

## **CHAPTER 4**

### **Fire Services Department**

<h3><b>Emergency ambulance service</b></h3>
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Hong Kong  
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*This audit review was carried out under a set of guidelines tabled in the Provisional Legislative Council by the Chairman of the Public Accounts Committee on 11 February 1998. The guidelines were agreed between the Public Accounts Committee and the Director of Audit and accepted by the Government of the Hong Kong Special Administrative Region.*

Report No. 51 of the Director of Audit contains 12 Chapters which are available on our website at <http://www.aud.gov.hk>.

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# EMERGENCY AMBULANCE SERVICE

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## **PART 1: INTRODUCTION**

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

### **Background**

1.2 The Fire Services Department (FSD) is responsible for fire-fighting and rescue on land and sea, and the provision of the emergency ambulance service for the sick and the injured under the Fire Services Ordinance (Cap. 95). The FSD is organised into seven Commands (i.e. the Headquarters Command, the Hong Kong Command, the Kowloon Command, the New Territories Command, the Fire Safety Command, the Licensing and Certification Command, and the Ambulance Command). The **Ambulance Command** is responsible for the provision of the emergency ambulance service, comprising pre-hospital care, and conveyance of patients and casualties to hospitals. Under the Ambulance Command, there are two operational regions (i.e. the Hong Kong and Kowloon Region, and the New Territories Region). The organisation chart of the Ambulance Command is shown at Appendix A.

1.3 As at 30 June 2008, the Ambulance Command had 36 ambulance depots, 27 outstations (fire stations used as ambulance outstations and standby locations) and 2 ambulance posts (standby locations at the immigration control points) strategically located in the territory to provide the emergency ambulance service. The Ambulance Command had an establishment of 131 ambulance officers and 2,298 ambulancemen, and a fleet of 252 ambulances, 4 mobile casualty treatment centres (Note 1) and 34 ambulance motorcycles (Note 2). In 2008-09, the estimated expenditure for the provision of the emergency ambulance service is \$948 million.

### **Ambulance calls**

1.4 Ambulance calls are classified into **emergency**, **urgent** and **non-emergency calls**. In principle, the FSD is responsible for providing the ambulance service in response to emergency and urgent calls. **Emergency calls** are classified into:

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**Note 1:** *The four vehicles, fitted with communication and medical equipment, are used as treatment centres in incidents involving a large number of casualties.*

**Note 2:** *These motorcycles are used to provide advanced pre-hospital paramedic care for casualties and patients before the arrival of ambulances.*

- (a) calls from the public, requesting conveyance of patients and casualties from scene of incidents to hospitals for emergency treatment; and
- (b) calls from hospitals or medical institutions, requesting transfer of patients with extreme urgency from a hospital or medical institution to another for emergency treatment.

1.5 Apart from emergency calls, there are also urgent calls and non-emergency calls. The FSD is also responsible for handling **urgent calls** from hospitals of the Hospital Authority (HA). Urgent calls are calls for transfer of patients with some degree of urgency from a hospital or medical institution to another for urgent treatment. In April 2003, the FSD, in consultation with the HA, introduced an urgent care fleet. Each ambulance of the fleet is manned by a 2-man crew instead of a 3-man crew to release resources for the emergency ambulance service. As at 30 June 2008, there were 12 ambulances under the urgent care fleet. In 2007, the FSD handled 573,657 emergency calls and 36,916 urgent calls.

1.6 **Non-emergency calls** are calls for transporting patients of non-emergency nature from a medical institution to other places. The non-emergency ambulance service is provided by the HA, the Auxiliary Medical Service and the St. John Ambulance Brigade (Note 3).

### **Audit review of the provision of the ambulance service in 1997**

1.7 In 1997, the Audit Commission (Audit) conducted a review of “The provision of ambulance service”. The results of the review of the emergency ambulance service were included in Part I of Chapter 6 of the Director of Audit’s Report No. 29 (October 1997). Audit found that there was room for improvement (such as the performance measurement for the emergency ambulance service and the provision of the paramedic ambulance service) and made a number of recommendations. The Administration generally agreed with the audit recommendations and took action to implement them.

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**Note 3:** *The HA has a fleet of 127 ambulances for providing the ambulance service for the mobility-handicapped patients. The Auxiliary Medical Service has a fleet of 6 ambulances providing the ambulance service for patients of the Department of Health, the Social Welfare Department and private hospitals. The St. John Ambulance Brigade has a fleet of 10 ambulances providing the ambulance service for the public.*



## Latest developments

### *Revised performance measurement*

1.8 Since November 1998, the FSD has set a performance target of answering **92.5% of the emergency calls within a target response time of 12 minutes**. In late 1999, the FSD reviewed the performance target and concluded that the target response time of 12 minutes was reasonable and achievable. In 2007, the FSD answered **92.8%** of the emergency calls within the target response time.

### *Paramedic ambulance service*

1.9 Since February 2005, the FSD has committed to providing the paramedic ambulance service to improve the survival rate of critical patients and casualties for all the emergency calls. All FSD ambulances are equipped with paramedic equipment (such as automated external defibrillators — AEDs) to facilitate the ambulance crew to render advanced pre-hospital paramedical care to patients. Ambulance staff are trained to be Emergency Medical Assistants II (EMA IIs — Note 4) to provide the paramedic ambulance service.

## Maintenance and replacement of ambulances

1.10 The maintenance service of the FSD ambulance fleet is provided by the Electrical and Mechanical Services Department (EMSD) under a 10-year Service Level Agreement (SLA) from 2006-07 to 2015-16. In 2007-08, the SLA maintenance charge of the ambulance fleet was \$19.2 million. Ambulances are considered as large vans and the Government Logistics Department (GLD)'s endorsement is required for procuring them.

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**Note 4:** *Advanced countries, such as Canada, have the following three skills levels of the ambulance staff for providing the paramedic ambulance service:*

- (a) EMA Is provide patient care at the basic level. Their training includes the use of defibrillator and basic life support;*
- (b) EMA IIs provide a more comprehensive patient examination and advanced pre-hospital treatment. Their training includes intravenous infusion, defibrillation and use of selected drugs; and*
- (c) EMA IIIs provide advanced patient care. Their training includes knowledge and technique of intubation and in-depth cardiac management.*

*The FSD's target skills level of ambulancemen is only the EMA II level.*

## **Mobilisation of ambulances**

1.11 The Fire Services Communication Centre (FSCC) of the FSD is responsible for mobilising all ambulance resources. It acts as an emergency co-ordinator for other government departments and public utilities in major incidents. Upon receipt of an emergency call, the FSD's Third Generation Mobilising System (TGMS — a sophisticated telecommunication and computer integrated mobilising system) will assign the ambulance that can reach the scene of incident within the shortest time to respond to the call. The FSD has to maintain a high level of availability of ambulances and ambulance crew for the provision of the emergency ambulance service.

## **Audit review**

1.12 Audit has recently conducted a review to examine the economy, efficiency and effectiveness in the provision of the emergency ambulance service by the FSD in response to emergency calls. The review has focused on the following areas:

- (a) use of the emergency ambulance service (PART 2);
- (b) performance measurement (PART 3);
- (c) use of ambulance resources (PART 4);
- (d) maintenance of ambulances (PART 5); and
- (e) procurement of replacement and additional ambulances (PART 6).

1.13 In carrying out the audit review, Audit examined the records and interviewed the staff of the FSD. Audit has found that there are areas where improvements can be made. Audit has made a number of recommendations to address the issues.

## **General response from the Administration**

1.14 The **Director of Fire Services** generally agrees with all the audit recommendations and will take follow-up actions in a proactive manner.

1.15 The **Secretary for Security** welcomes the value for money audit of the emergency ambulance service of the FSD. The Security Bureau (SB) notes that the FSD generally agrees with all the audit recommendations and will take follow-up action accordingly. The SB will closely monitor the FSD's progress and ensure that the audit recommendations are implemented as far as possible in a timely manner.

1.16 The **Secretary for Financial Services and the Treasury** welcomes the audit recommendations to improve the management and use of ambulances resources.

### **Acknowledgement**

1.17 Audit would like to acknowledge with gratitude the full cooperation of the staff of the FSD during the course of the audit review.

## **PART 2: USE OF THE EMERGENCY AMBULANCE SERVICE**

2.1 This PART examines the use of the emergency ambulance service and suggests measures for improvement.

### **Demand for the emergency ambulance service**

2.2 The principal role of the emergency ambulance service is to provide pre-hospital care for patients and convey them to the hospitals as quickly as possible and practicable. With the rapid growing and ageing population, there was an increase in the demand for the emergency ambulance service. The number of emergency calls increased from 421,146 in 1999 by 152,511 (36%) to 573,657 in 2007.

### **Audit observations and recommendations**

#### *Inappropriate use of the emergency ambulance service*

2.3 The emergency ambulance service is vital to giving immediate care under emergency conditions to save lives. According to the FSD's experience, some of the emergency calls received by the FSCC were not of an emergency nature. The use of emergency ambulance resources to handle such calls reduces the availability of the ambulance fleet for responding to patients who are in genuine need of the emergency ambulance service. However, the FSD does not have information on the degree of urgency of the calls. In the absence of management information on the inappropriate use of the emergency ambulance service, the FSD could not quantify the emergency ambulance resources deployed inappropriately for calls which were not of an emergency nature.

2.4 In handling each emergency call, the ambulance crew manually records the information (i.e. the symptoms of the patient, the pre-hospital treatment given, the time of call and time of despatch) on an ambulance journey record. Unlike those of the HA's Accident and Emergency (A&E) Departments (see para. 2.5), there was no assessment on the degree of urgency of the patients in the ambulance journey records. Audit notes that the FSD plans to introduce electronic ambulance journey records (Note 5) in early 2009. **Audit considers that, in implementing the electronic ambulance journey records, the FSD needs to explore the feasibility of incorporating information on the degree of urgency**

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**Note 5:** *Information may be entered to the electronic ambulance journey records through the mobile data terminals installed in ambulances and transmitted to hospitals upon arrival. The records can be uploaded to FSD computer system for future reference.*

of patients in these records, and using these data to generate management information for drawing the public's attention to the proper use of the emergency ambulance service.

2.5 According to the A&E Triage Categorisation System of the HA, a substantial number of conveyance of patients by ambulances to the A&E Departments were non-emergency cases. From 2004 to 2007, on average, **40.5%** of the conveyance of patients by ambulances were classified as semi-urgent (such as patients with bruise and sprain), non-urgent (such as patients with minor abrasion and gastroenteritis) or unclassified (Note 6) cases. Details are shown at Appendix B.

2.6 If some of the patients of non-emergency cases could be encouraged not to call for the emergency ambulance service (i.e. to use other providers' non-emergency ambulance service), the FSD could deploy its emergency ambulance resources more readily to patients who were in need of immediate medical treatment. **In view of the significant number of non-emergency conveyance of patients by ambulances, Audit considers that the FSD needs to step up its efforts to encourage the public's proper use of the emergency ambulance service through public education. The FSD, in collaboration with the HA and other providers of the non-emergency ambulance service, should consider the need of jointly launching education programmes to enhance the effectiveness of public education on the proper use of the emergency and non-emergency ambulance services.**

*Audit recommendations*

2.7 **Audit has recommended that the Director of Fire Services should:**

- (a) **in implementing the electronic ambulance journey records, explore the feasibility of incorporating information on the degree of urgency of patients in these records, and using these data to generate management information for drawing the public's attention to the proper use of the emergency ambulance service;**

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**Note 6:** *Unclassified cases refer to the conveyance of patients (by ambulances) who have:*

- (a) *registered with the hospitals for medical consultation before calling for the emergency ambulance service; and*
- (b) *registered with the A&E Departments and left the hospitals before the triage.*

- (b) **in view of the significant number of non-emergency conveyance of patients by ambulances, step up the efforts to encourage the public's proper use of the emergency ambulance service through public education; and**
- (c) **in collaboration with the Chief Executive, HA and other providers of the non-emergency ambulance service, consider the need of jointly launching education programmes to enhance the effectiveness of public education on the proper use of the emergency and non-emergency ambulance services.**

### **Response from the Administration**

2.8 The **Director of Fire Services** agrees with the audit recommendations. He has said that the FSD will:

- (a) in consultation with its medical directors, explore the feasibility of incorporating information on the degree of urgency of patients in the electronic ambulance journey records, and using these data to generate management information for drawing the attention of the public to the proper use of the emergency ambulance service;
- (b) in addition to the current methods (i.e. posters, FSD website, ambulance service campaign and announcements in public interest), consider other means to promote the proper use of the emergency ambulance service; and
- (c) try to collaborate with the HA and other ambulance service providers to explore the practicability and feasibility of jointly launching education programmes for promoting the proper use of the emergency and non-emergency ambulance services.

