again, the ambulance would have to respond with two paramedics in order to comply with its license; will this requirement result in delays in ambulance response, especially if the first-responding engine from the nearest ambulance station is already responding to another EMS or fire call? Or, will a first-responding engine be sent to **all** EMS calls, even those that would not otherwise require a first response, in order to ensure that 2 paramedics are present at such incidents?

Of equal importance to the above considerations is the issue of using paramedics for first response, given the function that first-responders are intended to perform. As noted above, first-responders provide specific types of pre-hospital care: CPR and provision of oxygen, spinal immobilization, defibrillation, and patient reassurance.[23] These techniques do not require ALS training or personnel; the point of first response is to perform this critical set of lifesaving procedures, and by doing so, to "buy time" while the system's ALS resources are being mobilized.[24] The use of ALS transport together with an agency capable of providing this type of first response is increasingly being seen as an optimum combination for an EMS system from both a medical and a cost-effectiveness viewpoint,[25] and it is certainly questionable whether placing ALS personnel and equipment on 15 vehicles in addition to ambulances is the most efficient use of resources when less than 30% of responses resulting in treatment require ALS-level treatment.[26] If Worcester's first-response capability is to be improved, it could be argued that there is much more to be gained by simply putting defibrillators on all engines and training all first-responders to use them, rather than adding paramedic first-responders. The huge effect that this single policy can have was recently demonstrated in Boston: the Boston Fire Department now has defibrillators on 30 of its engines, and the survival rate for individuals suffering cardiac

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misleading to suggest that putting a paramedic on first-responding engines would improve ALS response time. An accurate evaluation of this matter should be based primarily on a comparison of UMMC EMS ambulance response times with projected Fire Department ambulance response times.

[23]City of Sacramento Fire Department, Report to City Council on Expansion of Advanced Life Support and Transportation Program, October 11, 1994; Paul Pepe, MD, Director of EMS, Houston Fire Department, quoted in Gresham, p. 48; conversation with Edward McNamara, Director, Central Massachusetts Emergency Medical Systems Corporation.

[24]Paul Pepe, quoted in Gresham, p. 48; Robert Kennedy, Chief, Pittsburgh Bureau of EMS, quoted in Gresham, p. 51; Dr. Lawrence Mottley, Director of EMS, City of Boston, quoted in *The Boston Globe*, 22 October 1996, p. B5.

[25]Not everyone agrees with this view. The Director of CMEMSC, for example, believes that this combination may be optimum from a medical standpoint, but questions whether using ALS transport is more cost-effective than using a mixed ALS/BLS fleet. However, he also agrees that this consideration does not apply to situations, such as the current system in Worcester, where ALS transport is being provided at no cost to the taxpayer.

[26]The percentage is based on UMMC FY96 response data: of 11,683 transports, 3,394 resulted in ALS-level treatment, and 8,289 resulted in BLS-level treatment.

arrest outside of a hospital has increased 50%, from 16% in 1994 to 24% last year. Boston now has the second-highest survival rate in the nation in this regard.[27]

3. The revenue-producing potential of EMS. This report cannot provide a detailed evaluation of whether the Fire Department can make money by providing EMS; the tentative and undeveloped character of the department's proposals in this regard preclude any such evaluation. But any attempt to determine the revenue-producing potential of the Fire Department operating EMS should include the following considerations:[28]

A. Revenues

EMS providers derive revenue by providing transport. If a provider does not transport a victim to the hospital, it does not derive any revenue from its response to a call. Providers charge for the transport itself, and for particular treatments administered during the transport, such as providing oxygen, intravenous fluids, or cardiac monitoring.

In terms of revenue, the major problem afflicting urban EMS providers is the large proportion of uninsured individuals they transport, given the demographics of the populations they serve. In Worcester, this population makes up approximately 20% of the payer mix. The problem that these providers must address is how to subsidize this significant, non-paying population. Private providers often do so by providing non-emergency ambulance transports between medical facilities. UMMC EMS derives some subsidization from free care pool reimbursements. Neither of these subsidies will be available to the Fire Department.

