Effects of EMed System Model and Service Capability Level on Service Efficiency and Ambulance Utilization

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Abstract

An emergency medical service (EMed) system is proposed as a means to provide timely on-site medical treatment and transportation to the nearest hospital for Bangkok residents. The EMed system consists of a network of 29 fire stations and 41 hospitals in Bangkok linked by the Central Ambulance Dispatcher (CAD). Two models of the EMed system and two levels of service capability are tested using computer simulation to evaluate their emergency medical service efficiency and ambulance utilization. It is found that the EMed system that provides on-site medical treatments based on the severity of emergency cases (i.e., Model I) results in longer average ambulance utilization per trip. Consequently, the average patient waiting time for medical service tends to increase. This lessens the average number of patients served within 20 minutes. However, the percent ambulance utilization is high because it includes the idle time of the ambulance at the pick-up site. The EMed Model II (that is designed to deliver all patients to the hospital after only necessary medical treatment are provided at the pick-up site) has superior performance. This model decreases the ambulance utilization time, patient service time, and waiting time; it also increases the percent of patients served within 20 minutes. However, the percent ambulance utilization is decreased. For both models, increasing the level of service capability (i.e., the number of ambulances per station) helps to improve the service efficiency.

1. Introduction

If someone is seriously injured or suddenly becomes dangerously ill in Bangkok, timely medical help is a matter of luck. Nowadays, No well-developed system of emergency medical service exists in Bangkok. The task of delivering the seriously injured or sick patients belongs mainly to relatives, neighbors, or Samaritans. Although there are several ways to reach the hospital (e.g., by one's own car, by taxi, or by ambulance), some problems usually arise. For example, is there a taxi or an ambulance available nearby? Which hospital should be reached? Or, whether the ambulance can cut through the city traffic to get to the hospital in time to save life?

Traffic is probably the most daunting obstacle to timely medical care being provided outside hospital. The problem is worsened by lack of courtesy or ignorance of most motorists who refuse to make way for live-saving vehicles. Although ambulances are available, the shortages of trained paramedics make it no better than a medical taxi service. Consequently, seriously injured patients have lost their lives while being taken to hospital.

Bangkok residents can get emergency medical assistance by dialing 191 for the police or 199 for the fire brigade. However, calling these numbers does not guarantee prompt assistance. Take 191, for example. Once a request for an ambulance is registered, it will be passed on to the Police General Hospital. The hospital will ask another state hospital nearest the incidence to supply an ambulance. If no state hospital is able to do so, the request will be forwarded to the fire brigade's Rama Center to send an ambulance from its nearest fire station. Thus before the ambulance is dispatched, several valuable minutes could have been wasted. It is clear that an effective emergency medical service (EMed) system is essentially needed for Bangkok.

Emergency medical service systems commonly operated in big cities consist of three components, namely, health care policy, a network of ambulance stations, and a network of hospitals. Briefly, when a patient who is in need of medical service calls the designated (hotline) number, an ambulance from the nearest ambulance station is dispatched to the patient's residence. Necessary first-aid medical care is provided to the patient through consultation with physicians at the nearest hospital. Then the patient will be rushed to the hospital and delivered to the emergency room. The ambulance will finally return to its station.

To implement a similar emergency medical service system in Bangkok, it is necessary to establish networks of ambulance stations and hospitals that are able to satisfactorily serve about ten million people, which is the estimated population of Bangkok. Once the EMed system has been conceptually designed, its effectiveness in providing medical services must be assessed prior to its implementation. Since simulation involves the modeling of a system in such a way that the model mimics the response of the actual system to events that take place over time, it is the most appropriate tool to analyze how the EMed system performs under predetermined environment.

Simulation models have been widely used to design a new system and to 'fine-tune' the performance of existing systems [1]. For example, a simulation of traffic flow on the urban street network is useful for several tasks of traffic engineering, e.g., to evaluate new road construction, and to develop traffic control strategies [2]. Other than areas such as manufacturing, distribution, and transportation, health care has become a new area that benefits from simulation analysis. Mercy Hospital (Miami, Florida, USA) has used a computer simulation model to quantitatively improve the quality of patient care in the emergency room [3]. Gibson and Welgama [4] also applies a simulation approach to facilities design.

In this study, two EMed models and two levels of service capability are studied using a computer simulation program written in SIMAN.