2.9 The **Secretary for Financial Services and the Treasury** welcomes the audit recommendations. He has said that the Financial Services and the Treasury Bureau (FSTB) shares the view that information on the degree of urgency of ambulance calls received is important management information in addressing the problem of the inappropriate use of the emergency ambulance service. The FSTB considers that the FSD should start keeping a record of the data as soon as possible instead of waiting for the implementation of the electronic ambulance journey records in early 2009, which is only a tentative date. On the use of emergency ambulance service, the FSTB notes that the SB and the FSD have undertaken in their respective Controlling Officer's Reports that they would explore the long-term options for better meeting the demand for the emergency ambulance service and the feasibility of introducing a medical priority despatch system.

2.10 The **Chief Executive, HA** has said that the case classification is not an absolute indicator to reveal the nature and actual condition of the patient. It serves to facilitate the diversion of work in the A&E Departments. Based on his on-site medical condition, the patient, at his discretion, may call for the emergency ambulance service. There is a potential risk of deterioration that may warrant an immediate ambulance service. Therefore, from the perspective of patient safety, the HA considers that it is inappropriate to correlate the 40.5% with the over-use of the emergency ambulance resources.

### **Public education on the proper use of the emergency ambulance service**

2.11 To ensure that the emergency ambulance service is provided for those who are in genuine need for the service, the FSD encourages the proper use of the emergency ambulance service through public education. In 2005 and 2007, the FSD launched the publicity campaigns with the theme of “Do not misuse ambulance service”. Media publicity channels, posters and leaflets were used to disseminate the campaign message.

### **Audit observations and recommendations**

#### *Review of the effectiveness of publicity campaigns*

2.12 To promote the proper use of the emergency ambulance service, the FSD started to launch the television and radio announcements in public interest (APIs) “Do not misuse ambulance service” and the ambulance service campaign in November 2005. Two sets of the APIs were produced in 2005 and 2007 at a cost of about \$300,000 each. In August 2006, the FSD reviewed the effectiveness of the publicity campaigns by comparing the relevant statistics for the period from December 2005 to February 2006 with those for the period from December 2004 to February 2005. The review found that the campaigns in 2005 were effective as the number of patients conveyed by ambulances to the HA’s A&E Departments decreased by 4.4% and the number of emergency calls decreased by 4.3%. Since August 2006, the FSD had not reviewed the effectiveness of its publicity campaigns.

2.13 According to the Good Practice Guide to Mounting Publicity Campaigns of the Information Services Department, it is necessary to conduct a review after each campaign and submit the review report to the relevant bureau and the Information Services Department to help assess the need for similar campaigns in future. **Audit considers that the FSD needs to follow the Good Practice Guide of evaluating the effectiveness of its publicity campaigns and identify room for further improvement in promoting the proper use of the emergency ambulance service.**

*Need to use a wider range of publicity channels*

2.14 Audit noted that, from November 2005 to April 2008, a few organisations (a hospital, a media company and a minibus management company) requested for copies of the APIs “Do not misuse ambulance service” for broadcasting in a public hospital, some healthcare and dental clinics, and on board some minibuses. A wider range of publicity channels can enhance the effectiveness of the publicity campaigns. **Audit considers that the FSD needs to use a wider range of publicity channels to enhance the effectiveness of publicity campaigns.**

*Audit recommendations*

2.15 **Audit has recommended that the Director of Fire Services should:**

- (a) **follow the Good Practice Guide of evaluating the effectiveness of the publicity campaigns and identify room for further improvement in promoting the proper use of the emergency ambulance service; and**
- (b) **use a wider range of publicity channels (such as broadcasting at public and private hospitals, educational institutions and public utility companies) to enhance the effectiveness of publicity campaigns.**

**Response from the Administration**

2.16 The **Director of Fire Services** agrees with the audit recommendations. He has said that the FSD will:

- (a) with immediate effect, follow the Good Practice Guide of evaluating the effectiveness of the publicity campaigns and identify room for further improvement in promoting the proper use of the emergency ambulance service; and
- (b) consider using a wider range of publicity channels to enhance the effectiveness of publicity campaigns.



## **PART 3: PERFORMANCE MEASUREMENT**

3.1 This PART examines the performance measurement for the provision of the emergency ambulance service by the FSD and suggests measures for improvement.

### **Performance measurement for the emergency ambulance service**

3.2 According to FSD Controlling Officer's Report, the performance target for the emergency ambulance service is to answer 92.5% of the emergency calls within a target response time of 12 minutes. In addition to this target, the FSD sets five performance indicators for measuring the emergency ambulance service. The performance of the emergency ambulance service from January 2006 to June 2008 is shown at Appendix C. In both 2006 and 2007, the FSD was able to achieve the performance target for the emergency ambulance service. However, for the period from January to June 2008, the FSD failed to achieve the performance target (see Table 1 in para. 3.4).

### **Audit observations and recommendations**

#### *Review of the ambulance response time*

3.3 Since November 1998, the FSD has adopted the target response time of 12 minutes for the emergency ambulance service. The response time for an emergency call is measured from the time of receiving the call to the time of arrival of the ambulance or ambulance motorcycle, whichever is earlier, at the scene of incident. The 12-minute target response time comprises:

- (a) 2 minutes for activation (i.e. the mobilisation time and the turnout time — Note 7); and
- (b) 10 minutes for an ambulance to travel to the scene of incident.

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**Note 7:** *The mobilisation time is the interval between the time of receiving an emergency call and the time of broadcasting at the ambulance depot. The turnout time is the interval between the time of broadcasting and the time of acknowledging the despatch message of the mobile data terminal in the ambulance by the ambulance crew.*

3.4 The 10-minute travelling time was based on the recommendation of a consultancy study on the emergency ambulance service conducted in 1986. With the implementation of the TGMS in June 2005, ambulance resources of individual districts are flexibly deployed to answer the emergency calls in all districts to shorten the ambulances' travelling time to the scene of incident. The Global Positioning System is used to track the location of ambulances and identify an ambulance which requires the shortest travelling time to the scene of incident for each emergency call. However, audit analysis of the response time of ambulances indicated that the percentage of emergency calls answered within the 10-minute travelling time decreased from 91.2% in 2004 to 87.4% for the first six months of 2008. Details are shown in Table 1.

**Table 1**  
**Analysis of the response time of ambulances**  
**(January 2004 to June 2008)**

Year	Percentage of emergency calls answered		
	Within the 2-minute activation time	Within the 10-minute travelling time	Within the 12-minute target response time
2004	87.4%	91.2%	91.1%
2005	77.3%	92.8%	89.6%
2006	84.9%	90.8%	92.7%
2007	95.5%	88.7%	92.8%
2008 (January to June)	95.6%	<b>87.4%</b>	<b>91.8%</b>

*Source: FSD records*

3.5 For the period from January to June 2008, the FSD failed to achieve the performance target of answering 92.5% of the emergency calls within the target response time. Only 91.8% of the emergency calls were answered within the target response time. Audit noted that, since 1999, the FSD had not conducted any review of the 12-minute target response time for the emergency ambulance service. **Audit considers that the FSD needs to ascertain the reasons for the decrease in the percentage of emergency calls answered within the 10-minute travelling time despite the implementation of the TGMS. In view of its failure to achieve the performance target for the first six months of 2008, the**

**FSD needs to introduce measures to improve the response time of ambulances and promptly conduct a comprehensive review of the response time, comprising the activation time and the travelling time.**

#### *Review of the ambulance turnout time*

3.6 With the implementation of the TGMS (Note 8), the information is exchanged by means of graphics and text transmission, and the time spent on voice communication is reduced. Therefore, more emergency calls were answered within the 2-minute activation time. The percentage of emergency calls answered within the 2-minute activation time increased from 87.4% in 2004 to 95.6% for the first six months of 2008 (see Table 1 in para. 3.4).

3.7 Since June 2006, the FSD had started a benchmarking study on the 1-minute turnout time (Note 9). Audit noted that, up to 30 September 2008, the FSD had not finalised the study. **Audit considers that the FSD needs to expedite the finalisation of the study on the turnout time of ambulances, set a target completion date and introduce measures to further improve the activation time of ambulances.**

#### *Emergency ambulance service in the New Territories Region*

3.8 **Performance from January 2004 to June 2008.** During this period, the FSD could not achieve the performance target for the emergency ambulance service in the New Territories Region. The percentage of emergency calls in the New Territories Region answered within the target response time ranged from 87.1% to 91.5% from January 2004 to June 2008. Details are shown in Table 2.

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**Note 8:** *Before the implementation of the TGMS in June 2005, operators receiving calls in the FSCC used the wireless communication device during the 2-minute activation time to mobilise ambulances and confirm incident addresses with ambulance crew.*

**Note 9:** *The benchmarking study reviews the turnout time of fire fighting vehicles and ambulances for different types of fire stations and ambulance depots.*

**Table 2**  
**Achievement of the performance target**  
**(January 2004 to June 2008)**

Year	Region			Overall
	Hong Kong	Kowloon	New Territories	
2004	94.0%	90.5%	<b>90.2%</b>	91.1%
2005	93.3%	90.5%	<b>87.1%</b>	89.6%
2006	94.4%	93.9%	<b>90.8%</b>	92.7%
2007	93.8%	93.7%	<b>91.5%</b>	92.8%
2008	93.1%	91.9%	<b>91.2%</b>	91.8%

(January to June)

Source: FSD records

3.9 **Review conducted in 2006.** In addition to the commissioning of two new ambulance depots in the New Territories Region in 2004 and 2005 (Note 10), the FSD conducted a review of the emergency ambulance service in the New Territories Region in June 2006. The review concluded that the East and West Division of the New Territories Region could not achieve the performance target. The emergency ambulance resources in the New Territories Region had been stretched to their limits and there was a growing demand for the emergency ambulance service in the northern part of the New Territories Region.

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**Note 10:** *In 2004 and 2005, the Penny's Bay Ambulance Depot and the Kwai Chung Ambulance Depot were commissioned in the New Territories Region respectively.*

3.10 *Performance after the reorganisation of the Ambulance Command.*

In April 2007, to further enhance its operational and administrative efficiency, the Ambulance Command was reorganised (Note 11). However, after the reorganisation, the FSD still could not achieve the performance target for its emergency ambulance service in the **New Territories East and West Division**. From April 2007 to June 2008, only 89.8% of the emergency calls in the New Territories East and West Division were answered within the target response time of 12 minutes. Details are shown at Appendix D. Audit noted that:

- (a) on the day shift (i.e. from 8:30 a.m. to 8:30 p.m.), 91.5% of the emergency calls were answered within the target response time; and
- (b) on the night shift (i.e. from 8:30 p.m. to 8:30 a.m.), 86.9% of the emergency calls were answered within the target response time.

