

## **Emergency Medical Services Cost Analysis Workbook Guide**

### **Introduction**

The purpose of this workbook is to determine the cost of an EMS system. It is meant to be used from a societal perspective, which means it accounts for all costs no matter who pays them. However, it can also be used to determine the cost of an individual agency, a group of agencies, or the incremental cost of a single intervention.

An EMS system is defined as all of the agencies that participate in acute, unscheduled healthcare outside the hospital within a defined geographic region. As such the cost of all agencies and services that are part of the community's EMS system should be included.

To make gathering this information as easy as possible, a worksheet is included for each type of agency (e.g., EMS, fire, police, communication center, hospital, etc.). This workbook attempts to capture the best estimate of EMS system costs, while at the same time not being so overly burdensome that it is impossible for a system to complete.

It is suggested that when a community is using this workbook to determine their EMS costs a lead person or group should be identified to ensure that costs are not double counted, that is the same cost should not be included on multiple worksheets. This person or group should also ensure that all costs are included within the workbook.

### **Step 1: Define the community for which costs are being calculated**

The first step in calculating EMS system costs from a societal perspective is to define the boundaries of the community for which costs are to be calculated. This could be within government defined city or county limits, a system defined region (e.g., nine communities that work together to respond to the area's emergency medical service needs), or some other definable geographic area. This decision is based solely on the goals of the person(s) conducting the analysis. However, whatever boundaries are chosen, they must be adhered to throughout the analysis. That is, all relevant costs for delivering EMS services within the boundary must be included, no matter who pays that cost; and any cost for responses outside of that boundary must be excluded, no matter who pays that cost.

A worksheet called "Community Definition" has been provided to aid in defining the community. Completing these questions in the workbook will be useful for ensuring that the community definition is adhered to throughout data collection and analysis of the cost data. It will also be useful if workbooks are going to be compared between two communities or points in time.

### **Step 2: Determine all of the agencies that are part of the EMS system**

On the "Community Definition" worksheet make a list of every agency that contributes to the EMS system in the community that is being

costed. These agencies may not directly participate in patient care and may not be what would traditionally be called an agency. For example, a state agency may provide communication equipment or a police department may provide a training facility. These agencies should then be categorized using the types of agencies listed in Table 1. There is a tab in the workbook for each of these agency types. If in the community for which costs are being calculated one of the types of agencies listed does not participate in the EMS system, click on that tab and type “N/A” next to “name of agency” and leave the rest of that worksheet blank. Do not delete the worksheet as this may result in the spread sheet formulas failing to function properly. If the community has an agency type which is not specifically listed in Table 1 pick the type of agency that is closest to it.

Table 1: Types of Agencies that can be used

<b>Agency Type</b>	<b>Naming Convention</b>	<b>Example</b>
<b>Emergency Medical Service (i.e., ground ambulance service)</b>	EMS	EMS1
<b>Police Department</b>	PLC	PLC1
<b>Fire Department</b>	FRE	FRE1
<b>Air Medical /Other Specialty (e.g., boat transport) Transport Service</b>	AIR	AIR1
<b>Communication Center</b>	CMC	CMC1
<b>Public Health Agency</b>	PHS	PHS1
<b>Specialty Teams/HAZMAT</b>	STS	STS1
<b>Hospital</b>	HSP	HSP1
<b>Community Disaster Preparedness</b>	CDP	CDP1
<b>Shared System Services</b>	SSS	Only one page is allowed
<b>Bystander Training</b>	BYS	Only one page is allowed

If there are multiple agencies of a listed type insert a worksheet for each agency of that type. For example, if there are multiple EMS agencies within the community, a separate worksheet should be completed for each of the EMS agencies. To create a new worksheet for another EMS agency:

1. Insert a blank worksheet by selecting WORKSHEET from the insert menu. A new tab will appear at the bottom of the screen labeled “sheet 1”.
2. Click on the tab for this worksheet and drag it so that it is placed in between the “EMS1” and “EMS999” tabs.
3. Click on the “EMS999” worksheet tab and select all the cells by clicking on the box above row 1 and to the left of column A. The entire worksheet will be highlighted.
4. From the EDIT menu select COPY.
5. Click on the tab of the new worksheet, labeled “sheet 1”.

6. Click on cell A1 and from the EDIT menu select PASTE.
7. From the VIEW menu select ZOOM and 75%.
8. Click on cell C15 and from the WINDOWS menu select FREEZE\_PANES.
9. Right-click on the tab of the new worksheet and select RENAME. Type in "EMS2" (all upper case and no spaces) and hit the return/enter key.