2. The Emergency Medical Service (EMed) System

This section is intended to brief readers on the operation, influencing factors, severity of emergency cases, etc., of the EMed system design. Note that it is necessary to simplify the EMed system so that its behavior can be simulated by a computer program.

2.1 Operational Procedure of the Proposed EMed System

When there is a patient requiring emergency medical assistance, he/she (or someone) will dial a hotline number to call the Central Ambulance Dispatcher (CAD). CAD will record the caller's name and address of the caller, situation, and condition, and then dispatch an ambulance from the nearest station to pick up the patient. Once arriving at the pick-up site, paramedics will provide necessary first-aid medical treatments to stabilize the condition or stop bleeding. In the mean time, paramedics may call the nearest hospital to consult physicians about the patient's condition. After the patient's condition has been stabilized or it is safe to move the patient, the ambulance will then rush the patient to the nearest hospital to receive complete medical care. After delivering the patient to the hospital, the ambulance will return to its station.

2.2 Influencing Factors

The effectiveness of the EMed system in providing efficient medical services depends on the following factors.

1. Travel Time

The travel time is an amount of time for the ambulance to reach the pick-up site after the call has been made. The travel time depends on the travel speed of the ambulance (which subsequently depends on the traffic situation) and availability of the ambulance at the station.

2. Service Time

The service time of an ambulance consists of: (1) the travel time to the pick-up site, (2) the first-aid treatment time, and (3) the delivery time to the hospital. It depends on the severity of the case, travel speed of the ambulance, and availability of the ambulance at the station.

3. Population Density

The density of population in Bangkok is not uniformly distributed. Some areas may be more highly populated than others. The population density greatly affects the rate of emergency calls, and the utilization time of the ambulance.

For convenience, areas in Bangkok can be categorized as follows.

1. Zone 1 (Very busy/crowded) – having more than 25,000 persons/sq. km.
2. Zone 2 (Busy) – having between 20,000 and 25,000 persons/sq. km.
3. Zone 3 (Moderate) – having between 10,000 and 20,000 persons/sq. km.
4. Zone 4 (Not crowded) – having less than 10,000 persons/sq. km.

4. Traffic Situation

Similar to the population density, the traffic situation in some areas may be worse than that in others. Patients in heavy traffic areas will experience delayed pick-up and delivery.

2.3 Severity of Emergency Cases

The severity of emergency cases can be separated into three categories, namely, not serious, serious, and very serious. Different categories require slightly different service procedure. For simplicity, these three categories are referred to as false-alarm, treat-before-delivery, and immediate-delivery, respectively.

1. Case I: False-alarm

In the false-alarm case, when the ambulance arrives at the pick-up site, paramedics will only provide necessary medical treatments to the patient. A delivery to the hospital may or may not be needed depending on the EMed system policy. If the delivery to the hospital is not required, the ambulance will return to its station after leaving the pick-up site.

2. Case II: Treat-before-delivery

After arriving at the pick-up site, paramedics will initially provide first-aid treatments to the patients. Calls may be made to the nearest hospital to consult physicians. The amount of time spent at the pick-up site normally varies depending on the emergency case. Then the ambulance will deliver the patient to the nearest hospital. After that, the ambulance will return to its station.

3. Case III: Immediate-delivery

Case III situation is the most serious one. The patient's condition must be stabilized as soon as possible. Then the patient will be immediately delivered to the nearest hospital. After the delivery, the ambulance returns to the station.

2.4 Ambulance Stations and Hospitals

It is essential that the EMed system has efficient networks of ambulance stations and hospitals to help to provide emergency medical services. At present the emergency service network provided by the Police General Hospital uses all existing fire stations as ambulance stations. In the proposed EMed system some of these fire stations are also assigned as ambulance stations. Specifically, 29 fire stations in Bangkok and 41 hospitals form networks of ambulance stations and hospitals, respectively, for the EMed system. It should be noted that, if necessary, some police stations could also be used.

2.5 Emergency Sites

Presumably there are 50 emergency sites randomly assigned in Bangkok. A larger number of sites are created for zones having higher population density than those having a lower density. Emergency cases are generated based on different exponential probability distributions. The exponential distributions with different inter-arrival times are applied to individual sites according to their population density. The offset times are also assigned using the values form the random number table.