3.11 **As the FSD could not achieve the performance target in the New Territories East and West Division after the reorganisation, Audit considers that the FSD needs to closely monitor the achievement of the performance target of the emergency ambulance service in the New Territories East and West Division. The FSD also needs to critically review the allocation of ambulance resources among individual divisions to ensure that the performance target for the emergency ambulance service is achieved in all divisions.**

*Audit recommendations*

3.12 **Audit has recommended that the Director of Fire Services should:**

*Review of the ambulance response time*

- (a) **ascertain the reasons for the decrease in the percentage of emergency calls answered within the 10-minute travelling time despite the implementation of the TGMS;**

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**Note 11:** *The Hong Kong Region and the Kowloon Region were merged into the Hong Kong and Kowloon Region. The four divisions under the Hong Kong Region and the Kowloon Region were reorganised into the Hong Kong Division and the Kowloon Division. The three divisions of the New Territories Region were also reorganised into two divisions (see Appendix A). The ambulance depots and outstations under different divisions were reshuffled.*

- (b) **in view of the FSD's failure to achieve the performance target for the emergency ambulance service for the first six months of 2008, introduce measures to improve the response time of ambulances;**
- (c) **promptly conduct a comprehensive review of the response time, comprising the activation time and the travelling time;**

*Review of the ambulance turnout time*

- (d) **expedite the finalisation of the study on the turnout time of ambulances, set a target completion date for the study and introduce measures to further improve the activation time of ambulances;**

*Emergency ambulance service in the New Territories Region*

- (e) **closely monitor the achievement of the performance target of the emergency ambulance service in the New Territories East and West Division; and**
- (f) **critically review the allocation of ambulance resources among individual divisions to ensure that the performance target for the emergency ambulance service is achieved in all divisions.**

**Response from the Administration**

3.13 The **Director of Fire Services** generally agrees with the audit recommendations. He has said that:

*Review of the ambulance response time*

- (a) the FSD will try to ascertain the reasons for the decrease in the percentage of emergency calls answered within the 10-minute travelling time. The FSD believes that due to the ever-increasing demand for the emergency ambulance service, it is often necessary to despatch an ambulance which requires more than the 10-minute travelling time to the scene of incident;
- (b) the achievement of the performance target of the emergency ambulance service has been closely monitored by the FSD. The following timely and strategic measures have been implemented to boost the performance:
  - (i) enhancing the daily ambulance availability by paying off-duty ambulancemen for working overtime to man additional ambulances;

- (ii) closely monitoring the overstaying of ambulances at hospitals and the downtime of ambulances;
- (iii) redeployment of rapid response vehicles (i.e. modified medium saloon cars, manned by EMA II ambulance officers, with communication and ambulance equipment) to strengthen the frontline management and respond to emergency calls; and
- (iv) reactivation of ten ambulances under the Minimum Cost Refurbishment Programme to relieve the shortage of ambulances as a result of the ageing of the ambulance fleet and the pre-mature disposal of ambulances due to traffic accidents.

The FSD will make continuous effort to sustain the above measures. The FSD will strategically deploy newly trained ambulancemen to compensate the shortage of manpower in operational units and continue to search for new strategic sites (e.g. Sheung Shui) to construct ambulance depots;

- (c) the FSD will review its emergency ambulance service operation and identify room for improvement to ensure a more consistent achievement of the performance target of answering 92.5% of the emergency calls within the target response time of 12 minutes;

#### ***Review of the ambulance turnout time***

- (d) the FSD aims to finalise the study on the turnout time of ambulances in six months' time;

#### ***Emergency ambulance service in the New Territories Region***

- (e) the FSD is well aware of the performance and the increasing demand in the New Territories East and West Division, and has closely monitored the situation. The FSD Information Technology Management Unit provides the regional emergency call demand and response time performance summary to the respective divisional commanders and deputy commanders daily. The Ambulance Command Headquarters also provides the commanders of each region and division with the number of emergency calls and response time performance of the emergency ambulance service in each area monthly. The FSD will consider obtaining more information from the Information Technology Management Unit for monitoring the achievement of the performance target of the emergency ambulance service; and

- (f) the FSD has periodically conducted reviews on the allocation of ambulance resources among divisions to ensure that the performance target is achieved in all divisions. The measures include the standby arrangement of ambulances at different depots on a need basis, the flexible redeployment of ambulance resources within each region, and the deployment of newly trained ambulancemen to divisions according to the demand for the emergency ambulance service. The FSD will make continuous effort to sustain these measures and, in addition, will search for strategic sites to construct new ambulance depots at areas where the demand for the emergency ambulance service is increasing significantly and the target response time cannot be achieved.



## **PART 4: USE OF AMBULANCE RESOURCES**

4.1 This PART examines the use of the ambulance resources and suggests measures for further improvement.

### **Resources for the ambulance service**

4.2 *Ambulances.* As at 30 June 2008, the FSD had a fleet of 252 ambulances. Of these 252 ambulances:

- (a) 2 were deployed for training purposes;
- (b) 7 were deployed as urgent care ambulances for handling urgent calls;
- (c) 47 were under maintenance; and
- (d) 196 were available for providing the emergency ambulance service (see paras. 4.5 and 4.6) and the urgent care ambulance service (see paras. 4.13 and 4.14).

4.3 *Ambulancemen.* As at 30 June 2008, the FSD had 2,198 frontline ambulance staff, comprising 240 Principal Ambulancemen, 580 Senior Ambulancemen and 1,378 Ambulancemen. Of these 2,198 ambulancemen, 64 were in training, 330 were on leave, 886 were off-duty, and 34 were deployed to perform other administrative duties. The remaining 884 were deployed to ambulance depots, outstations and ambulance posts for providing pre-hospital care for casualties or patients and conveying them to hospitals.

4.4 *Manning ratio for ambulances.* Each emergency ambulance has to be manned by a 3-man crew. The ambulancemen work on the day shift and the night shift. The shift pattern of an ambulanceman is on a five-day cycle (Note 12). The manning ratio for each shift of an emergency ambulance was 6.067 frontline ambulance staff (Note 13).

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**Note 12:** *For the first two days of the cycle, an ambulanceman works on day shift. For the third day, the ambulanceman works on night shift. For the last two days of the cycle, the ambulanceman is off-duty.*

**Note 13:** *The manning ratio was set in 1998 after taking into account the shift pattern and leave entitlement of the ambulancemen.*

## Availability of ambulances for the emergency ambulance service

4.5 **Daily ambulance availability (DAA).** To achieve the performance target of answering 92.5% of the emergency calls within 12 minutes, the FSD has to ensure that sufficient ambulances and ambulance crew are available for handling emergency calls. In the 1980s, the FSD, based on the manning ratio and the strength of frontline ambulance staff, started to set the target DAA (Note 14) on the day shift and the night shift. The target DAA is the notional number of ambulances that can theoretically be manned by ambulance crew without taking into account manpower not available for a shift due to various factors (such as training, leave of absence, physical fitness assessment and other job related activities).

4.6 **Baseline DAA.** In August 2002, after taking into account sick leave, training, physical fitness assessment and other job related activities of ambulancemen, the FSD started to set the baseline DAA for monitoring the availability of its ambulances. The baseline DAA is the desired level of actual availability that the FSD can reasonably achieve. As at 30 June 2008, the baseline DAA was 184 ambulances on the day shift and 100 ambulances on the night shift for the provision of the emergency ambulance service.

## Audit observations and recommendations

### *Review of the baseline DAA*

4.7 From January 2007 to June 2008, the FSD could not achieve the baseline DAA for 229 days (i.e. 42% of 547 days) on the day shift and 435 days (i.e. 80% of 547 days) on the night shift. Details are shown at Appendix E.

4.8 In August 2007, to augment the DAA, the FSD implemented a scheme for deploying off-duty ambulancemen to man additional ambulances in two timeslots (i.e. 7:00 a.m. to 11:00 a.m. and 8:30 p.m. to midnight). From 28 August 2007 to 9 April 2008, the FSD paid disciplined services overtime allowance of \$4.4 million to off-duty ambulancemen for enhancing the DAA.

4.9 Despite the implementation of the scheme, from January to June 2008, the FSD could not achieve the baseline DAA for 71 days on the day shift and 124 days on the night shift. **In Audit's view, the FSD needs to review the effectiveness of the scheme, ascertain the reasons for not achieving the baseline DAA on both shifts, and introduce measures to enhance the DAA.**

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**Note 14:** *The DAA is the maximum number of ambulances, manned by a 3-man crew, available for the provision of the emergency ambulance service.*

### *Audit recommendations*

- 4.10 **Audit has recommended that the Director of Fire Services should:**
- (a) **review the effectiveness of the scheme (i.e. the deployment of off-duty ambulancemen to man additional ambulances) in achieving the baseline DAA for the provision of the emergency ambulance service; and**
  - (b) **ascertain the reasons for not achieving the baseline DAA on both shifts, and introduce measures to enhance the DAA for the provision of the emergency ambulance service.**

### **Response from the Administration**

4.11 The **Director of Fire Services** generally agrees with the audit recommendations. He has said that:

- (a) the arrangement to augment the DAA by deploying off-duty ambulancemen to man additional ambulances has been closely monitored on a daily basis and regularly reviewed since the implementation in August 2007. The FSD will continue to review the effectiveness of the scheme; and
- (b) the baseline DAA is derived from the average actual DAA captured over a study period in 2002 and updated by the FSD from time to time. The baseline DAA is used to facilitate the management of the daily operation of the emergency ambulance service (e.g. for the purpose of scheduling training activities). As the baseline DAA is only meant to reflect a reasonable availability target, the FSD is of the view that it would be normal that the actual availability may fluctuate above or below the baseline DAA as updated from time to time. The availability figures on the day shift in 2007 in paragraph 4.7 and Appendix E should be seen in that context. The average DAA achieved on the day shift in 2007 was 182.2 ambulances (i.e. 99.8% of the baseline DAA). The average DAA achieved on the night shift in 2007 was 95.9 ambulances (i.e. 3.5% lower than the baseline DAA). The FSD will ascertain the reasons for not meeting the baseline DAA on the night shift in 2007.

4.12 The **Secretary for Financial Services and the Treasury** welcomes the audit recommendations. He has said that the SB and the FSD were provided with additional resources in the 2005 Recurrent Expenditure Resource Allocation Exercise to improve the emergency ambulance service. With the additional resources, it was expected that the FSD should be able to meet the baseline DAA (i.e. 184 ambulances on the day shift and 100 ambulances on the night shift as at 30 June 2008). In the light of the above, the FSTB agrees that the FSD should find out the reasons for not achieving the baseline DAA and introduce measures for improvement.

## Monitoring the urgent care ambulance service

4.13 *Urgent care fleet.* In April 2003, the FSD introduced the urgent care fleet to handle **urgent calls** (see para. 1.5) to release resources for the emergency ambulance service. There is no performance pledge for the urgent care ambulance service, but the FSD's internal target is to respond to such calls within an hour. **As at 30 June 2008, the urgent care fleet comprised 12 ambulances.** Of the 12 urgent care ambulances, 2 were under maintenance, 7 were available for handling urgent calls and 3 were not available for handling urgent calls as the ambulance supervisors of these ambulances were on leave. Each urgent care ambulance is manned by a 2-man crew instead of the normal 3-man crew. The operating hours of the urgent care fleet are from 9:30 a.m. to 6:15 p.m. on weekdays and from 9:30 a.m. to 1:45 p.m. on Saturday.

4.14 *Floating urgent care fleet.* If an emergency ambulance is manned by a 2-man crew with or without an EMA II supervisor, or a 3-man crew but not supervised by an EMA II, it is assigned as a floating urgent care ambulance to handle urgent calls. An EMA II is not deployed to man urgent care or floating urgent care ambulance except under special circumstances (e.g. for a short duration within the shift). All urgent calls (excluding those related to psychiatric patients) should be handled by the urgent care or floating urgent care ambulances.

## Audit observations and recommendations

### *Need to review the effectiveness of the urgent care fleet*

4.15 Since September 2003, the FSD has a fleet of 12 urgent care ambulances. According to FSD records, from 2004 to 2007, on average, 10.7 urgent care ambulances were available for handling urgent calls on each day. However, on average, only 6.6 (62%) of 10.7 urgent care ambulances were used to handle urgent calls. Details are shown in Table 3.

**Table 3**  
**Utilisation of urgent care ambulances**  
**(2004 to 2007)**

Year	Availability		Utilisation	
	Average daily availability	Number of ambulances available	Utilisation rate (Note)	Number of ambulances used
	(a)	(b) = (a) × 12	(c)	(d) = (b) × (c)
2004	93%	11.2	66%	7.4
2005	87%	10.4	61%	6.4
2006	89%	10.7	61%	6.5
2007	86%	10.3	57%	5.9
	<b>Average</b>	<b>10.7</b>		<b>6.6</b>

*Source: FSD records*

*Note: The utilisation rate is the proportion of time that an ambulance is used to handle urgent calls.*

4.16 The number of urgent calls decreased from 47,453 in 2003 by 10,537 (22%) to 36,916 in 2007. Since 2004, the number of urgent calls had remained rather stable, ranging from 34,175 to 37,192. However, the number of urgent calls handled by the urgent care fleet decreased from 9,390 in 2004 by 1,037 (11%) to 8,353 in 2007. Details are shown in Table 4.