There is now a worksheet for a second EMS agency. To add additional worksheets for other EMS agencies, follow the steps described above, renaming the worksheets sequentially EMS3, EMS4, etc. and place them so that they are always between EMS1 and EMS999. The workbook can only accommodate 999 of any one agency type but it is not anticipated that a community would need more than that. Similarly, to add worksheets for other agency types like police or fire, follow the steps outlined above, but using the naming convention shown in Table 1. The order of tabs for each specific agency type must follow sequentially from left to right: AGENCY1, AGENCY2, AGENCY3, etc., AGENCY999, TOTALAGENCY.

When adding a new worksheet for an agency type, always move the new worksheet in between AGENCY1 and AGENCY999 and rename it with the next sequential number. Never move the AGENCY1, AGENCY999 or TOTALAGENCY worksheets. Never enter data on to the worksheet pages labeled AGENCY999 or TOTALAGENCY. Do not move or delete worksheet "CPICF". Failure to follow these directions will result in the total cost being miscalculated.

### **Communication Center**

The cost of communication may be spread over several agencies. Communication includes, but is not limited to, primary and secondary Public Safety Answering Points (PSAP) and operational communications. Be sure to complete an agency worksheet for each Communication Center (CMC) (if they exist as a separate agency), and/or include the cost of communication within each agency (i.e., radios, secondary dispatch, etc.) on their respective worksheets. In the equipment section of the worksheet include trunk systems or other communication equipment that is devoted to EMS/public safety. Do not include the costs of general public communication infrastructure (e.g., cell phone towers) as these are considered general public utilities or "sunk costs".

If there is communication infrastructure that is paid for by an agency that provides no other EMS services, a worksheet should still be created for that agency and it should include only the communication costs (e.g., state law enforcement that provides repeaters) and a percent

use by EMS should be determined (see Step 3). This percent should be calculated based on the percent of calls sent through the system that are medical (option #1 in step 3). The percent of time on medical calls (option #2 in step 3) is preferred but is probably not feasible to measure.

### **Specialty Teams/Hazmat**

The Hazmat or other specialty teams (like swift water rescue, high angle rescue, trench, confined space) may reside within one of the agencies already listed in the workbook or it may be a separate agency. However, because Hazmat and other specialty activities can be expensive and only a small proportion of the activities are related to EMS these costs should be placed on a separate worksheet and the percent involved in EMS should be calculated. These worksheets will be labeled using the designation STS.

When selecting what teams to include separately use the following as a general rule: If a non-EMS agency is performing their traditional role these costs or activities should not be included or separated out as a specialty team. That is if a fire department fights a fire where a patient is trapped inside, the cost of removing that patient should not be attributed to EMS since the fire agency was performing their traditional role. However, the cost of heavy rescue equipment used to extricate a patient entrapped in a vehicle after a crash should be considered as well as the cost of providing patient decontamination. A way to differentiate whether an activity is an EMS related event is to determine if an ambulance is being sent to the scene in case there is a patient.

To calculate the percent of time a specialty team is involved in EMS, determine the percent of time they spend responding to calls that involve a patient and the time they spend training for patient related activities compared to calls where clean up activities are performed without involving a patient and total training time (Option #2, Step 3).

### **Hospital**

The Hospital (HSP) worksheet should be used to account for any EMS specific goods or services that are provided by local hospitals. A separate worksheet may be created for each hospital in the region or a single worksheet that accounts for all of the services provided by all of the hospitals can be created. Only the cost of EMS-related items or activities should be included on the worksheet. That is, it is not necessary to account for the cost of hospital care of EMS patients on this worksheet or any other function the hospital provides for the community. For example, if replacement equipment is given to EMS by a local hospital, then a worksheet should be created for that hospital as an agency and the cost of equipment given to EMS should be determined. This should be the actual cost of the equipment, not the hospital charge. Also, if there is a linen, medication, or other exchange program, account for the cost of those programs. Further, if medical direction or hospital communication devices

are provided by the hospital these should be included on the hospital worksheet.

Hospital costs may actually represent a variety of organizations that provide salaries, services, and goods within the hospital. For example, a hospital could provide on-line medical direction via physicians whose salaries are paid for through a practice plan, hospital communication equipment paid for through the hospital budget, and secretarial support and office supplies paid for through a medical school's budget. It is important that all these costs are included. Also account for the time required to notify the emergency department that EMS is bringing a patient to the facility, even when no on-line medical direction is provided.

### **Medical Direction**

Physician, nurse, or other healthcare provider time for direct (on-line) and indirect (e.g., creating protocols, serving on oversight committees, and conducting quality of care reviews) medical direction should be accounted for even if it is provided by individuals who are working in an emergency department while also performing clinical duties, or on a voluntary or uncompensated basis. To calculate the human resource cost for these providers, identify the number of hours worked on this activity, and whether this activity was shared (e.g., also providing clinical care) or dedicated to EMS. If shared, estimate the proportion of time that the worker devotes to EMS (see Step 2). For example, if physicians spend 1 hour of each 12 hour clinical shift providing on-line medical direction to EMS providers, then enter 730 hours in the human resource section for the number of hours worked per year (1 hour per shift times 2 shifts per day times 365 days per year). Then estimate the average hourly wage and benefits for a physician in that emergency department. If residents or other staff participate, their time involved should be determined separately and their regular pay rate used instead of the higher attending physician rate. This could also be calculated by taking the overall number of calls separated by the type of provider who takes the call and then multiplied by the average time on a call and that level of provider's average salary. This information would be included in the Hospital (HSP) worksheet.