3. The EMed Models

Two EMed models (Models I and II) are investigated in this study. They differ in the way they respond to the three categories of emergency cases. Detailed explanations of both models are given in Section 4. Their basic assumptions and performance measures are explained below.

3.1 Assumptions

Both EMed models behave according to the following basic assumptions.

1. There is no waiting time when calling the designated hotline number to request an ambulance.
2. The CAD spends one minute to get information from the caller.
3. The amount of time required to call the ambulance station (from CAD) to dispatch an ambulance is neglected. If there is an ambulance available, it will be dispatched right away.
4. The ambulance travel speed is 16 km/hr.
5. The number of ambulances is limited and is the same at every station.
6. All hospitals have unlimited number of beds in the emergency room.
7. Each pick-up site uses its own random generator to generate emergency cases. The time-between-arrivals of the cases follows an exponential distribution, with its mean being a function of the population density. First cases are generated at different times as randomly determined using a random number table. The mean times-between-arrivals used are 20, 30, 40, and 80 minutes for sites located in Zones 1, 2, 3, and 4, respectively.
8. At any hospital, a transfer of the patient from the ambulance to the emergency room takes 5 minutes and the transfer time is constant.
9. After returning to the station, the ambulance will immediately be available for the next call for pick-up.

3.2 Performance Measures

1. Average Ambulance Utilization Time

   The average ambulance utilization time is defined as the sum of the travel times (from the ambulance station to the pick-up site, from the pick-up site to the hospital, and from the hospital to the ambulance station), treatment time (at the pick-up site), and the patient transfer time (at the hospital).
2. Average Patient Service Time

   The average patient service time is defined as the sum of the calling time, waiting time, travel times (from the ambulance station to the pick-up site and from the pick-up site to the hospital), treatment time (at the pick-up site), and patient transfer time (at the hospital).
3. Average Waiting Time

   The average waiting time for the ambulance is defined as the time interval between initiating a call to the CAD and the arrival of the ambulance at the pick-up site.
4. Average Percent Ambulance Utilization

   The average percent ambulance utilization is defined as the ratio of the product of the average ambulance utilization time and the average total number of patients served by the EMed system to the product of the total available time of an ambulance and the total number of ambulances in the EMed system.
5. Average Percent Patient Served Within 20 Minutes

   The average percent patient served within 20 minutes by the EMed system is defined as the ratio of the average number of patients served within 20 minutes to the average total number of emergency cases generated by the system.

4. Simulation Models of the EMed System

4.1 Model I

The EMed Model I is designed to respond to the emergency cases differently according to their categories, i.e., false-alarm, treat-before-delivery, and immediate-delivery. Treatment times at pick-up sites are based on the severity of the case. Two service capability levels as determined by the number of ambulances at each station are considered: three ambulances per station, and four ambulances per station.

Additional assumptions used in Model I are as follows.

1. Once an emergency case is generated, a severity level is assigned. The probabilities of the occurrence of the three categories are:
   Pr[false-alarm] = 0.07
   Pr[treat-before-delivery] = 0.90
   Pr[immediate-delivery] = 0.03
2. The treatment time at the emergency site follows a normal distribution with the mean and standard deviation as shown below.
   False-alarm case: N (20, 5)
   Treat-before-delivery case: N (10, 3)
   Immediate-delivery case: N (3,1)

Generally, the average ambulance utilization time can be expressed as

$$AF(x) = AS(x) + TreatTime(x) + SH(x) + 5 + HA(x) \quad (1)$$

where:
AF = Utilization time of the ambulance
AS = Travel time from the ambulance station to the pick-up site
TreatTime = Treatment time at the pick-up site
SH = Travel time from the pick-up site to the Hospital
HA = Travel time from the hospital to the Ambulance station

Note that x represents the type of emergency case where x = 1, 2, and 3 for the false-alarm, treat-before-delivery, and immediate- delivery cases, respectively.

Similarly, the average patient service time can be expressed as

$$PF(x) = 1 + AS(x) + TreatTime(x) + SH(5) + 5 \quad (2)$$

where:
PF = Service time of the patient

4.2 Model II

The EMed Model II is designed to respond to the emergency in the same way, irrespective of their categories. In every case, the paramedics will provide necessary first-aid medical treatments at the pick-up site to stabilize the patient's condition and then delivery him/her to the hospital. Two simulation models are developed for the EMed Model II based on the levels of service capability. The first model assumes that there are three ambulances per station while the second model assumes that there are four ambulances per station. Additional assumptions used in Model II is that the treatment time at the pick-up site follows a normal distribution, with the mean and standard deviation of 3 minutes and 1 minute, respectively.