It is also generally agreed in the EMS industry that, for a number of reasons, private EMS providers and billing agencies do a better job of collecting than public providers. Both UMMC EMS and the Fire Department have acknowledged this fact, the former through its pending contract with American Medical Response, which includes billing services, and the latter through its stated intention of having EMS billing done by a private billing agency. Nonetheless, the improvement that such agencies can effect in collection rates is limited, given the nature of the population with which they are dealing. According to the Director of UMMC EMS, the hospital's understanding is that AMR will increase the collection rate 5–10%. Based on statements made by the Chief of the Fire Department to the Research Bureau, the department will have to collect at a rate of 50% in order to meet EMS expenses. Assuming the number of transports and types of services provided by UMMC remained static, expected revenue would therefore be between $2.25 and $2.5 million. Consequently, in order to break even, operating costs for Fire Department EMS would have to be no more than $2.5 million.

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[27] *The Boston Globe*, 8 October 1996, p. B1. In July of this year, the Worcester Fire Department put defibrillators, which were purchased using block grant money, Fire Department Safety Fund money, and a donation from the firefighter union, on three of its engines. However, the Research Bureau has been informed that the firefighter union requested that the City pay personnel on those engines an annual stipend to operate the defibrillators. As a result, the devices were removed from the engines and are not currently being used, and operation of the defibrillators became a matter of collective bargaining.

[28] The following discussion of EMS expenses and revenues is based in part on documents produced by the Director of UMMC EMS.

A cautionary note is also in order concerning future changes in the nature and availability of EMS revenues, given the current volatility in the fields of health care and insurance. It is impossible to predict whether Medicare and Medicaid will continue to provide reimbursement for emergency transports, or at what level. For their part, health maintenance organizations (HMOs) are likely to move increasingly towards a system of "capitation," in which an HMO will contract to pay a set amount of money to an EMS provider based on the HMO's determination of the likely number of transports its insured population will require, regardless of the number and types of transports actually provided. One analysis goes so far as to argue that "fee-for-service [reimbursement] is a short-term solution to program funding. In the long term, fee-for-service will go the way of the dinosaur in the wake of the spread of capitated reimbursement."[29] The uncertainty introduced by considerations such as these obviously affects the ability to predict likely revenues from EMS beyond the next few years.

B. Expenses

Calculation of the overall cost of having EMS provided by the Fire Department should include at least the following expenses:

Personnel Costs

•All paramedic personnel costs, including not only basic salaries, but cost of living and other incremental increases, health insurance, retirement and vacation, paramedic incentive (additional salary paid to paramedics), and other benefits. Since the department plans a complement of 96 paramedics, this would comprise total costs for hiring 16 new firefighter/paramedics, and additional costs incurred to make up the balance of this complement by training existing personnel. The proposed salary and benefits for a department firefighter/paramedic would be higher than for a comparable UMMC paramedic.

•Training costs. The department will be responsible for the costs of paramedic training programs for the 80 current personnel it plans to train. It will also be responsible for annual retraining expenses for all of its paramedics.

The department will also incur a significant initial startup cost in its first three years of operation if the initial training (1,200 hours/paramedic) of current personnel is done on an overtime basis (the Chief of the Fire Department has stated to the Research Bureau that the department has not done training of this sort on an overtime basis in the past, and that he would be opposed to training paramedics on this basis). The department may also incur overtime costs for the annual retraining of personnel (approximately 40 hours/year/paramedic), if this training is not done on-duty.[30] Both of these matters would be subject to collective bargaining.

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[29]Cady and Mayfield, p. 75.

[30]The obstacle to an urban EMS provider doing such retraining on-duty lies in the potential for disruption of training by the need to respond to calls. Given that there is currently an average of 47 calls for service each day in Worcester, the likelihood that on-duty personnel would have to interrupt training classes to respond to calls is great.

•Associated costs for other (administrative and clerical) personnel. Fire Department EMS might require additional uniformed supervisory personnel, civilian administrative/clerical personnel, maintenance personnel for several new ambulances, and new training personnel. Although the Chief of the Fire Department indicated to the Research Bureau that taking over EMS would only result in the addition of one clerical position, the magnitude of an EMS operation suggests that additional personnel might well be necessary.

•Overtime costs. Since a minimum level of specialized personnel will have to be maintained over all shifts on all ambulances, this may increase overtime costs (alternatively, the department could cover shortages by moving paramedics from engines to ambulances. However, this would affect the quality of the department's ALS first response, i.e., it would result in longer ALS first-response times).