If an EMS agency contracts with a local hospital for medical direction, this cost should be accounted for using the hospital worksheet and the contract charges should not be included on the EMS worksheet. However, if it is not possible to complete the hospital worksheet for those costs, then the EMS contract cost should be reported instead. These costs should not be included on both the EMS agency and the hospital worksheets since that would result in an over-estimation of medical direction costs. Further, the contract charges may not represent the true costs. Account for all

medical direction costs even if the contract is less expensive than the true cost.

Medical Directors for an EMS agency participate in a variety of activities. Whether this time is provided as part of their hospital duties, as an employee of the EMS agency, or as a private citizen, these costs must be accounted for. This includes time spent creating protocols, serving on oversight committees, conducting quality reviews, etc. The time spent on these activities as well as use of support staff and equipment should be included on the hospital or EMS agency worksheets. If it is necessary to create a separate worksheet for medical direction it should be labeled as an additional hospital (HSP) worksheet.

### **Community Disaster Preparedness**

The costs of community disaster preparedness operations outside of the listed agencies (e.g., Emergency Operations Center) that are purchased for the community need to be accounted for as they relate to the EMS response. These costs could include emergency operations centers, a specialty community disaster response team, or other related activities and they should be included on the Community Disaster Preparedness (CDP) worksheet. This worksheet should include any extra equipment, personnel, building space, etc. used solely for the community's medical response to a disaster or preparedness. The distinction for what is medical may not always be apparent but in general use costs associated with the care of a patient during a disaster or other major event (e.g., triage tags, patient stretchers). In particular, determine the proportion of an emergency operations center that is devoted to the medical response.

Disaster preparedness equipment purchased by an agency for their disaster response activities should be included on their worksheet, but make sure these items are not double-counted by including them on multiple worksheets. The Community Disaster Preparedness worksheet should not include equipment or personnel that are already accounted for on one of the other agency worksheets.

### **Shared System Services**

If there are costs that are spread across the whole system and are not paid by any of the agencies listed in table 1 then include those costs on the Shared System Services (SSS) worksheet. However, do not double-count those costs by including them on multiple worksheets. For example, to calculate the cost of EMS for a county that has multiple volunteer EMS agencies and the county government provides insurance and OSHA training for all of the volunteer care providers, use the worksheet titled SSS and list those costs. Do not include the cost of those services on the worksheet for each EMS agency since they are represented on the SSS worksheet.

## **Businesses/Universities and other entities that Provide Emergency Medical Care**

Businesses, universities, prisons or other entities might have their own internal emergency medical response teams and equipment. These should be considered as the list of potential agencies is developed. However, a worksheet should only be developed for these agencies if they are considered a part of the formal EMS system. A test for this is whether or not their presence changes the resources that are sent to the scene when there is an emergency request for aid. For example, if when a university has a medical emergency their internal EMS providers care for and transport the patient then this should be considered an EMS agency and a worksheet should be created for them and labeled using the EMS agency type naming convention. On the other hand, if a university has responders but they have no duty to respond, are not licensed within the community, and/or are not a recognized part of the EMS system and the local EMS agency would still send the same response to the call as they would if it had come from a local residence then no worksheet should be created for that agency.

### **Step 3: Estimate the percent of time that each agency is involved in EMS**

A given agency might serve several roles within the community that is being costed in addition to the EMS services it might provide (e.g., a fire department might provide EMS and fire suppression services). Including the total cost of such an agency would over-estimate the cost of an EMS system but ignoring it would under-estimate the costs. To address this issue, calculate the total cost of the agency (excluding any segments of the agency that have no EMS role as described in step 1) and then determine the percent of the agency that is involved in EMS. The calculation of this percentage is controversial. At the top of each worksheet, provide information that can be used to estimate the percent of time each agency is involved in EMS. The worksheet is designed so that 100% is the default value that is used unless the user inserts their local data into these cells replacing the default value of 1.

Four possible ways to calculate this percent are to: option 1 - determine the percent of calls that are EMS related compared to the total number of calls (distributing readiness time across all functions); option 2 - determine the percent of time responding to, treating or returning from EMS calls compared to the total time on any calls (distributing readiness time across all functions); option 3 - determine the percent of time responding to, treating or returning from EMS calls compared to the total time available (excluding the cost of readiness from the EMS costs); or option 4 - determine the percent of time responding to, treating or returning from EMS calls and waiting for a call compared to the total time available (includes all of the cost of readiness in the EMS costs) (Table 2).