The ambulance utilization time can be mathematically expressed as

$$AF = AS + TreatTime + SH + 5 + HA \quad (3)$$

Note that there are no differences in treatment times among emergency cases.

Similarly, the average patient service time is

$$PF = 1 + AS + TreatTime + SH + 5 \quad (4)$$

5. Analyses of Simulation Results

The simulation analyses are performed on both EMed models (Models I and II). For each model, the operation of the EMed system is simulated for a period of seven days continuously. The warm-up period is six hours to allow the system to reach a steady state. At the end of the simulation time (i.e., Day 7), the statistics of model parameters, not including those occurred during the warm-up period, that are used in the calculation of the performance measures are determined for each simulation run. Five replications are continuously run by the simulation program to obtain sufficient number of observations for further statistical analyses. A hypothesis testing about one mean and a two-factor analysis of variance (ANOVA) are employed to evaluate the EMed system behaviors and performances.

For the sake of comparison, the effectiveness criteria have been arbitrarily set as follows.

1. The average patient service time is at most 20 minutes.
2. The average waiting time for the ambulance is at most 10 minutes.
3. The average percent ambulance utilization is at least 75%.
4. The average percent patients served within 20 minutes is at least 80%.

Readers must be aware that these predetermined values of criteria can affect the conclusion about the effectiveness of the EMed system models. In practice, careful consideration must be thoroughly given when setting the criteria.

5.1 Model I

5.1.1 Simulation Results

Tables 1 and 2 presents the average data of the performance measures from five replications. Note that each replication simulates the behavior of the EMed model during a 7-day period. The numbers of ambulances per station are three and four, respectively.

Table 1
Performance Measures of EMed Model I (3 ambulances/station)

Performance Measure	Replication No.					Mean	Std. Dev.
	1	2	3	4	5		
Ambulance Utilization Time (min.)	37.78	37.51	37.56	37.78	27.55	37.64	0.14
Patient Service Time (min.)	27.65	27.53	27.62	27.86	27.55	27.64	0.13
Waiting Time (min.)	7.54	7.45	7.48	7.60	7.49	7.51	0.06
Ambulance Utilization (%)	51.87	51.27	51.08	52.45	51.24	51.58	0.57
Patients Served w/i 20 Minutes (%)	12.24	12.50	12.71	11.60	12.87	12.38	0.50

Table 2
Performance Measures of EMed Model I (4 ambulances/station)

Performance Measure	Replication No.					Mean	Std. Dev.
	1	2	3	4	5		
Ambulance Utilization Time (min.)	35.61	35.38	35.17	35.39	35.24	35.36	0.17
Patient Service Time (min.)	26.26	26.19	26.07	26.24	26.08	26.17	0.09
Waiting Time (min.)	6.14	6.10	6.05	6.11	6.03	6.09	0.05
Ambulance Utilization (%)	35.98	36.10	36.01	36.71	36.23	36.21	0.30
Patients Served w/i 20 Minutes (%)	15.61	16.04	16.04	15.19	15.71	15.16	0.31

5.1.2 Statistical Analysis

A hypothesis testing about one mean has been performed on each system effectiveness criterion for both service capability levels of EMed Model I. It is seen that three of the four criteria fail to pass the hypothesis tests. The results indicate that EMed Model I is ineffective in providing satisfactory emergency medical services to needy patients, irrespective of the number of ambulances per station.

The results are summarized in Tables 3 and 4. The significance level α is 0.05.