There is one other possible source of significant overtime expense. The federal Fair Labor Standards Act requires that personnel working more than 40 hours/week be paid on a overtime basis, but the act includes an exemption for fire department personnel. The assumption of EMS operations by fire departments has raised the question whether this exemption applies to their EMS personnel. Several district courts have ruled that such personnel are not eligible for the exemption. A number of these decisions are being appealed, and the next Congress may well address the issue, but the distinct possibility exists that any fire department with dedicated EMS personnel will become liable for substantially increased overtime costs, including retroactive payments.

•Injured On Duty (IOD) expenses. EMS personnel are exposed to a variety of injuries, contagious diseases, and accidents. If the Fire Department assumes provision of EMS, it will incur injured-on-duty expenses for affected personnel. The Fire Department would incur higher expenses than the present provider in this regard, since its IOD policy pays 100% of the salary of injured personnel, whereas workers' compensation coverage pays only 66%. Additional overtime expenses may also arise from the need to replace personnel who are absent due to injury or illness. Moreover, it seems reasonable to expect that at least in its initial years of EMS operation, the department's relatively inexperienced personnel will incur higher than average numbers of absences due to injuries and contagious disease exposures.

In FY96, UMMC lost 2,478 hours due to work-related injuries with a paramedic staff approximately 1/4 the size of that proposed by the Fire Department.

Non-personnel Costs

•Equipment and supplies, including purchase of new ambulances, all equipment necessary to provide ALS-level ambulance service and an ALS-level presence on engines, and disposable medical supplies. The Director of UMMC EMS has pointed out that the current industry standard for reserve vehicle capacity is a minimum of 30%. To meet this standard, the Fire Department would need at least 2 reserve vehicles in addition to the 4–5 it plans to operate. The department could also expect to have to replace its ambulances on a 5- or 6-year cycle.

•Operating costs including fuel and replacement parts for ambulances and any other

vehicles acquired to provide EMS.

•Vehicle insurance for all ambulances and any other vehicles acquired to provide EMS.

•Malpractice insurance and liability costs. EMS operation will open the City to the possibility of legal action based on allegations of malpractice. Any realistic calculation of the cost of providing this service must therefore include some estimate of the cost of liability insurance or, if the City chooses to self-insure, of the likely cost of adverse judgments and of the legal costs of defending the City against such lawsuits. Given the fact that the department plans to fill the majority of its EMS staff by training existing personnel, and that its staff paramedic experience will therefore be very low for the first years of operation, it is again reasonable to expect that the department may incur higher than average costs in this regard.

Other Costs Associated With Providing EMS

•Licensing costs. The department will have to pay for annual state ambulance licenses, paramedic examinations, biannual paramedic relicensing, and DEA Narcotics Licenses.

•CMEMSC dues. As the Director of UMMC EMS has noted, the Fire Department will be responsible for paying annual dues to the Central Massachusetts EMS Corporation. Since these dues are based on a provider's call volume, and UMMC's current dues are approximately $11,000, the Fire Department would incur a similar amount annually.

•Medical control/direction expenses. The Fire Department would have to contract with an area hospital to provide medical direction for its service. The Director of UMMC EMS has estimated that this would cost the Fire Department up to $30,000/year; however, the Director of the Central Massachusetts EMS Corporation believes that the expense likely would be significantly less than this amount.

•Emergency communications and dispatch personnel. If the Fire Department takes over EMS, the City's Communications Department would have to assume provision of EMS dispatch, which is currently provided by UMMC. The Director of Communications believes that pre-arrival instruction is an integral part of EMS dispatch, and that this is the minimum acceptable level of service that the City should provide. To do so, two EMS dispatchers must be on duty at all times; this level of service would therefore require 9 new full-time equivalent employees, plus an EMS dispatcher-trained supervisor. The Director believes that these personnel should be trained and certified as Emergency Medical Dispatchers (EMDs), in part in order to enable them to give pre-arrival instructions. Since all City calltaker/dispatchers are cross-trained, all personnel would also need to receive EMD training; and all would require biannual refresher courses and recertification. The director estimates that the annual cost of providing this level of service would be an additional $325,000–$345,000. This estimate does not include any benefits, salary increases, or overtime costs.