This is just 4 examples of how these percents can be calculated there are numerous other methods that can be used.

**Table 2: Sample of Ways to Calculate Percent Involved in EMS**

Option 1	#EMS calls taken in the community being costed	÷	Total # of calls taken by the agency	Attribute readiness time across all functions based on volume
Option 2	Time on EMS calls taken in the community being costed	÷	Total time on calls taken by the agency	Attribute readiness time across all functions based on time
Option 3	Time on EMS calls taken in the community being costed	÷	Total time available for calls	Attribute readiness time to other functions only
Option 4	(Total time available for calls) – (Time on non EMS calls and calls taken outside the community being costed)	÷	Total time available for calls	Attributes all readiness time to EMS

This workbook is designed to determine the cost of readiness from a societal perspective thus it will use the percent options as listed in the table below for each respective agency type. However, this workbook is also intended to have the flexibility to be used for a variety of analyses and it is anticipated that some users may want to know the incremental cost for an agency to provide EMS services. The incremental costs are how much more it costs the community to have an existing agencies also provide EMS services. Therefore, the workbook also provides the incremental EMS cost by using a different percent for each agency type (as shown in the table 3).

There is also space for the user to insert an alternate percent. This will allow the user to report cost as a range or to generate a variety of reports using different cost perspectives. By inserting a different percent in the cell specified, a total cost for that agency using that alternate percent will be calculated. The bottom of each worksheet will provide the total cost to provide EMS services for that agency using the four percent calculation options listed above and the alternate method. The



TOTALAGENCY worksheet provides the total cost for all agencies of that type using the four percent calculation options listed above and the alternate method. The TOTAL SYSTEM Costs page provides detailed cost summaries using the calculation methods shown in table 3.

Some EMS agencies can serve a larger area than the community being costed or provide other services such as non-emergent inter-hospital transfer. If so, less than 100% of the EMS agency's costs should be attributed to the cost of EMS to the community. For example, to calculate EMS costs for a city that uses a helicopter service which also responds to the counties surrounding the city, determine the percent of the helicopter service to attribute to the cost of EMS for that city alone.

Further, if an agency provides several different programs related to EMS and each program has a different percent effort, they should be entered on separate worksheets. Enter the unique number of EMS calls and coverage hours for each program at the top of the corresponding worksheet. For example, a fire department that provides transporting EMS ambulances as well fire suppression and first response should be considered as three different agencies for costing purposes: an EMS agency, a first response agency, and a fire suppression agency. Therefore, in the cost workbook make two worksheets one for the aspects of the fire department that represent the EMS transport function and one that represents the first response function. No worksheet is needed for the fire suppression function.

Costs that are distributed across the two functions should be accounted for on each sheet based on their percent involvement. For example, shared building space should be divided by function and the percent for each function recorded. Alternatively, a person, such as a captain, whose position is 50% ambulance transport and 50% fire suppression, should only have half of their hours counted on the transport worksheet. The individuals, equipment, vehicles, and other resources, which are never used for any part of the EMS-related response, should not be included on any worksheet. For example, a fire inspector who would never participate in any aspect of EMS should not be included on any of the worksheets.

**Table 3: Three Methods Used in the Workbook to Calculate Total EMS System Cost on the Worksheet "Total System Cost"**

<b>Agency Type</b>	<b>Naming Convention</b>	<b>Societal Total using economic methods</b>	<b>Incremental Total using economic methods:</b>	<b>Alternate Total using economic methods</b>	<b>Alternate Total using accounting methods</b>
<b>EMS</b>	EMS	Option 2	Option 3	User provided	User provided
<b>Police</b>	PLC	Option 2	Option 3	User	User

				provided	provided
<b>Fire</b>	FRE	Option 2	Option 3	User provided	User provided
<b>Air Medical Transport/Other Specialty Transport (e.g., Marine)</b>	AIR	Option 2	Option 3	User provided	User provided
<b>Communication Center</b>	CMC	Option 1	Option 1	User provided	User provided
<b>Public Health</b>	PHS	User provided	User provided	User provided	User provided
<b>Specialty Teams/HAZMAT</b>	STS	Option 2	Option 3	User provided	User provided
<b>Hospital</b>	HSP	User provided	User provided	User provided	User provided
<b>Community Disaster Preparedness</b>	CDP	User provided	User provided	User provided	User provided
<b>Shared System Services</b>	SSS	User provided	User provided	User provided	User provided
<b>Bystander</b>	BYS	100%	100%	100%	100%

\*Note economic versus accounting method refers to the method used to account for buildings, vehicles, or other durable equipment that was purchased in the past. The economic method accounts for the change in the value of a dollar from year to year and uses a 3% discount rate. The discount rate can be changed by going to the CPICF worksheet and changing the values for the “Economic Depreciation Rate”. The accounting method makes no adjustment.