Table 3
Summary of Statistical Analyses of EMed Model I (3 ambulances/station)

Effectiveness Criterion	Null Hypothesis	Decision	Result
Average Patient Service Time (min.)	> 20	Not Rejected	Ineffective
Average Waiting Time (min.)	> 10	Rejected	Effective
Average Ambulance Utilization (%)	< 75	Not Rejected	Ineffective
Average Patients Served w/i 20 minutes (%)	< 80	Not Rejected	Ineffective

Table 4
Summary of Statistical Analyses of EMed Model I (4 ambulances/station)

Effectiveness Criterion	Null Hypothesis	Decision	Result
Average Patient Service Time (min.)	> 20	Not Rejected	Ineffective
Average Waiting Time (min.)	> 10	Rejected	Effective
Average Ambulance Utilization (%)	< 75	Not Rejected	Ineffective
Average Patients Served w/i 20 minutes (%)	< 80	Not Rejected	Ineffective

5.2 Model II

5.2.1 Simulation Results

Similar to Model I, five replications of EMed Model II are run. Two levels of service capability (i.e., the number of ambulances per station) are also considered. The performance measures obtained from individual replications, including their averages and standard deviations, are presented in Tables 5 and 6, for both levels of service capability.

5.2.2 Statistical Analysis

The summaries of the statistical analysis are shown in Tables 7 and 8. It is found that EMed Model II is able to provide adequate medical services for both service capability levels. The average patient service time and average waiting time are both statistically less than 20 minutes and 10 minutes, respectively. However, both the average ambulance utilization and average patients served w/i 20 minutes do not meet the effectiveness criteria.

Table 5
Performance Measures of EMed Model II (3 ambulances/station)

Performance Measure	Replication No.					Mean	Std. Dev.
	1	2	3	4	5		
Ambulance Utilization Time (min.)	29.65	29.25	29.47	29.55	29.43	29.47	0.15
Patient Service Time (min.)	20.01	19.84	19.87	19.95	19.89	]19.91	0.07
Waiting Time (min.)	6.71	6.53	6.61	6.62	6.55	6.60	0.07
Ambulance Utilization (%)	40.90	39.63	40.10	40.96	40.25	40.37	0.56
Patients Served w/i 20 Minutes (%)	60.59	60.44	60.81	60.30	59.78	60.38	0.39

Table 6
Performance Measures of EMed Model II (4 ambulances/station)

Performance Measure	Replication No.					Mean	Std. Dev.
	1	2	3	4	5		
Ambulance Utilization Time (min.)	28.46	28.28	28.33	28.14	28.26	28.29	0.12
Patient Service Time (min.)	19.09	19.03	19.12	19.02	19.09	19.15	0.21
Waiting Time (min.)	5.79	5.74	5.80	5.74	5.77	5.77	0.03
Ambulance Utilization (%)	29.20	29.25	29.42	29.54	29.31	29.34	0.14
Patients Served w/i 20 Minutes (%)	64.91	64.69	64.50	64.90	64.55	64.71	0.19

Table 7
Summary of Statistical Analyses of EMed Model II (3 ambulances/station)

Effectiveness Criterion	Null Hypothesis	Decision	Result
Average Patient Service Time (min.)	> 20	Rejected	Effective
Average Waiting Time (min.)	> 10	Rejected	Effective
Average Ambulance Utilization (%)	< 75	Not Rejected	Ineffective
Average Patients Served w/i 20 minutes (%)	< 80	Not Rejected	Ineffective

Table 8
Summary of Statistical Analyses of EMed Model II (4 ambulances/station)

Effectiveness Criterion	Null Hypothesis	Decision	Result
Average Patient Service Time (min.)	> 20	Rejected	Effective
Average Waiting Time (min.)	> 10	Rejected	Effective
Average Ambulance Utilization (%)	< 75	Not Rejected	Ineffective
Average Patients Served w/i 20 minutes (%)	< 80	Not Rejected	Ineffective

Although the results shown in Tables 7 and 9 indicate that both EMed Model II are able to meet two of the four effectiveness criteria, it cannot be concluded yet that the EMed system is effective in providing satisfactory emergency medical services. One may have to weight these criteria based on their significance and then perform a decision-making analysis.

Furthermore, it is interesting to see if the two EMed models are significantly different from one another. A two-factor ANOVA is used to test the differences in all effectiveness criteria at $\alpha = 0.05$. An additional performance measure, i.e., average ambulance utilization time is included in this statistical analysis. The results are shown in Table 9.