**Table 4**  
**Handling of urgent calls**  
**(2004 to 2007)**

Year	Number of urgent calls			Total
	Handled by urgent care fleet	Handled by floating urgent care fleet	Handled by emergency ambulance fleet	
2004	9,390	2,739	25,063	37,192
2005	9,711	4,643	19,821	34,175
2006	9,712	4,517	20,542	34,771
2007	8,353	3,934	24,629	36,916

*Source: FSD records*

*Remarks: From 2004 to 2007, the FSD had a fleet of 12 urgent care ambulances (see para. 4.15).*

4.17 The last review of the operation of the urgent care fleet was conducted by the FSD in April 2004. **In view of the low utilisation of the urgent care fleet, the decrease in the number of urgent calls, and the lapse of four years since the last review, Audit considers that the FSD needs to conduct a comprehensive review of the efficiency and effectiveness of the urgent care ambulance service, and ascertain the causes of the low utilisation of the urgent care fleet.**

***Need to review the handling of urgent calls***

4.18 According to Table 4 in paragraph 4.16, some of the urgent calls were handled by the emergency ambulances instead of the urgent care ones. The number of urgent calls handled by emergency ambulances increased from 19,821 in 2005 by 4,808 (24%) to 24,629 in 2007. Audit randomly selected 25 urgent calls handled by emergency ambulances from May to July 2008 for review. Of these 25 cases:

- (a) 5 were psychiatric cases which had to be handled by emergency ambulances;
- (b) 5 were handled outside the operating hours of the urgent care fleet; and
- (c) 15 were handled within the operating hours of the urgent care fleet.

In view of the significant number (i.e. 15 cases) of urgent calls handled by emergency ambulances within the operating hours of the urgent care fleet, Audit considers that the FSD needs to ascertain the causes for using emergency ambulances to handle the urgent calls to ensure the efficient and effective utilisation of ambulance resources.

*Long waiting time at hospitals*

4.19 When the FSD receives an urgent call, it despatches an urgent care ambulance for transferring patient from a hospital to another. According to FSD experience, urgent care ambulances have to wait at the hospitals for a long time before the picking up or handing over of patients. From January 2007 to May 2008, the ambulance crew had to wait for more than 30 minutes at the hospitals for 379 urgent cases. The average waiting time at the hospitals for the 379 urgent calls was 41 minutes, ranging from 31 to 71 minutes. Details are shown at Appendix F.

4.20 It is a waste of ambulance resources to keep the ambulances waiting for a long time at the hospitals. Audit noted that, since June 2006, the FSD had monitored the waiting time of ambulances at hospitals. **Audit considers that the FSD, in collaboration with the HA, needs to introduce measures to improve the communication between the ambulance crew and HA staff, and shorten the waiting time of the ambulances for picking up or handing over patients at hospitals.**

*Audit recommendations*

4.21 **Audit has recommended that the Director of Fire Services should:**

- (a) **in view of the low utilisation of the urgent care fleet, the decrease in the number of urgent calls, and the lapse of four years since the last review, conduct a comprehensive review of the efficiency and effectiveness of the urgent care ambulance service, and ascertain the causes of the low utilisation of the urgent care fleet;**
- (b) **in view of the significant number of urgent calls handled by emergency ambulances within the operating hours of the urgent care fleet, ascertain the causes for using emergency ambulances to handle the urgent calls to ensure the efficient and effective utilisation of ambulance resources; and**
- (c) **in collaboration with the Chief Executive, HA, introduce measures to improve the communication between the ambulance crew and HA staff, and shorten the waiting time of the ambulances for picking up or handing over patients at hospitals.**

## Response from the Administration

4.22 The **Director of Fire Services** generally agrees with the audit recommendations. He has said that:

- (a) the FSD will review the efficiency and effectiveness of the urgent care ambulance service. The FSD's preliminary view is that, from 2004 to 2007, the utilisation rate of the urgent care ambulances (ranging from 57% to 66%) is an acceptable figure since it is calculated from the time the call is received to the time of handover of the patient to the hospital. The computation of the utilisation rate excludes the time for the return trip to the ambulance depot, and the time for other activities (such as cleaning and disinfection of the ambulances, replenishment of medical supplies, daily training and briefing) which are essential to prepare the crew and ambulances for handling urgent calls;
- (b) since urgent calls are received randomly throughout the whole territory, it is impracticable for the 12 urgent care ambulances to handle all urgent calls on their own. In addition, urgent calls from hospitals are unplanned and unscheduled. When no urgent care fleet ambulance is available in the vicinity, emergency ambulances have to respond to urgent calls. The FSD will keep its response to urgent calls under regular review so as to ensure the efficient and effective utilisation of ambulance resources; and
- (c) the FSD will closely monitor the situation and work with the HA to strive for improvement. Measures are already in place to improve the communication between the ambulance crew and HA staff to shorten the waiting time at hospitals. In addition, since 2006, there has already been a well-established procedure agreed between the FSD and the HA on the pickup and handover of patients in order to shorten the waiting time at hospitals. In 2007, based on FSD statistics, there was an improvement in the waiting time at hospitals. Regular liaison meetings and discussions are held between divisional or depot commanders and the medical staff of hospitals to enhance efficiency.

4.23 The **Chief Executive, HA** has said that, in order to pick up and hand over patients at hospitals promptly, the HA would remind hospital staff to improve communication with the FSD.



## Resources for the paramedic ambulance service

4.24 In addition to the ambulances, the quality of the emergency ambulance service depends on the level of training of the ambulance staff. The training of ambulance staff is provided by the Fire Services Ambulance Command Training School (Note 15). Since February 2005, the FSD has committed to providing the paramedic ambulance service (see para. 1.9) to improve the survival rate of critical patients and casualties for all the emergency calls. All emergency ambulances are equipped with AEDs and drugs. The FSD had to train ambulancemen to be EMA IIs (Note 16) for the provision of the paramedic ambulance service. As at 31 December 2007, 99 (82%) ambulance officers and 895 (40%) ambulancemen were EMA IIs.

## Audit observations and recommendations

### *Training of EMA IIs*

4.25 Although 139 ambulance staff were trained as EMA IIs in 2006 and 2007, 51 EMA IIs retired from service and 46 EMA IIs were suspended from performing the related duties of EMA IIs (Note 17). As a result, the number of EMA IIs increased from 952 in 2005 by only 42 to 994 in 2007. An emergency ambulance has to be supervised by an EMA II for providing the paramedic ambulance service. If an emergency ambulance is manned by a 3-man crew but not supervised by an EMA II, it is regarded as a floating urgent care ambulance (see para. 4.14) and normally not used to provide the paramedic ambulance service.

4.26 Audit noted that, the FSD did not have the required number of EMA IIs to provide the paramedic ambulance service for all the emergency calls. The number of emergency calls handled by floating urgent care ambulances increased from 6,819 in 2004 by 6,537 (96%) to 13,356 in 2007. **In view of the significant increase in the number of emergency calls handled by floating urgent care ambulances, Audit considers that the FSD needs to assess the number of EMA IIs required for providing the paramedic ambulance service and expand the training programme to enable more ambulancemen to be trained as EMA IIs.**

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**Note 15:** *Each ambulance staff receives a 24-week initial training followed by a 2-week on-the-job training.*

**Note 16:** *An ambulanceman has to attend a 6-week training course which includes intravenous infusion, defibrillation and use of selected drugs.*

**Note 17:** *The reasons for suspending EMA IIs from performing the related duties were that the physical condition of staff was suitable for light duty only or they failed to pass the examination of the re-certification course.*

*Effectiveness of the continuous quality improvement programme*

4.27 With the commitment to provide the paramedic ambulance service for all the emergency calls in the first quarter of 2005, the FSD implemented a continuous quality improvement programme in 2005 to monitor the performance of the paramedic ambulance service. Under the programme, clinical support officers (Note 18) conduct documentation review on all cardiac arrest cases and on other selected cases. In April 2006, to enhance the effectiveness of the programme, a quality assurance team (Note 19) was established to coordinate and monitor quality assurance activities.

4.28 In November 2006, the FSD considered that 1.13% of emergency cases reviewed were too small to be a reliable assessment of the performance of the ambulance staff. In March 2008, the FSD reminded the clinical support officers to review as many cases as possible. However, under the continuous quality improvement programme, except for cardiac arrest cases (Note 20), there was no specification of the minimum number of emergency cases to be reviewed.

4.29 In the first quarter of 2008, 3,436 (2.17%) cases were reviewed. **To enhance the effectiveness of the continuous quality improvement programme, Audit considers that the FSD needs to specify the percentage of emergency cases, other than cardiac arrest cases, to be reviewed by the clinical support officers, and ensure that the reviews are reliable assessments of the performance of the paramedic ambulance staff.**

*Audit recommendations*

4.30 **Audit has recommended that the Director of Fire Services should:**

- (a) **in view of the significant increase in the number of emergency calls handled by floating urgent care ambulances, assess the number of EMA IIs required for providing the paramedic ambulance service and expand the training programme to enable more ambulancemen to be trained as EMA IIs; and**

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**Note 18:** *A clinical support officer is an ambulance officer who has completed a 3-day training course and has taken up additional quality assurance duties under the continuous quality improvement programme. As at 31 March 2008, 52 ambulance officers completed the 3-day training course under the programme.*

**Note 19:** *The team (comprising one senior ambulance officer and two ambulance officers) conducts field audit in ambulances and hospitals, and reviews and follows up cases referred by clinical support officers.*

**Note 20:** *Under the programme, all cardiac arrest cases have to be reviewed by clinical support officers.*

- (b) specify the percentage of emergency cases (other than cardiac arrest cases) to be reviewed by the clinical support officers, and ensure that the reviews are reliable assessments of the performance of the paramedic ambulance staff.

### Response from the Administration

4.31 The **Director of Fire Services** generally agrees with the audit recommendations. He has said that the FSD will:

- (a) closely monitor the number of EMA IIs and take timely measures to expand the training programme to allow more ambulancemen to be trained as EMA IIs when necessary; and
- (b) consider setting a specific target, taking into account:
  - (i) the percentage of emergency cases reviewed by the clinical support officers in the past years; and
  - (ii) the implementation of the paramedic service quality assurance system for replacing the existing manual process (see para. 2.4).

### Deployment of resources for community education programme

4.32 To optimise the survival rate of out-of-hospital cardiac arrest, the FSD has introduced the community education programme to provide training in the cardiac pulmonary resuscitation (CPR — Note 21) and public access defibrillator (PAD — Note 22) for the public. For the CPR, the training courses are conducted by on-duty ambulance officers and off-duty ambulancemen. For PAD, the training courses are conducted by contract staff.

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**Note 21:** *The training is a free 1-day course which covers the CPR skills and relief of airway obstruction for adults. Enrolment is on a first-come-first-served basis. An attendance certificate is awarded at the end of the course. Since February 2007, the duration of the course has been reduced to half-day.*

**Note 22:** *The training is a free 1-day course which covers skills in the CPR and using an AED. Enrolment is on a first-come-first-served basis. Trainees who have passed the examination are appointed as Heart Savers.*

## **Audit observations and recommendations**

4.33 Audit noted that the same kind of training is available from other parties. Details of the training in the CPR and PAD provided by the FSD and other parties are shown at Appendix G. Audit noted that the requirements of training courses provided by other parties are different from those of the FSD (such as the requirement to renew the certificate by attending practical examination and refresher course).

4.34 Audit noted that the FSD did not keep management information on the deployment of resources for providing training in the CPR and PAD. Since the deployment of off-duty ambulancemen to conduct training course in the CPR in July 2000 and the introduction of the training in PAD in May 2007, the FSD had not evaluated the cost-effectiveness of the provision of such training.