### **Agencies that provide a single distinct EMS Service**

For agencies that only contribute a single distinct service or services to EMS include only the costs of the part of that agency that participates in EMS on the agency’s worksheet. Do not include any costs that have no relation to EMS (providing care or administration). Further, when calculating the percent involved in EMS determine the percent for just those services not the entire organization. For example, if police officers on bicycles respond to all requests for medical aid in a large pedestrian mall, but do not respond in other places in the city then calculate the total cost of the bicycle program and then determine the percent involved in EMS by determining the percent of total bicycle calls that are EMS related. A second example would be a police department that does not respond to any medical calls but allows EMS to use its training facilities. Determine the total costs associated with the training facilities on the worksheet for that agency and then determine the percent

of time that the training facility is used by EMS. However, if an agency were to provide several different programs with different amounts of effort a worksheet should be completed for each program (i.e., that single agency would be treated as multiple agencies with a worksheet for each function they serve). For example, if a single agency provided the bike program and the training facilities a worksheet would be completed for each program separately even though they are provided by the same agency. The worksheets for those two functions would be labeled using the same convention described above, as if they were two separate agencies.

#### **Step 4: Select a year**

To make data obtained in this worksheet comparable from year to year or across agencies, it is important to record what year costs were incurred for items recorded in the workbook. Once a year is selected wherever possible use the cost of that item for the selected year. For example, when calculating human resource costs use the costs from the year selected or when calculating vehicle costs try to use the average cost of vehicles purchased in the selected year. Record the year that the dollars were used in the cell under “year used” at the top of each worksheet. It may not always be possible for the cost of buildings, vehicles, and durable equipment to be stated in the year selected so for each of these items list the year’s dollars that are used in the designated area of the workbook regardless of whether it is the same as the year stated at the top of the worksheet.

The cost calculated in the summary section of each worksheet and on the total pages will automatically be adjusted to 2006 dollars based on Consumer Price Index calculations published by the Bureau of Labor Statistics. This calculator will work through the year 2016. If you would like to use a different year and all of the costs are already in that year’s dollars simply enter 2006 everywhere the year is asked. Entering “2006” for Year Used will result in overriding the calculations to the index year of 2006 (i.e., no adjustments due to inflation). If the costs are in a different year from the one you want to use (other than 2006) you will need to convert those dollars into that year using a separate calculator and then enter that year’s cost in to the workbook.

#### **Step 5: Calculate Human Resource Costs**

For each agency worksheet, list all of the types of workers that are employed by that agency. This includes those who provide direct patient care as well as those who have support roles. For example, an EMS agency might have many levels of care providers, administrators, dispatchers, mechanics, clerical staff, etc. Each type of employee should be listed in their own column. In the row labeled employee type, insert a name for that type of employee and then enter the information for that

employee type below the label. The existing labels in the green colored cells can be replaced with the names of the agency's employee types. For each type of employee, report the total number of hours worked in a year, the average hourly wage for that position, and the average hourly benefit.

For example: In EMS1, to add costing information for EMTs, click on the cell "Employee 1" (shaded in light green) and type in "EMT". To add additional employee types enter their designations into the Employee Type row, using a separate column for each employee type.

When completing the worksheet for salaried employees who do not have a set schedule assume that a salaried employee works 37.5 hours per week for 48 weeks or 1800 hours per year. Their average hourly wage is their compensation (including performance bonuses) divided by 1800. The average benefits are the employee's total benefits divided by 1800. Although these employees may work many more hours per week, this method will approximate those costs.

If the number of hours a salaried employee works is known, divide the salary and benefits by that number and enter that information on the worksheet. If wages and benefits are not separated from each other, calculate the average hourly wage and benefit, and enter this value in the "wage" cell and leave the benefit cell blank. If employees are paid hourly rather than salaried, include the average wages and benefits for each category of hourly employee and report the number of hours of coverage provided during a year. For example, an agency may have a mechanic on duty 24 hours per day with double coverage Monday through Friday for 8 hours. In this case, there are 208 hours ( $24 \text{ hours} \times 7 \text{ days} + 8 \text{ hours} \times 5 \text{ days}$ ) of coverage per week and 10,816 hours per year. Enter 10,816 in the worksheet under "number of hours worked at regular pay." If instead, an agency has a full time mechanic and 3 part time mechanics who cover a total of 60 hours per week each, add 1800 hours for the full time employee plus 3,120 for the hourly employees for a total of 4,920 hours of mechanic coverage per year. Enter the average hourly wage for the 4 mechanics under "average hourly wage."