•Billing agency expenses. The charge for the billing agency's services—typically, such agencies charge 8–10% of net revenues—must be included in the Fire

Department's EMS expenses. Assuming that an outside agency was able to improve the UMMC EMS current collection rate by 10%, and therefore to increase collections to $2.5 million, the charge for billing services would be approximately $200,000–$250,000.

•Initial additional expenses for transport. The Fire Department does not plan to provide ambulance transport during at least the first year of EMS operation. It would therefore have to find another transport provider. Assuming that it can do so (and this is by no means certain), the expense of contracting for the service must be included in the department's EMS startup costs. The cost for this service would depend on the amount private providers were willing to bid in response to an RFP.

Based on the above considerations, it is not clear that the revenues that the Fire Department can reasonably expect from EMS transport would be sufficient to cover EMS-related expenses.

4. Other issues. It is important to reiterate that to date the Fire Department has not issued a detailed proposal for assuming the full range of EMS in Worcester. However, any such proposal should address the following critical issues.

•Fire Department background and experience in ALS. EMS is the critical front end of emergency medical care in a city. The Fire Department has no background or experience in providing ALS-level EMS, nor does it intend to hire experienced paramedics in starting its EMS operation. Is it possible to compensate for this absence of field experience at the operations and supervisory levels, and if so, how does the Fire Department propose to do so?

•Integration of EMS into the Fire Department. What is the Fire Department's plan for integrating EMS into its operations? How will the department ensure quality medical care in an EMS operation? For example, who will have medical control of paramedics, and how will that person or persons be integrated into the command structure of the department? Will all EMS supervisory personnel (including the District Chief in charge of EMS) be required to have paramedic training?

•Resources for EMS. How will the department ensure that adequate resources are devoted to EMS if it becomes part of Fire Department responsibilities? That is, will EMS be in competition with fire suppression and related activities for overall department resources and funds? Will EMS have a separate budget, or will it be part of the overall department budget?

•EMS and Fire Department culture. How will EMS be integrated into the "culture" of the Fire Department? Are department rank and file willing to become health-care providers and to be subject to the injuries and illnesses that come with paramedic work, or will the introduction of EMS be a source of tension within the department? Is the Fire Department confident that the typical firefighter can maintain the level of training that will be required to serve as both a firefighter and a paramedic?

•The Fire Department's overall future orientation. In March 1996, the Research

Bureau issued a report calling for a comprehensive examination of the Fire Department, and for consideration **in this context** of provision of EMS by the department. To date, this study has not been undertaken. The Research Bureau continues to believe that this comprehensive examination should be done **before** any major addition to the role and duties of the department, including the addition of EMS.

V. CONCLUSION

The City consciously removed itself from both the EMS and medical care fields by closing City Hospital as an acute care facility and selling Belmont Home to a private operator. Is there now a compelling reason to get back into that business by shifting the entirety of EMS to the Fire Department, given the particular circumstances that obtain in Worcester? Or are there good and sufficient reasons not to alter the current configuration but to maintain the contractual relationship with UMMC, while revising it if the City finds that revisions are necessary? Robert Bass, a former Director of EMS in Washington, DC, has pointed out that it is not enough to want to do EMS to save jobs or to gain revenue: a department has to want to do **the job itself**, which entails a commitment to quality medical care.[31] Is the Fire Department interested in taking over EMS primarily for fiscal reasons, or for patient-care reasons? Does the current system have deficiencies, and if it does, can those deficiencies be remedied, or do they dictate that an entirely new system be introduced? Based on its examination, the Research Bureau believes that it is necessary to answer these questions, as well as those raised above in regard to the particular system that the Fire Department would implement, before any informed decision can be made regarding future EMS provision in Worcester. This report does not (and cannot) provide a definitive evaluation of future EMS provision in the city, given the as yet undetermined character of the system the Fire Department would implement. However, the level and kind of expenses that would be incurred if the Fire Department assumes responsibility for EMS make it appear unlikely that revenues would cover costs. The Research Bureau may issue a supplement to this report once the Fire Department proposal is more defined and the City Manager's Committee has issued its recommendations.

[31]Quoted in Gresham, p. 51.

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