4.35 **Audit has recommended that the Director of Fire Services should:**

- (a) **keep management information on the deployment of resources for the provision of training in the CPR and PAD; and**
- (b) **in view of the significant increase in demand for the emergency ambulance service and the availability of similar training by other parties, critically review the cost-effectiveness of the provision of training in the CPR and PAD by the FSD.**

## **Response from the Administration**

4.36 The **Director of Fire Services** generally agrees with the audit recommendations. He has said that the FSD will:

- (a) subject to the result of the review on the training in the CPR and PAD, consider keeping management information on the deployment of resources for this purpose. The training in the CPR and PAD are only value-added services provided by the Ambulance Command to the public in response to the Government's advocacy for more involvement with the community; and
- (b) conduct a review on the effectiveness of the continued provision of the training in the CPR and PAD. The purpose of providing training in the CPR and PAD is two folds. Firstly, as more people become trained in the CPR and PAD, they can help in the resuscitation of a cardiac arrest patient before the ambulance crews' arrival and therefore can directly help in saving lives. Secondly, the CPR and PAD training courses also serve as a channel through which the Ambulance Command can actively interact with the community.

## **PART 5: MAINTENANCE OF AMBULANCES**

5.1 This PART examines the maintenance of ambulances and suggests measures for improvement.

### **Maintenance services provided by the EMSD**

5.2 As at 30 June 2008, the Ambulance Command operated a fleet of 252 ambulances (i.e. 246 town ambulances, 2 cross-country ambulances and 4 village ambulances — Note 23) for the provision of the ambulance service. The FSD workshops provide the maintenance service for the 4 village ambulances. For the other 248 ambulances, the maintenance service is provided by the EMSD under a 10-year SLA (from 2006-07 to 2015-16). In general, the maintenance of the ambulance fleet is classified as follows:

- (a) *Scheduled maintenance.* It is preventive in nature. It targets at replacing certain components and parts of an ambulance before the expiry of their useful lives to minimise the interruption of the ambulance service caused by breakdowns; and
- (b) *Unscheduled maintenance.* It is carried out to repair the ambulances before they can be used as a result of:
  - (i) traffic accidents (i.e. incidents involving third parties — see para. 5.9); and
  - (ii) sudden breakdowns (i.e. incidents not involving third parties, such as engine failure — see paras. 5.10 and 5.11).

5.3 Under the SLA, the maintenance service of ambulances is provided at an agreed annual charge. Some maintenance service (such as damage due to misuse and negligence) is provided at an additional charge. In 2007-08, the total maintenance charge for the ambulance fleet was \$21.9 million. As at 30 June 2008, 8 out of the 248 ambulances maintained by the EMSD were reactivated under a **Minimum Cost Refurbishment Programme (MCRP)** — see paras. 5.12 to 5.14). Under the MCRP, the service life of an ambulance is extended for two years beyond its design serviceable life at a cost of 10% to 20% of the original acquisition cost. The EMSD guarantees the safety, reliability and roadworthiness of the ambulances.

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**Note 23:** *Cross-country ambulances serve the countryside and mountainous areas. Village ambulances serve the offshore islands.*

## **Availability and reliability of the ambulance fleet**

5.4 The availability of the ambulance fleet for the provision of the emergency ambulance service depends on a number of factors, including:

- (a) the number of ambulances in service;
- (b) the impending delivery of new ambulances;
- (c) the provision of ambulance crew for manning the ambulances;
- (d) the number of ambulances assigned to handle urgent calls; and
- (e) the number of ambulances reserved for training, scheduled maintenance and contingency purposes (such as the ad hoc increase in demand due to special events and unscheduled maintenance).

The implementation of improvement measures (such as the TGMS — see para. 3.6) can also, to a certain extent, enhance the efficiency of the emergency ambulance service and the availability of the ambulance fleet.

5.5 In addition, the availability of the ambulance fleet depends on the efficiency of the maintenance support. An increase in the downtime of scheduled maintenance reduces the availability of the ambulance fleet. An increase in the downtime caused by the sudden breakdowns of ambulances reduces the availability of ambulances, jeopardises the rescue operations and undermines the reliability of the ambulance fleet. From the public safety point of view, as the ambulance fleet is used for rescue operations, it is of paramount importance to ensure the safety, reliability and roadworthiness of the ambulance fleet.

## **Audit observations and recommendations**

### ***Monitoring of unscheduled maintenance***

5.6 According to FSD records, the downtime of the ambulances maintained by the EMSD (including ambulances under the MCRP) under the SLA from 2003 to 2007 is shown in Table 5.

**Table 5**  
**Downtime of the ambulances**  
**(2003 to 2007)**

Year	Availability			Downtime			
	(a)	(b)	(c) = $\frac{(b)}{(a)} \times 100\%$	(d)	(e) = $\frac{(d)}{(a)} \times 100\%$	(f) = (b) + (d)	(g) = $\frac{(f)}{(a)} \times 100\%$
	(Day)	(Day)	(Percentage)	(Day)	(Percentage)	(Day)	(Percentage)
2003	86,962	3,374	3.9%	5,559	6.4%	8,933	10.3%
2004	87,351	3,586	4.1%	6,926	7.9%	10,512	12.0%
2005	91,162	4,002	4.4%	9,657	10.6%	13,659	15.0%
2006	89,917	4,431	4.9%	9,409	10.5%	13,840	15.4%
2007	89,269	3,703	4.1%	9,687	10.9%	13,390	15.0%

Source: FSD records

Remarks: The vehicle maintenance team of the FSD is responsible for consolidating the status of each ambulance and forwarding a monthly report of downtime to the respective divisions for confirmation. The divisional monthly reports of downtime are then submitted to the Ambulance Command Headquarters for consolidation.

5.7 From 2003 to 2007, the percentage of downtime of the ambulances increased from 10.3% to 15% (Note 24). Details are as follows:

- (a) **Scheduled maintenance.** The percentages of downtime were within the range of 3.9% to 4.9% from 2003 to 2007; and
- (b) **Unscheduled maintenance.** The percentage of downtime significantly increased from 6.4% in 2003 by 70% to 10.9% in 2007. The downtime for unscheduled maintenance significantly increased from 5,559 days in 2003 by 4,128 (74%) days to 9,687 days in 2007.

**Note 24:** The percentages of downtime of the village ambulances, maintained by FSD workshops from 2003 to 2007, were within the range of 2% to 7%.

In 2007, the downtime for unscheduled maintenance accounted for 72% of the total downtime. The significant increase in the downtime of unscheduled maintenance undermined the availability and reliability of the ambulance fleet for the emergency ambulance service.

5.8 Audit noted that, up to 30 June 2008, the FSD had not kept management information on the breakdown and the maintenance of individual ambulances. **In view of the FSD's failure to achieve the performance target for the emergency ambulance service for the period from January to June 2008 (see Table 1 in para. 3.4), Audit considers that the FSD needs to closely monitor the downtime of the ambulance fleet, in particular, the downtime of unscheduled maintenance, and assess the impact of the breakdown of ambulances on the emergency ambulance service. The FSD also needs to keep management information on the breakdown and maintenance history of individual ambulances. In addition, the FSD, in consultation with the EMSD, needs to ascertain the reasons for the significant increase in the downtime of unscheduled maintenance, and introduce measures to minimise its occurrence.**

#### *Increase in traffic accidents and breakdowns*

5.9 *Traffic accidents involving ambulances.* According to FSD records, the number of traffic accidents involving ambulances increased from 133 in 2003 by 30 (23%) to 163 in 2007. The FSD maintains a database on injury compensations and the costs of repairing the ambulances. The consequences of the 163 traffic accidents in 2007 were that:

- (a) 4 ambulances were prematurely disposed of;
- (b) there were 2,106 days of downtime for repairing the ambulances;
- (c) 18 injured ambulancemen were on sick leave for 881 days; and
- (d) about \$1.5 million was incurred for repairing the ambulances.

5.10 *Ambulance breakdown.* Unlike traffic accidents involving ambulances, the FSD did not have information on the breakdown history of individual ambulances even though some breakdowns occurred when the ambulances were conveying patients or casualties to the hospitals. In view of the frequent breakdowns in July 2008, on 20 July 2008, the FSD started to keep a brief summary of the breakdowns. For the period from 20 July to 19 August 2008, there were 67 ambulance breakdowns. Among the 67 ambulances involved in the breakdowns, 53 ambulances had been in service for over 9 years. Of the 67 breakdown cases, 31 cases occurred when the ambulances were conveying patients to hospitals.



5.11 *Causes of increase in breakdowns.* The FSD did not ascertain the causes and consequences of the increase in breakdowns of ambulances. The sudden breakdowns of ambulances jeopardise the rescue operations, and reduce the availability and reliability of the ambulances. **Audit considers that the FSD needs to conduct a comprehensive review of the causes and consequences of the increase in breakdowns, including the impact on rescue operations, introduce measures to minimise the frequency of breakdowns and enhance the availability and reliability of the ambulance fleet.**

#### *Minimum Cost Refurbishment Programme*

5.12 The FSD is the only disciplined services department joining the MCRP for its ambulances (see para. 5.3). The FSD joined the MCRP in April 2006. Up to 31 August 2007, ten mothballed ambulances under the MCRP (Note 25) had been refurbished at a cost of \$1 million. In September 2007, to maintain the availability of ambulances, the FSD decided to reactivate two refurbished ambulances (Note 26). In November 2007, the FSD evaluated the effectiveness of using the two refurbished ambulances for maintaining the availability of the ambulance fleet. The review concluded that the performance and serviceability of the two refurbished ambulances were satisfactory at their age. Thereafter, the FSD reactivated six more refurbished ambulances by phases (see Table 6).

5.13 Audit noted that, as at 30 June 2008, 8 out of the 10 refurbished ambulances had been reactivated under the MCRP. These ambulances had been in service, on average, for about 11 years. The downtime of the eight refurbished ambulances is shown in Table 6.

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**Note 25:** *The ten ambulances ceased to be in service from November 2004 to December 2005. These ambulances had been in service, on average, for 8 years, ranging from 7.3 years to 8.5 years.*

**Note 26:** *The GLD endorsed the proposal to reactivate two ambulances, subject to the following conditions:*

- (a) the retention period was one year;*
- (b) the maximum allowable maintenance cost (excluding preventive maintenance) during the 1-year retention period was limited to \$49,340 for each ambulance; and*
- (c) the FSD was required to bear all the costs and take steps to monitor the accumulated maintenance costs during the retention period.*

Table 6

**Downtime of the refurbished ambulances  
(20 September 2007 to 30 June 2008)**

Ambulance	Maximum availability	Downtime	
	(a)	(b)	(c) = $\frac{(b)}{(a)} \times 100\%$
	(Day)	(Day)	(Percentage)
A	285	54	18.9%
B	38	7	18.4%
C	39	7	17.9%
D	284	42	14.8%
E	186	18	9.7%
F	187	15	8.0%
G	186	11	5.9%
H	35	0	0%
<b>Total</b>	<b>1,240</b>	<b>154</b>	<b>12.4%</b>

Source: FSD records

5.14 Up to 30 June 2008, the average downtime of the eight ambulances under the MCRP was 12.4%. Audit noted that, since November 2007, the FSD had not evaluated the effectiveness of using the eight refurbished ambulances (see para. 5.12). **In view of the significant downtime of several ambulances under the MCRP, Audit considers that the FSD needs to critically review the effectiveness and efficiency of using refurbished ambulances, taking into account the breakdown and maintenance history of individual ambulances, in particular, the risk of breakdown on rescue operations.**

#### *Monitoring of scheduled maintenance*

5.15 Under the SLA, the EMSD is required to maintain the availability of FSD ambulance fleet at 92% after taking into account the downtime for scheduled maintenance in EMSD workshops. The EMSD is also required to submit a quarterly performance report of its maintenance service to the FSD. If the performance is below the target, the EMSD will provide details of follow-up actions.