Some agencies use volunteers to provide services. Although, these positions are not paid for by the agency, their cost should still be counted. Create a category for each type of volunteer that works for the agency and enter the number of hours covered by those volunteers. Under wages, enter the prevailing wage in the community. This can be found by going to <http://www.bls.gov/oes/current/oesrcma.htm#M> and selecting the geographic area that is being costed. Then select "all wages." Mean hourly wage for all occupations is at the top of the page. This wage should be recorded on the worksheet under "average hourly wage."

If services are contracted from an external source, these costs should be entered in the administrative cost section. However, if these services are provided by an agency that has its own worksheet, provide

the cost of those services on that worksheet and estimate the cost rather than the contract charge. If the service is not included on another agency worksheet (for example janitorial services) put the cost of that contract on the worksheet for the agency that buys the service. However, if these charges are less than the actual cost and it is possible to estimate the cost, the cost should be provided rather than the charge. Use caution not to double-count wage costs; do not include a given cost in more than one section. For example, if maintenance of vehicles is provided by employees as well as by third parties, include the wages and hours of employees who provide vehicular repair and the total cost of vehicular repair by an external body shop. Do not include the wages and hours of employees of the external body shop.

Use the number of hours training section if training time is paid for separately by the agency. If training is included in the regular working hours, then leave the hours of training blank. If training time is not paid for or included in the regular wage, then estimate the number of hours of training required and multiply it by the regular wage. For volunteer systems, when determining the human resources costs, the hours providing care and training should be included in the number of hours worked section and the prevailing wage would be used to determine cost.

As with any human resource, the cost of medical direction should be included and it should reflect the hours worked, not necessarily the amount of money that is charged. Care must be taken not to double-count these costs by including them on multiple worksheets.

Further, leadership activities may not be limited to the medical director. For each agency, account for time that is spent by employees on leadership committees and councils under the human resource section even if that time is uncompensated (provided outside of normal working hours and attendance is not considered a job requirement).

The time for members of agency board of directors and other agency specific boards should be accounted for even if the members are volunteers. This refers only to boards that are directly responsible for the agency that is being costed. Oversight bodies that have broader responsibilities (e.g., city council) should not be considered.

### **Step 6: Calculate Physical Plant Costs**

The physical plant costs are those related to all stationary buildings that are used to house and support any activities related to the agency. Types of physical plant buildings include (but are not limited to) training facilities, stations to house response vehicles and personnel, repair and other garages, and administrative offices. Each building should be listed in a separate column. The building name/type row should be used to type in a description of the building that is being costed. The cost for that building when it was originally purchased by the agency should be determined along with the year of the purchase. If any renovations have been done these costs should be listed along with the year of the

renovation. If there were multiple renovations, include all renovations that have been made in the last 15 years. Enter them in separate columns but only enter the building costs once. The workbook will calculate economic and accounting depreciation for building costs and will use 30 years as the as the life span for the buildings and 15 years as the life span for renovations. Thus, buildings and renovations that are older than their life spans of 30 and 15 years respectively, do not contribute towards the agency's cost. These life spans can be changed for the entire workbook by going to the CPICF worksheet and changing the values for the "average life span of the building" and/or "average lifespan of renovations". Alternatively the lifespan for a single building or renovation can be changed by changing the individual values for that specific building. However, once these are changed from the default any future changes will need to be made manually.

When the purchase or renovation costs of a building are unknown, estimate the costs using the cost of the most recently built similar building. If this method of estimation is used, under year the facility was purchased state the year the building that is being used for the cost estimate was purchased. If the building was purchased more than 30 years ago leave the cost of the building blank, but account for any renovations. For a building that is not owned by the agency and there is no lease charged to the agency, estimate a lease cost for that building and enter that cost on the worksheet. This can be done by using the average industrial lease cost for the area.

For a building that is shared, determine the percent of the building that is devoted to the agency by calculating the total square feet devoted to the agency being costed and divide that by the total square feet of the building. If creating a worksheet for an agency that serves multiple functions including EMS, calculate the portion of the building that is devoted to that agency not the proportion that is devoted to EMS. The percent devoted to EMS will be determined using the percent calculated in step 2. If determining the cost of a single service provided by that agency, such as the police bicycle response at a pedestrian mall (see description in step 3), then calculate the percent of the building that is devoted to the EMS-related service, not to the entire police department.

For a rented or leased building, include the rent or lease costs for the year. Use the same guidelines as stated above for partial use arrangements. The worksheet will not allow both a rent or lease cost and a purchase cost to be entered. Lease costs should be reported using the same year stated at the top of the worksheet. This is adjusted to 2006 dollars for the total.

Next determine the actual yearly cost for utilities (e.g., electricity, gas, telephone, cable television service), janitorial services, maintenance, and insurance for the entire building. If there are other costs for the building list them in the worksheet under "other facility costs." If the

agency budget reports a total cost for all of these services that may be entered instead of the individual amounts.