Table 9
Summary of Two-factor ANOVA Results

	p-value	Significance at $\alpha = 0.05$?
Ambulance Utilization Time		
Model type	0.00005	Yes
Service Capability Level	0.00005	Yes
Model Type x Service Capability Level*	0.00005	Yes
Patient Service Time		
Model type	0.00005	Yes
Service Capability Level	0.00005	Yes
Model Type x Service Capability Level*	0.00005	Yes
Patient Waiting Time		
Model type	0.00005	Yes
Service Capability Level	0.00005	Yes
Model Type x Service Capability Level*	0.00005	Yes
Percent Ambulance Utilization		
Model type	0.00005	Yes
Service Capability Level	0.00005	Yes
Model Type x Service Capability Level*	0.00005	Yes
Percent Patients Served w/I 20 Minutes		
Model type	0.00005	Yes
Service Capability Level	0.00005	Yes
Model Type x Service Capability Level*	0.00005	Yes

**Interaction effect*

The first factor is the EMed model type which has two levels, namely, Model I (Case-dependent) and Model II (Case-independent). The second factor is service capability level. Two levels are considered: (1) three ambulances per station, and (2) four ambulances per station.

Unfortunately, all two-factor ANOVA tests indicate that the interaction effects between the EMed model type and the service capability level are significant (see Table 9), causing the attempt to statistically conclude the effects of the EMed model type and the service capability level on the effectiveness criteria to be inconclusive. Nevertheless, it can still be *said* that the EMed system designed based on Model II outperforms the one designed based on Model I. When the number of ambulances per station increases, the patient service time and waiting time decrease, indicating an improvement. However, the percent ambulance utilization is degraded.

6. Discussion and Conclusions

The effectiveness of the EMed system in providing emergency medical services can be evaluated using various criteria. In this paper, five effectiveness criteria are considered: (1) ambulance utilization time, (2) patient service time, (3) patient waiting time, (4) percent ambulance utilization, and (5) percent patients served w/i 20 minutes.

The first and the fourth criteria provide information about the utilization of ambulances. The information indicates how busy the ambulances will be and how many vehicles are needed at the ambulance station. The second and the third criteria evaluate the patient service time and patient waiting time. These criteria indicate the quality of medical services that the EMed system provides. The fifth criterion tells the overall performance of the EMed system. The 20-minute time limit is the recommended amount of time by which a patient should reach the hospital (suggested by the emergency room physicians). We have arbitrarily set the second, third, fourth, and fifth criteria at 20 minutes, 10 minutes, 75%, and 80%, respectively.

Initially we have assumed that each station has only one ambulance. The simulation analysis shows that the ambulance will be 100% utilized and the averaging waiting is significantly large. Similar results are also found when the number of ambulances is two. These initial findings suggest that, based on the assumed operational environment, the minimum feasible number of ambulances per station is three. Thus in this paper we consider two service capability levels: (1) when there are three ambulances per station, and (2) when there are four ambulances per station.

Three types of emergency case are assumed. They are: (1) false-alarm, (2) treat-before-delivery, and (3) immediate-delivery. The EMed Model I responds to these cases differently while Model II responds to all cases in the same way.

It is found that EMed Model I cannot satisfactorily serve patients since the patient service time is statistically greater than the effectiveness criterion. Furthermore, both the percent ambulance utilization and percent patients served within 20 minutes do not meet the preset criteria. The results are the same for both levels of service capability. Although we are unable to statistically conclude that there are significant differences among service capability levels, we observe that EMed Model I provides better services when there are four ambulances per station. However the percent ambulance utilization time is lower.

For EMed Model II, both service capability levels demonstrate similar results to those of Model I. Model II which requires that the patient must be delivered (after being stabilized) to the hospital provides acceptable service level. Both the patient service time and waiting time are not statistically greater than the criteria, at both levels of service capability. However, the percent ambulance utilization does not meet the criterion.

Although statistically inconclusive, Model II seems to provide better service to patients than Model I since the patient service time is less. The percent patients served within 20 minutes of Model II is also greater than that of Model I.

In conclusion, the selection of the EMed system depends on the effectiveness criteria set by the authority agency. When the main interest is to provide faster service and increase the number of patients served within 20 minutes, EMed Model II that does not allow paramedics to provide complete medical services at pick-up sites but requires them to deliver patients to the hospital should be implemented. It is suggested that the networks of fire stations and hospitals should be expanded to reduce the ambulance utilization time and patient waiting time. This can be accomplished by including existing police stations into the networks to serve as possible ambulance stations. With more efficient networks, the number of ambulances per station may be reduced which will help to increase the percent ambulance utilization.

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