5.16 Audit noted that the guaranteed level of availability was only applicable to ambulances in service not exceeding seven years. On the commencement of the SLA (i.e. 1 April 2006), 147 (60%) of the 246 ambulances at that time had already exceeded their design serviceable life of seven years (i.e. **aged ambulances**). However, no target availability was set for these aged ambulances. Audit also noted that since the commencement date of the SLA in April 2006, the EMSD had not submitted, and the FSD had not requested for, the quarterly performance report specified in the SLA. **Audit considers that the FSD needs to set a target availability for these aged ambulances. The FSD also needs to closely monitor the performance of the EMSD under the SLA and ensure that the quarterly performance reports are submitted by the EMSD.**

#### *Quotas for keeping ambulances in EMSD workshops*

5.17 The FSD failed to achieve the performance target for the emergency ambulance service in 2004 and 2005 (see Table 1 in para. 3.4). In June 2006, the FSD and the EMSD agreed to set quotas for the maximum number of ambulances that could be kept in the five EMSD workshops (Note 27) to maintain the availability of ambulances at a minimum acceptable level (Note 28). As at 30 June 2008, the maximum number of ambulances that could be kept in EMSD workshops was 38 (i.e. 15.3% of 248 ambulances).

5.18 From August 2006 to June 2008, the number of ambulances kept in the Fan Garden and the Siu Ho Wan workshops exceeded the quotas for a significant number of days, ranging from 92 days to 224 days. These two workshops provided the maintenance service for ambulances which mainly handled emergency calls in the New Territories Region. **In view of the FSD's failure to achieve the performance target for the emergency ambulance service for the period from January to June 2008 (see Table 1 in para. 3.4), Audit considers that the FSD needs to urge the EMSD to review the operation of EMSD workshops, in particular, the Fan Garden and the Siu Ho Wan workshops, taking into account the availability of ambulances in individual regions. The FSD also needs to urge the EMSD to take measures to increase the availability of ambulances when the number of ambulances kept in EMSD workshops exceeds the quotas.**

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**Note 27:** *The five EMSD workshops are located at Caroline Hill, Fan Garden, Kowloon Bay, Siu Ho Wan and Tuen Mun.*

**Note 28:** *If the number of ambulances kept in any EMSD workshop exceeded the quota, the EMSD would take measures (such as speeding up maintenance by working overtime, deferring non-essential corrective maintenance and temporarily suspending enhancement modifications) to rectify the situation.*

*Audit recommendations*

5.19 **Audit has recommended that the Director of Fire Services should:**

*Monitoring of unscheduled maintenance*

- (a) **closely monitor the downtime of the ambulance fleet, in particular, the downtime of unscheduled maintenance;**
- (b) **assess the impact of the breakdown of ambulances on the emergency ambulance service;**
- (c) **keep management information on the breakdown and maintenance history (i.e. the frequency of breakdowns and the risk of breakdown on the rescue operations, the downtime of unscheduled maintenance and the related costs) of individual ambulances;**
- (d) **in consultation with the Director of Electrical and Mechanical Services, ascertain the reasons for the significant increase in the downtime of unscheduled maintenance, and introduce measures (e.g. the issue of guidelines on the proper use of ambulances to the frontline ambulance staff) to minimise its occurrence;**

*Increase in traffic accidents and breakdowns*

- (e) **conduct a comprehensive review of the causes and consequences of the increase in breakdowns, including the impact on rescue operations;**
- (f) **introduce measures to minimise the frequency of breakdowns and enhance the availability and reliability of the ambulance fleet;**

*Minimum Cost Refurbishment Programme*

- (g) **critically review the effectiveness and efficiency of using refurbished ambulances under the MCRP for maintaining the availability of ambulances, taking into account the breakdown and maintenance history of individual ambulances, in particular, the risk of breakdown on rescue operations;**

*Monitoring of scheduled maintenance*

- (h) **set a target availability for the ambulances with a service period exceeding the design serviceable life of seven years;**

- (i) **closely monitor the performance of the maintenance service provided by the EMSD under the SLA;**
- (j) **ensure that the quarterly performance reports are submitted by the EMSD;**

*Quotas for keeping ambulances in EMSD workshops*

- (k) **in view of the FSD's failure to achieve the performance target for the emergency ambulance service for the period from January to June 2008, urge the Director of Electrical and Mechanical Services to review the operation of EMSD workshops, in particular, the Fan Garden and the Siu Ho Wan workshops, taking into account the availability of ambulances in individual regions; and**
- (l) **urge the Director of Electrical and Mechanical Services to take measures to increase the availability of ambulances when the number of ambulances kept in EMSD workshops exceeds the quotas.**

### **Response from the Administration**

5.20 The **Director of Fire Services** generally agrees with the audit recommendations. He has said that:

*Monitoring of unscheduled maintenance*

- (a) the FSD will closely monitor the downtime of the ambulance fleet, in particular, the downtime of unscheduled maintenance. The FSD has a 10-year SLA with the EMSD starting from 2006-07. During the agreement period, the EMSD shall maintain records on all maintenance and repairs of ambulances, and all these data can be obtained upon request;
- (b) the FSD will, in collaboration with the EMSD, assess the impact of the breakdown of ambulances on the emergency ambulance service, especially when the ambulances are responding to emergency calls;
- (c) the FSD will arrange with the EMSD to keep management information on the breakdown and maintenance history of ambulances;
- (d) the FSD will, in collaboration with the EMSD, ascertain the reasons for the significant increase in the downtime of unscheduled maintenance and introduce suitable means to tackle the problem;

***Increase in traffic accidents and breakdowns***

- (e) the FSD will, in collaboration with the EMSD, review the causes and consequences of the breakdowns and assess the impact of breakdowns on the availability and reliability of the ambulance fleet;
- (f) the FSD will, in collaboration with the EMSD, introduce measures to enhance the availability and reliability of the ambulance fleet (such as increasing the frequency of scheduled maintenance and expediting the replacement program of the ageing ambulances);

***Minimum Cost Refurbishment Programme***

- (g) the FSD will review the effectiveness and efficiency of the MCRP. The retention of ambulances under the MCRP is only a temporary measure to enhance the availability of ambulances on a need basis;

***Monitoring of scheduled maintenance***

- (h) the FSD will, in collaboration with the EMSD, set a mutually agreed target availability for the ambulances with a service period exceeding the design serviceable life of seven years, taking into account the utilisation of the ambulances;
- (i) the FSD will closely monitor the performance of maintenance service provided by the EMSD under the SLA;
- (j) the FSD will urge the EMSD to submit the quarterly reports to fulfill the requirement under the SLA. The FSD is keeping a very close eye on the performance of maintenance service provided by the EMSD. Currently, the EMSD is required to provide weekly performance reports to the FSD;

***Quotas for keeping ambulances in EMSD workshops***

- (k) the FSD will urge the EMSD to improve the operation of the Fan Garden and the Siu Ho Wan workshops. The FSD supports the view that more effective and efficient maintenance services provided by EMSD workshops would help improve the ambulance availability; and
- (l) the FSD is monitoring the daily situation on the number of ambulances kept in EMSD workshops and will take necessary action when the quotas are exceeded.

5.21 The **Director of Electrical and Mechanical Services** generally agrees with the audit recommendations. He has said that:

- (a) the EMSD has constantly monitored the unscheduled maintenance of ambulances and found that the main reason of the significant increase in downtime is the ageing of ambulances. The EMSD has increased the frequency of the scheduled maintenance of ambulances to improve the situation;
- (b) the EMSD will resume the submission of the quarterly performance reports; and
- (c) from August 2006 to June 2008, the maximum number of ambulances kept in the Fan Garden and the Siu Ho Wan workshops exceeded the quota for many days as a result of ageing ambulances which had a longer downtime. The EMSD had taken immediate remedial measures by assigning staff working on other vehicles to work on the ambulances in these workshops. On some occasions, the ambulances were towed to the workshop in Kowloon Bay for repair.

## **PART 6: PROCUREMENT OF REPLACEMENT AND ADDITIONAL AMBULANCES**

6.1 This PART examines the procurement of replacement and additional ambulances, and suggests measures for improvement.

### **Procurement of replacement ambulances**

6.2 There are a number of factors to determine if an ambulance is due for replacement. The factors include the breakdown and maintenance history of the ambulance (i.e. the maintenance costs, the frequency of breakdowns and the downtime), and the lead time for procuring the ambulance. The frequency of breakdowns and maintenance costs of an ambulance are affected by its age. The increase in the frequency of breakdowns of the ageing ambulance fleet, among other things, will increase the maintenance costs. Frequent breakdowns of ambulances jeopardise the rescue operations if the ambulances are conveying patients or casualties to the hospitals.

### **Audit observations and recommendations**

#### *Ageing ambulance fleet*

6.3 The design serviceable life of an ambulance is 7 years. As at 30 June 2008, 244 ambulances, excluding the 8 ambulances under the MCRP, had been in service, on average, for 8.1 years (ranging from 5 months to about 11 years). Of the 244 ambulances, 176 (72%) were aged ambulances (see para. 5.16), including 64 (26%) ambulances in service for 10 years or more. Audit noted that the average age of the FSD ambulance fleet increased from 5.36 years in 2003 to 7.61 years in 2007. The number of aged ambulances increased from 23 in 2003 by 6.7 times to 178 in 2007. Details are shown in Table 7.



Table 7

**Ambulances in service exceeding seven years  
(2003 to 2007)**

As at 31 December	Number of ambulances	Average age of ambulances	Ambulance in service exceeding seven years	
	(a)  (Number)	(Year)	(b)  (Number)	(c) = $\frac{(b)}{(a)} \times 100\%$  (Percentage)
2003	242	5.36	23	10%
2004	252	5.17	48	19%
2005	249	5.98	110	44%
2006	250	6.61	175	70%
2007	245	7.61	178	73%

*Source: FSD records*

6.4 The significant increase in aged ambulances is probably one of the reasons for the increase in the downtime due to the sudden breakdowns of ambulances. However, the FSD did not keep management information on the breakdown and maintenance history of individual ambulances (see para. 5.8). It was difficult for the FSD to justify the replacement of its aged ambulances.

6.5 **Audit considers that the FSD needs to provide comprehensive management information to substantiate its request for replacing the ambulances and review the methodology of determining the number of ambulances to be replaced. The FSD also needs to conduct a comprehensive review of the serviceability of its ambulance fleet.**

***Bids in the Resource Allocation Exercise***

6.6 The procedure of identifying ambulances to be replaced under the Resource Allocation Exercise (RAE) is shown at Appendix H. Audit noted that 12 ambulances, not included in the SB's submission to the FSTB in the 2005 RAE, were recommended for replacement by the FSD in the 2006 RAE. However, 10 ambulances, rejected in the 2006 RAE, were not recommended for replacement by the FSD in the 2007 RAE. These 10 ambulances were subsequently recommended for replacement in the 2008 RAE. **Audit considers that the FSD needs to introduce procedures to ensure that all ambulances due for replacement, including those rejected in the previous RAE, are recommended for replacement in the annual RAE.**

*Lead time for the replacement of ambulances*

6.7 According to FSD records, it takes about three to four financial years to complete the process of replacing an ambulance (i.e. from the bidding of funds, and drawing up of design and specification to the delivery of an ambulance). The lead time for the replacement of ambulances from 2005-06 to 2007-08 is shown at Appendix I.

6.8 **Audit noted that 7 out of the 9 ambulances (excluding 2 ambulances prematurely disposed of) approved for replacement in 2005-06 were aged ambulances.** At the time of delivery of the replacement ambulances (i.e. at the end of 2008), these 7 ambulances will have been in service, on average, for about 11 years. Audit also noted that:

- (a) the FSD incurred \$0.4 million in 2006-07 and 2007-08 for the unscheduled maintenance of the 7 ambulances, including refurbishment and repairing damages as a result of traffic accidents;
- (b) of the \$0.4 million, \$293,000 was incurred for the unscheduled maintenance of 2 of the 7 ambulances (i.e. 11.3% of the acquisition cost of \$1.3 million for a replacement ambulance); and
- (c) in 2007, on average, the percentage of downtime was 21.3%, ranging from 10.4% to 51.8%.