If the building utility costs are only known for the percent of the building that is devoted to the agency then enter those in the rows “utilities attributed to the agency”. If the building utility costs are only known for the entire building then enter those in the rows “utilities attributed to the building” and the workbook will automatically apply the percent listed under percent of this building devoted to this agency. Either method can be used or both methods can be used for different utility types but do not double-count utility costs.

### **Step 7: Calculate Vehicle Costs**

Vehicle refers to all modes of transport used by the agency. These could be used for EMS response, direct patient transport, or other EMS-related purposes. This includes all types of transport vehicles (e.g., ground, air, or sea transport vessels). Each vehicle type should be listed in a separate column. The vehicle type row is used to enter a description of the vehicle type. If the vehicle is owned, enter the average cost and life span for a vehicle of that type.

There are two ways to calculate the cost of vehicles purchased in different years: 1) make a column for each year vehicles were purchased and enter the average cost for each year, as well as the number of vehicles purchased, the average life span, and the year; 2) calculate the average cost of vehicles purchased in a single year and use that cost for all vehicles of that type regardless of the year they were purchased. For example, an agency has 25 ambulances and they replace 5 ambulances every year, so that no vehicle is ever more than 5 years old. For the first option, enter the average vehicle cost for each year, list the total number of vehicles as 5 in each of the 4 columns, and list the year of purchase in each column. For the second option, calculate the average cost of the 5 ambulances purchased in a single year and enter that cost under average vehicle cost. Then enter 25 under the number of vehicles of that type owned and the year being used. If vehicles are routinely sold/traded-in after the agency-defined life span, then the purchase price entered under average vehicle cost should be the average purchase price minus the average sale price for a used vehicle of that type (e.g., trade-in/market value). If a vehicle is leased, provide only the yearly lease cost.

For each vehicle type, also include the yearly fuel, maintenance, and insurance costs. When calculating fuel costs federal and state taxes should be excluded. If the vehicle is leased and these costs are included in the lease price do not enter them a second time.

If an agency serves multiple functions, and there are vehicles that are never involved in EMS response or administration, then those vehicles should not be included on the worksheet. However, if a vehicle is involved in both EMS and other functions, then the full cost of the vehicle should be

entered into the worksheet and the percent calculated in step 3 will be applied to that cost.

It is important to make sure all types of vehicles are included (e.g., fire apparatus, ambulance, quick response vehicle, supervisory response vehicle, motorcycle, aircraft, watercraft, or bicycle).

### **Step 8: Calculate Equipment Costs**

Equipment includes those things that are used for direct patient care as well as items that are used to support the agency such as administrative computers, dispatch consoles and other. Do not include vehicles or buildings under this section. If any tax is paid in the purchase of equipment, deduct it when estimating/calculating cost. If equipment is leased, it should be listed under contract and shared services rather than in this section.

Consumable goods are those intended for single use and subsequently discarded (e.g., oxygen masks, AED pads). Durable goods are those that can be used for multiple patients (e.g., AEDs, gurneys). Some agencies/systems will list durable equipment as capital goods, while others will define it as any piece of equipment that costs over a certain amount. However, for this costing process, use the above definition to differentiate between the two. Each equipment type should be listed in a separate column. Equipment may be listed by the specific type (e.g., 4X4 gauze) or categories (e.g., bandages).

#### **Durable Equipment**

Each type of durable equipment should be listed in a separate column. Enter the average cost and life span for each type of durable equipment, as well as, the average yearly maintenance costs and the number of pieces that are owned by the agency. If the life expectancy is not known, then use 15 years. A life expectancy must be entered for the workbook to function properly. Further, if the equipment is typically sold at the end of its life span enter the resale value of that equipment. If the used equipment is not sold, the resale value may be left blank.

Many pieces of durable equipment may require consumable equipment to operate. For example, an AED can not be used without pads, but the pads can only be used once while the AED can be used for multiple patients. In this case, the AED would be listed in a column under durable equipment and the pads would be listed under consumable equipment.

Further, if equipment has been purchased over multiple years, then use the average cost in a single year. If the equipment model selected has changed and the costs are different make a separate equipment type column for each model that is owned by the agency. Record the cost and the year the equipment was purchased on the worksheet.

#### **Consumable Equipment**



For each type of consumable equipment or each category of consumable equipment list how many units are used or discarded per year, and the average cost per unit. If there are large categories of purchases from an agency budget and the number of units is not available leave that section blank and enter the total cost for the category in the row labeled “total cost per category”.

## **Step 9: Calculate Other Administrative Costs**

### **Shared or Contracted Services**

Identify and include on the worksheet any services the agency uses that have not been counted in the previous steps. This includes services such as: human resources management by an outside agency, information technology services, legal services, or laundry service. Only list the services that are provided through a contract that have not already been counted in the human resources section. Each service type should be listed in a separate column. In the column below list the number of hours that service was used per year and the average cost per hour that was paid. If the number of hours/units of service used and corresponding cost is not known, enter the total cost for each service type, but not both.

### **Insurance**

The cost for insuring vehicles and buildings has already been considered under those sub-headings. However, the cost of other types of insurances must be counted. Start by making a list of each type of insurance. Examples include: liability/risk management or workers compensation. Each insurance type should be listed in a separate column. Provide the annual premium for each insurance type under its heading.

If insurance is self-funded by the agency, then enter the actual costs from the most recent fiscal year. If a cost is being paid by insurance fees than do not include that cost on the worksheet. For example, if the salary of an employee who is on “light duty” is being paid by insurance, that salary should not be included in the human resource section. However, the cost of replacing that employee should be included in the human resources section.

### **Fees**

Make a list of each fee paid by the agency (e.g., regulatory compliance or accreditation). Make a column for each fee type and enter the total annual fee. If a fee is paid less frequently than yearly, then divide the total fee over the number of years it covers and enter that amount.

### **Information Systems**

Generate a list of all of the information systems used by the agency. Create a column for each information system type. For each

entry determine if it is licensed or purchased. If it is licensed, enter the annual licensing fee. If it is purchased, enter the total purchase price and the anticipated life span in years. In either case, enter the number purchased or leased and any training fees that are not included in the purchase price or accounted for elsewhere. If life expectancy is not known, use 5 years.

### **Travel**

All travel costs outside the geographic area paid by the agency should be reported either as a total cost for the agency or broken down by trip, event, or employee type. When calculating cost on a per trip, event, or employee basis enter the average cost for transportation, the total lodging cost, per diem including number of days, and registration fees as well as the number of persons and number of trips. If entering the total cost of a trip, enter the total cost in "Other travel cost" and "1" for the number of trips; no other numbers should be entered for that trip type.

### **Step 10: Calculate EMS-related Training Costs**

Separate the EMS-related training the agency provides into initial and continuing training. Initial training is defined as any EMS-related training that is new to the student (e.g., paramedic training for basic EMT or CPR training for police recruits). Continuing training is defined as any EMS-related training that is a refresher for the student (e.g., renewing CPR training). Neither initial nor continuing training should include the basic medical education of an on-line physician, fire suppression training of fire fighters, etc., but would include specific EMS education for physicians, fire fighters, or others.

Create a column for each type of training. For each training, determine the annual training fees, space rental fees, equipment rental fees, and the cost of printing and duplication of training materials. If training equipment is purchased and it has been listed under equipment do not list it again here.

Since only EMS related costs are being included, no percent will be applied to these costs when the total costs are calculated for the system.

### **Step 11: Calculate Bystander Training Costs**

On the worksheet titled "BYS", estimate the total number of people in the community who take CPR training, public access defibrillation training, and "First There First Care" courses during a year and the average cost to train a single person in those courses. These training courses are primarily intended to train lay responders to enhance the EMS system. All courses provided in the community should be included not just those taught by the agencies listed in the workbook.

For each course, enter the total number of instructors, the average hourly wage for an instructor, the total number of people who took the

course during the year, the average number of hours the course lasts, and average additional costs of the course (e.g., room rental, refreshments, etc.). For agencies, that are not included in the workbook it may be necessary to estimate the total number of trainees and the training costs.

Enter the prevailing wage for the community at the top of the worksheet (see step 5).

Estimate the number of public access defibrillators available in the community for which costs are being calculated. Place this number on the worksheet. Also, estimate the average cost of an automated external defibrillator in the community. For example, use a community or state negotiated cost for AED's. Eight years is suggested for use as the average life span, unless there is a community specific lifespan.

On each agency worksheet there is space to estimate bystander costs on an agency-by-agency basis. This agency information will be used to support the estimate on the Bystander page, although it is anticipated that the number trained on the bystander worksheet will be much higher. These numbers will not be included in the calculation of the total system or agency costs.

### **Step 12: Exclude any costs associated with revenue generation**

Any costs related solely to revenue generation should be excluded. It is acknowledged that revenue generation is an important aspect for any agency but these costs are excluded because they are an income transfer. They are not a cost of delivering EMS services. Further, it would be too difficult to fairly represent these costs across all agency types (e.g., billing, tax levies, grants). No matter what type of agency is being costed (municipal, commercial, etc), any revenue generating activities such as billing, lobbying or fundraising should be excluded. This includes the human resource costs of billers as well as the equipment computers, software, etc. .

### **Additional Worksheet Notes:**

- Do not change the structure of the worksheet(s) by adding/deleting rows or columns.
- Enter data only into cells highlighted in green.
- Gray cells and white cells contain calculations and should not be changed
- If notes or comments do not fit in the space provided, they may be entered into any empty white colored cell.
- Blue colored cells contain verification data and will not be incorporated into any calculations.