6.9 **Audit noted that 83 out of the 88 ambulances (excluding 5 ambulances prematurely disposed of in 2007), approved for replacement in 2007-08, had been in service, on average, for 9 years (ranging from 7.4 years to 10.3 years).** At the time of the delivery of replacement ambulances, these 83 ambulances will have been in service, on average, for about 11 years.

6.10 **In view of the FSD's failure to achieve the performance target for the emergency ambulance service for the period from January to June 2008 (see Table 1 in para. 3.4), the significant downtime and maintenance costs of the aged ambulances, and the long lead time for replacing ambulances, Audit considers that the FSD, in consultation with the EMSD and the GLD, needs to consider expediting the replacement process.**

*Audit recommendations*

6.11 **Audit has recommended that the Director of Fire Services should:**

*Ageing ambulance fleet*

- (a) **provide comprehensive management information on the breakdown and maintenance history of the ambulances to substantiate the request for their replacement;**
- (b) **review the methodology of determining the number of ambulances to be replaced, taking into account all relevant factors (in particular, the risk of the breakdown on rescue operations), to ensure the efficient provision of the emergency ambulance service;**
- (c) **conduct a comprehensive review of the serviceability of the ambulance fleet;**

*Bids in RAE*

- (d) **introduce procedures to ensure that all ambulances due for replacement, including those rejected in the previous RAE, are recommended for replacement in the annual RAE; and**

*Lead time for the replacement of ambulances*

- (e) **in consultation with the Director of Electrical and Mechanical Services and the Director of Government Logistics, consider expediting the replacement process, in view of the significant downtime and maintenance costs of the aged ambulances, and the long lead time for replacing ambulances.**

**Response from the Administration**

6.12 The **Director of Fire Services** generally agrees with the audit recommendations. He has said that:

*Ageing ambulance fleet*

- (a) in the past, the FSD had provided the required information to substantiate its requests for replacement of ambulances in accordance with the established procedures. However, in the light of the audit recommendation, the FSD will review with the relevant parties, including the GLD, the FSTB and the SB, as to how requests for replacement of ambulances could be better substantiated with additional management information. The FSD will also liaise with the GLD, the FSTB and the SB on setting the benchmark for the replacement of ambulances;

- (b) in collaboration with the EMSD and the GLD, the FSD will try to work out an objective methodology that is acceptable to all parties;
- (c) the FSD will work with the EMSD to conduct a comprehensive review of the serviceability of the ambulance fleet;

***Bids in RAE***

- (d) the FSD will ensure that all ambulances rejected in the previous RAE are included in the bid of the annual RAE; and

***Lead time for the replacement of ambulances***

- (e) the FSD is working closely with the EMSD and the GLD to expedite the replacement process for ambulances.

6.13 The **Secretary for Financial Services and the Treasury** supports the audit recommendations. He has said that:

- (a) in the 2006 RAE and the 2007 RAE, the FSTB suggested to the FSD that improvements should be made, including the review of the record keeping system to monitor the need of replacing ambulances and, in consultation with the GLD and the EMSD, the review of the replacement mechanism and schedule of ambulances; and
- (b) the FSTB agrees that the FSD should, in consultation with the GLD and the EMSD, expedite the procurement process for ambulances.

**Procurement of additional ambulances**

6.14 In determining the number of **additional** ambulances to be procured, a number of factors (including the projected increase in demand for the emergency ambulance service, the utilisation of the ambulance fleet, the lead time for procurement and the reserve level) have to be taken into account. In addition, instead of procuring additional ambulances to meet the additional demand, improvement measures, to some extent, could be taken to improve the efficiency of the ambulance fleet to absorb the additional demand.

6.15 The FSD bid funds to procure additional ambulances for the projected increase in emergency calls and the maintenance reserve under the Non-works Capital Expenditure RAE. From 2001 to 2007, the number of emergency calls increased from 484,501 by 18.4% to 573,657. However, the number of ambulances increased from 243 in 2001 only by 9 (3.7%) to 252 in 2007.

## **Audit observations and recommendations**

### *Additional ambulances for the projected increase in emergency calls*

6.16 **Methodology of estimating additional ambulances.** Since 2001, the FSD, based on the ratio of ambulances to emergency calls recommended in the consultancy report of December 2001 (Note 29), had estimated the number of additional ambulances required for the projected increase in emergency calls (Note 30) and bid funds under the Non-works Capital Expenditure RAE.

6.17 **Need to review the methodology.** Audit noted that the ratio of ambulances to emergency calls (recommended in the 2001 consultancy report) took into account a number of factors (such as the availability of ambulances, the average time taken for emergency calls and the ability of the fleet to absorb additional demand). However, the ratio, which was based on data in 2000, might no longer be applicable. **Audit considers that the FSD needs to review the existing methodology of estimating the number of additional ambulances for the projected increase in emergency calls, taking into account the availability of the ambulance fleet and the actual average time taken to handle each emergency call.**

6.18 **Ability to absorb the additional demand.** Procuring additional ambulances is not the only way to meet additional demand for the emergency ambulance service. From 2005 to 2007, having considered all relevant factors (such as the capacity of the ambulance fleet to absorb the additional demand), the GLD did not support the FSD's proposals for the procurement of additional ambulances for the projected increase in emergency calls. Details are shown at Appendix J. An ambulance fleet, to a certain extent, has the ability to absorb additional demand, in particular, with the implementation of improvement measures, such as the TGMS (see para. 3.6) and the urgent care fleet (see para. 4.13), to increase efficiency of the service and availability of the ambulance fleet. **Audit considers that the**

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**Note 29:** *The consultancy report summarised the results of the review of the paramedic ambulance service and the development of the provision of the paramedic ambulance service.*

**Note 30:** *The FSD used the average annual growth rate of ambulance calls in the past years to project the ambulance calls in the coming year.*

FSD needs to conduct a comprehensive review on the availability and utilisation of its ambulances, taking into account the implementation of the TGMS and the introduction of the urgent care fleet. The FSD also needs to provide comprehensive management information to substantiate the request for the procurement of additional ambulances for the projected increase in emergency calls.

*Additional ambulances for the maintenance reserve*

6.19 **Bidding of funds.** In addition to the procurement of additional ambulances for the projected increase in emergency calls, the FSD also bid funds for procuring additional ambulances for the **maintenance reserve**. The FSD's bids for additional ambulances for the maintenance reserve from 2004 to 2007 are shown at Appendix K.

6.20 **Information to substantiate bids.** The reserve level of ambulances is determined by a number of factors, including the number of ambulances reserved for training, scheduled maintenance and contingency purposes (see para. 5.4). The factors for determining the number of additional ambulances required to meet the increase in demand for the emergency ambulance service and the maintenance reserve are interrelated. Audit noted that when applying for additional ambulances for the maintenance reserve, the FSD did not provide comprehensive information on the availability and reliability of its ambulance fleet to the GLD. **Audit considers that the FSD needs to review the existing methodology of determining the number of additional ambulances required for the maintenance reserve, taking into account all the factors affecting the availability and reliability of the ambulance fleet. The FSD also needs to provide comprehensive management information to substantiate its request.**

*Audit recommendations*

6.21 **Audit has recommended that the Director of Fire Services should:**

*Additional ambulances for the projected increase in emergency calls*

- (a) **review the existing methodology of estimating the number of additional ambulances for the projected increase in emergency calls, taking into account the availability of the ambulance fleet and the actual average time taken to handle an emergency call;**
- (b) **conduct a comprehensive review on the availability and utilisation of ambulances, taking into account the implementation of the TGMS and the introduction of the urgent care fleet;**

- (c) **provide comprehensive management information on the availability and utilisation of the ambulance fleet (including the performance of the emergency ambulance service in individual regions) to substantiate the request for the procurement of additional ambulances for the projected increase in emergency calls;**

*Additional ambulances for the maintenance reserve*

- (d) **review the existing methodology of determining the number of additional ambulances required for the maintenance reserve, taking into account all the factors affecting the availability and reliability of the ambulance fleet; and**
- (e) **provide comprehensive management information to substantiate the request for the procurement of additional ambulances for the maintenance reserve.**

**Response from the Administration**

6.22 The **Director of Fire Services** generally agrees with the audit recommendations. He has said that:

*Additional ambulances for the projected increase in emergency calls*

- (a) the FSD will review the existing methodology of estimating the number of additional ambulances for the projected increase in emergency calls, taking into account the availability of the ambulance fleet and the actual average time taken to handle an emergency call;
- (b) the FSD will review the availability and utilisation of ambulances, taking into account the implementation of the TGMS and the introduction of the urgent care fleet;
- (c) in the past, the FSD had provided the required information to substantiate its requests for procurement of additional ambulances in accordance with the established procedures. However, in the light of the audit recommendation, the FSD will review with the relevant parties, including the GLD, the FSTB and the SB, as to how requests for additional ambulances could be better substantiated with additional management information;

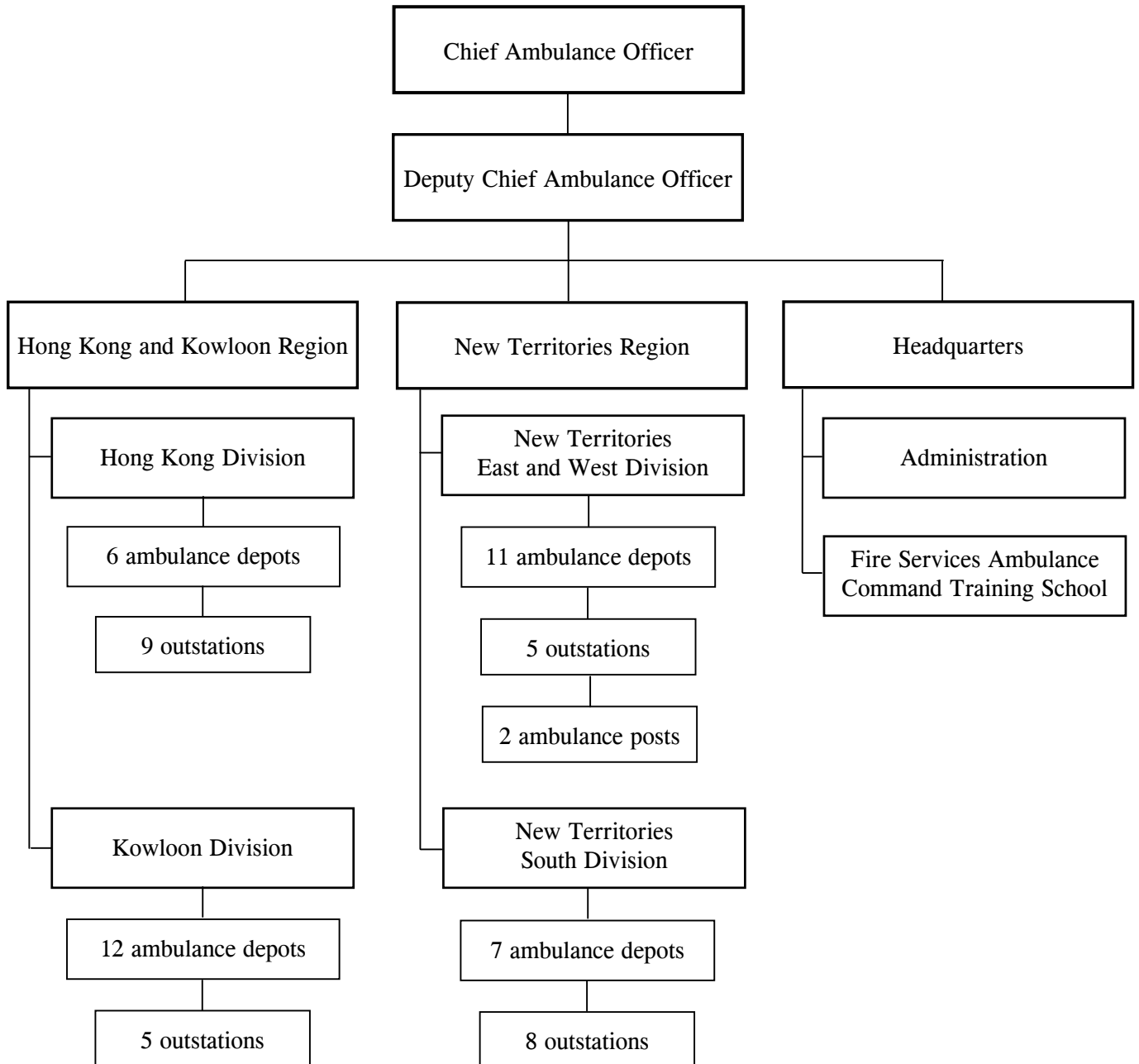
*Additional ambulances for the maintenance reserve*

- (d) in collaboration with the EMSD and the GLD, the FSD will conduct a review to establish a well recognised and scientific method to estimate the number of additional ambulances required for the maintenance reserve; and
- (e) same as (c) above, the FSD will review with the relevant parties as to how requests for additional ambulances for the maintenance reserve could be better substantiated with additional management information.

6.23 The **Secretary for Financial Services and the Treasury** welcomes the audit recommendations. He has said that the FSD should take into account the measures to be introduced to prevent the abuse of ambulance service in the comprehensive review on the availability and utilisation of ambulances.



**Organisation chart of the Ambulance Command  
(June 2008)**



Source: FSD records

Remarks: Outstations are fire stations used as ambulance outstations and standby locations. Ambulance posts are standby locations at the immigration control points.

**Conveyance of patients by ambulances to the  
Hospital Authority's Accident and Emergency Departments  
(2004 to 2007)**

Year	Total number of cases	Number of non-emergency cases	Percentage of non-emergency cases
	(a)	(b)	$(c) = \frac{(b)}{(a)} \times 100\%$
2004	400,403	170,511	42.6%
2005	427,470	177,861	41.6%
2006	416,545	167,121	40.1%
2007	438,364	166,689	38.0%
<b>Total</b>	<b>1,682,782</b>	<b>682,182</b>	<b>40.5%</b>

*Source:* HA records

*Remarks:* The A&E Triage Categorisation System with performance pledge is to provide a balanced view on the waiting time situation for A&E services spanning from those life-threatening conditions to non-urgent cases. According to HA records, conveyance of patients by ambulances to the HA's A&E Departments are classified into critical, emergency, urgent, semi-urgent, non-urgent and unclassified cases. The semi-urgent, non-urgent and unclassified cases are grouped as non-emergency cases as no pledged waiting time at the A&E Departments is set for them.

**Performance target and indicators  
(2006 to 2008)**

		2006	2007	January to June 2008
Performance target	Target	(Actual)	(Actual)	(Actual)
Emergency calls answered within the target response time of 12 minutes	92.5%	92.7%	92.8%	91.8%
<b>Indicators</b>				
Number of emergency calls		539,903	573,657	303,181
Number of urgent calls		34,771	36,916	20,721
Calls per ambulance		2,227	2,367	1,255
Turnouts of ambulances, ambulance motorcycles and Rapid Response Vehicles to calls		627,979	667,505	352,387
Emergency move-ups of ambulances to provide operational coverage (Note)		45,630	66,619	32,256

Source: FSD 2008-09 Controlling Officer's Report and records

Note: Move-up refers to the redeployment of an ambulance in the depot of a district to standby in the depot of another district for providing an appropriate ambulance coverage in different districts. The significant increase in the number of emergency move-ups of ambulances in 2007 was due to a change in the method of collating the data in 2007. If an ambulance received a despatch instruction when it was on its way to an ambulance depot as stand-bys, two move-ups, instead of one move-up, would be recorded.

**Achievement of the performance target of the emergency ambulance service  
(April 2007 to June 2008)**

Division	Number of emergency calls answered			Percentage of emergency calls answered within the target response time  $(d) = \frac{(a)}{(c)} \times 100\%$
	Within the target response time  (a)	Exceeding the target response time  (b)	Total  (c) = (a) + (b)	
<b>Day shift</b>				
Hong Kong	79,238	5,201	84,439	93.8%
Kowloon	146,887	12,186	159,073	92.3%
New Territories East and West	122,072	11,308	133,380	<b>91.5%</b>
New Territories South	70,646	4,068	74,714	94.6%
<b>Subtotal</b>	<b>418,843</b>	<b>32,763</b>	<b>451,606</b>	<b>92.7%</b>
<b>Night shift</b>				
Hong Kong	43,878	3,262	47,140	93.1%
Kowloon	85,363	6,158	91,521	93.3%
New Territories East and West	69,223	10,430	79,653	<b>86.9%</b>
New Territories South	41,104	2,388	43,492	94.5%
<b>Subtotal</b>	<b>239,568</b>	<b>22,238</b>	<b>261,806</b>	<b>91.5%</b>
<b>Overall</b>				
Hong Kong	123,116	8,463	131,579	93.6%
Kowloon	232,250	18,344	250,594	92.7%
New Territories East and West	191,295	21,738	213,033	<b>89.8%</b>
New Territories South	111,750	6,456	118,206	94.5%
<b>Total</b>	<b>658,411</b>	<b>55,001</b>	<b>713,412</b>	<b>92.3%</b>

Source: FSD records

**Baseline daily ambulance availability  
(January 2007 to June 2008)**

	Number of ambulances under the baseline DAA		Number of days not achieving the baseline DAA			
	Day shift (Number)	Night shift (Number)	Day shift (Day)	(Percentage)	Night shift (Day)	(Percentage)
<b>2007</b>						
January	182	99	3	10%	15	48%
February	182	99	17	61%	23	82%
March	182	99	17	55%	31	100%
April	182	99	23	77%	30	100%
May	182	99	2	6%	28	90%
June	182	99	6	20%	30	100%
July	182	99	16	52%	29	94%
August	182	99	26	84%	31	100%
September	182	99	8	27%	22	73%
October	184	100	13	42%	23	74%
November	184	100	20	67%	27	90%
December	184	100	7	23%	22	71%
		<b>Subtotal</b>	<b>158</b>	<b>43%</b>	<b>311</b>	<b>85%</b>
<b>2008</b>						
January	184	100	3	10%	14	45%
February	184	100	16	55%	23	79%
March	184	100	18	58%	25	81%
April	184	100	18	60%	26	87%
May	184	100	9	29%	15	48%
June	184	100	7	23%	21	70%
		<b>Subtotal</b>	<b>71</b>	<b>39%</b>	<b>124</b>	<b>68%</b>
		<b>Total</b>	<b>229</b>	<b>42%</b>	<b>435</b>	<b>80%</b>

Source: FSD records

Remarks: 1. The percentage was computed as follows:

$$\frac{\text{Number of days not achieving the baseline DAA}}{\text{Number of days in the month}} \times 100\%$$

2. From January to June 2008, the average DAA achieved was 184.6 ambulances on the day shift and 97.7 ambulances on the night shift.

**Urgent calls with more than 30-minute waiting time at hospitals  
(January 2007 to May 2008)**

Waiting time in minutes	Number of urgent calls			Total	Percentage
	Hong Kong Region	Kowloon Region	New Territories Region		
31 to less than 46	33	187	95	315	83%
46 to less than 61	5	29	24	58	15%
61 to 71	—	5	1	6	2%
<b>Total</b>	<b>38</b>	<b>221</b>	<b>120</b>	<b>379</b>	<b>100%</b>

Source: FSD records

**Appendix G**  
(para. 4.33 refers)

**Training in the cardiac pulmonary resuscitation  
and public access defibrillator  
(30 June 2008)**

	FSD		Other parties
	CPR course	PAD course	CPR/PAD courses
Introduced in	April 1999	May 2007	Not available
Provided for	Public	Staff of property management companies and elderly homes	Public
Duration	Half-day	One-day	Half or one day
Course contents	CPR skills	CPR skills and skills in using an AED	CPR skills or skills in using an AED
Fee	Nil	Nil	\$110 — \$500
Practical examination	Nil	Yes	Yes
Refresher course	Nil	Nil	Yes
Validity period of certificate	Nil	Nil	1 — 3 years

*Source: FSD records and websites of the CPR and PAD course providers*

*Remarks: Training in the CPR and PAD is provided by other parties, including the Auxiliary Medical Service, the Hong Kong Life Saving Society, the Hong Kong Red Cross and the St. John Ambulance Brigade.*

**Procedures of identifying ambulances  
to be replaced under the Resource Allocation Exercise**

- (a) The GLD prepares a first provisional replacement list for ambulances which have reached the end of their economical lives (Note 1). The GLD also prepares a second provisional replacement list for ambulances which have been in service for over seven years but have not been included in the first provisional replacement list.
- (b) The GLD requests the FSD to examine the completeness of the replacement ambulances on the two lists.
- (c) The EMSD examines the conditions of the ambulances on the second provisional replacement list to determine the need for replacement (Note 2).
- (d) The GLD prepares a final replacement list by incorporating the ambulances on the first provisional replacement list, the ambulances on the second provisional replacement list recommended by the EMSD for replacement, and the ambulances requested for replacement by the FSD.
- (e) The FSD examines the need for replacing the ambulances on the final replacement list and submits a request for procurement of replacement ambulances to the GLD, the SB and the FSTB.
- (f) The GLD examines the request from the FSD and forwards the recommendations to the SB.
- (g) The SB, after considering the merits of the request, forwards its recommendations on the ambulances to be replaced to the FSTB for consideration.
- (h) Upon receipt of the RAE bid for the replacement of ambulances, the FSTB considers it, taking into account the recommendations of the SB, the GLD and the EMSD.

*Source: FSD records*

*Note 1: The GLD adopts an economic life model to assess a vehicle due for replacement by taking into account the accumulated maintenance costs, mileage, age and replacement costs of a vehicle. An ambulance will be recommended for replacement if the additional costs to be incurred in keeping the ambulance in service are greater than the capital and maintenance costs of a replacement ambulance, and action will be taken two to three years in advance.*

*Note 2: The EMSD charges a fee of \$500 for conducting replacement assessment for each ambulance. The assessment criteria adopted by the EMSD include the vehicle's condition and design serviceable life, mileage of the vehicle and availability of spare parts in the market.*



**Lead time for the replacement of ambulances  
(2005-06 to 2007-08)**

<b>Number of replacement ambulances</b>	<b>Year of approval</b>	<b>Year of delivery</b>	<b>Lead time (Financial year)</b>
9	2005-06	2008-09	4
26	2006-07	2008-09	3
88	2007-08	2009-10 (Note)	3

*Source: FSD records*

*Note: The time of delivery of the first batch of replacement ambulances is at the end of 2009.*

**FSD bids for additional ambulances  
for projected increase in ambulance calls  
(2005 to 2007)**

<b>RAE</b>	<b>Number of ambulances submitted by the FSD</b>	<b>Number of calls</b>		
		<b>Emergency</b>	<b>Urgent</b>	<b>Total</b>
2005	53 (Note)	595,000	41,000	636,000
2006	17	543,000	36,000	579,000
2007	24	587,000	37,000	624,000

*Source: FSD records*

*Note: The request for 53 additional ambulances, not supported by the GLD, was subsequently withdrawn in the 2005 RAE.*

**FSD bids under the Non-works  
Capital Expenditure Resource Allocation Exercise  
(2004 to 2007)**

<b>RAE</b>	<b>Number of additional ambulances</b>			<b>Not supported by the GLD</b>
	<b>For the projected increase in emergency calls</b>	<b>For the maintenance reserve</b>	<b>Total</b>	
2004	—	7	7	7
2005	53	9	62	62
2006	17	2	19	19
2007	24	2	26	26

*Source: FSD records*

**Acronyms and abbreviations**

A&E	Accident and Emergency
AED	Automated external defibrillator
API	Announcement in public interest
Audit	Audit Commission
CPR	Cardiac pulmonary resuscitation
DAA	Daily ambulance availability
EMA II	Emergency Medical Assistant II
EMSD	Electrical and Mechanical Services Department
FSCC	Fire Services Communication Centre
FSD	Fire Services Department
FSTB	Financial Services and the Treasury Bureau
GLD	Government Logistics Department
HA	Hospital Authority
MCRP	Minimum Cost Refurbishment Programme
PAD	Public access defibrillator
RAE	Resource Allocation Exercise
SB	Security Bureau
SLA	Service Level Agreement
TGMS	Third Generation Mobilising System