EMERGENCY MEDICAL SERVICES IN THE ARAB REPUBLIC OF EGYPT

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TABLE OF CONTENTS

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EXECUTIVE SUMMARY

The history of Emergency Medical Services (EMS) in the Arab Republic of Egypt (ARE) has three distinct phases that are important to an understanding of the situation today. The first and longest phase stretches from 1902 to 1966, during which ambulance services were provided in the major cities by voluntary associations. Throughout this period, ambulance services were focused exclusively on rapid transportation of the patient to the nearest hospital; no real first aid was provided either at the scene or en route to the hospital.

Toward the end of this period, donations to the ambulance services declined substantially. This coincided with the growing tendency to nationalization, and ambulance services were declared by statute to be an exclusive government responsibility in 1966. This same statute and a subsequent ministerial decree decentralized this responsibility to the governorate level (there are 26 governorates in the ARE), but retained authority for overall planning in the Ministry of Health (MDH). During the subsequent ten years, little emphasis was placed on emergency medical services. Although the availability of ambulance services increased somewhat in the rural areas, emphasis continued to be on patient transportation, not on effective treatment.

Two major developments ushered in the third phase of EMS history. First, the importance of EMS in the overall scheme of health care was realized at the highest levels of government, and a High Council for First Aid was established by Presidential Decree in 1976. In the following year, the Joint Working Group on Medical Cooperation (a newly created American-Egyptian body) assigned high priority to improving emergency medical services in the ARE; shortly thereafter, US$6 million were made available from the Commodity Import Program (CIP) for this purpose and for neonatal intensive care projects.

A major part of the CIP funds, supplemented by funds from the MDH and other foreign donors, has been committed to an EMS Demonstration Project covering a small, densely populated section of Cairo and most of Alexandria.

The initial phase involved deployment of 90 new Dodge modular ("big box") ambulances in Cairo and 45 identical vehicles in Alexandria. Shortly thereafter, a sophisticated ultra high frequency (UHF)

communications system was installed in all these ambulances, in an ambulance communications control center and three hospitals in Cairo, and in a similar center and two hospitals in Alexandria. Additional base stations are now being installed, with MOH funds, in six other hospitals in Cairo and Alexandria. Beyond such advanced features as selective calling and ability to connect any ambulance crew to any telephone in Egypt, this communications system also permits transmission of electrocardiograph (EKG) signals from the ambulances to the participating hospitals; only six of the Cairo ambulances are equipped, however, with EKG monitors in the vehicle itself.

Subsequently, the MOH has purchased an additional 832 new ambulances of various makes, using USAID, other foreign donor, and its own funds. These ambulances have been deployed to other sections of Cairo and Alexandria and throughout the rest of the ARE.

Concurrently, the MOH has embarked on a major program of upgrading hospital emergency departments, which generally have been in deplorable condition before renovation. Twenty-five MOH hospitals are currently slated for such projects, of which nine are already completed or are nearing completion. Several of these projects are taking the form of relatively comprehensive critical care centers, including burn units ranging from 8 to 20 beds, intensive and cardiac critical care units of about the same size, and dedicated laboratory, X-ray, and surgical theatre facilities. Similar developments are taking place at several university hospitals, and the first poison control center in Egypt was recently opened at Ain Shams University Hospital in Cairo. In a separate but closely related project, neonatal intensive care units have been opened at two Cairo and one Alexandria hospitals, and two additional such units are scheduled to open soon--one in Cairo and another in Assiut.

Beneath all this activity, however, several fundamental problems persist throughout the ARE, including the EMS Demonstration Project area, and considerably dull any efforts to improve emergency medical services:

- Although there are no reliable data, the need for emergency medical services is unquestionably huge and growing rapidly. Population density, particularly in Cairo, is among the highest in the world. The resulting traffic congestion, coupled with a fatalistic attitude toward accidents and a nearly total disregard for elementary rules of traffic safety, results in an exceptionally high rate of traffic injuries and deaths. Other endemic problems, including a high rate of smoking among males and serious gastrointestinal problems among infants, also contribute heavily to the load on the EMS system. All these problems are, of course, beyond the control of the officials responsible for EMS.

- Methods of calling for EMS assistance are slow and unreliable. Because telephones often are inaccessible and more often do not

work, ambulances commonly are summoned by taxis, by passing motorists, or by friends or bystanders coming to the ambulance stations on foot or riding animals. Ambulances may be called also by policemen on the police VHF radio network; this method is effective mostly in the large cities only, however, because few ambulances in the rural areas are radio-equipped. A major, multinational project now nearing completion is expected to result in dramatic improvements in the telephone system throughout the ARE within two years.

- Except in the hospitals where there has been recent emergency department renovation or construction, patients are normally received in "reception rooms." Particularly in the smaller hospitals in the rural areas, these reception rooms frequently have doorless openings onto unpaved courtyards; dust, bystanders, children, and even animals move through the area unimpeded; doctors and bystanders smoke without hesitation while patients are being treated. The reception rooms are equipped only to perform triage and the most elementary first aid (sometimes including suturing of moderately severe lacerations without anesthesia or surgical gloves). Patients in more serious condition are admitted immediately to inpatient services. Equipment is in short supply; the hospitals find it difficult to maintain what they have.

- EMS personnel throughout the system have been poorly trained. Most Emergency Medical Technicians (EMTs) are trained in three-year secondary schools, where the most relevant training is equivalent to the 81-hour U.S. Department of Transportation EMT course; no referesher training had been provided until 1982. (Most nurses are trained in similar secondary school programs.) Emergency departments and reception rooms are staffed mainly by "house officers" (equivalent to interns, in the U.S. system), often without supervision, and untrained attendants; few nurses are available. Morale and motivation are low, largely because of very low salaries, and turnover is high.

An important step toward addressing one facet of this last problem has been made in the last three months. A doctor/nurse team from the United States has developed and implemented an intensive training course for a selected group of physicians, who now are prepared to train emergency department personnel and EMTs throughout the country in most aspects of emergency medical techniques through the Advanced Cardiac Life Support (ACLS) level (but not the Advanced Trauma Life Support Level).

A conspicuous deficiency of the EMS system in the ARE is a lack of planning and evaluation. An EMS Comprehensive Plan has been developed and has been revised at least once, but it falls short of being a sufficiently specific for use as an effective management tool. No disaster planning has been done. Data collection has been virtually

non-existent, but a new data collection system (including forms that lend themselves well to computer tabulation) was initiated in the EMS Demonstration Project area in January 1982. The first tabulations from the new system will be available within the next few weeks. Inevitably, there has been no effective program evaluation.

Against this background, several fundamental recommendations relative to the EMS system in the ARE are offered.

First and perhaps most pervasive, the planning function relative to the EMS system should be strengthened. The EMS Comprehensive Plan should continue to be a dynamic document that is updated at least annually, more often if necessary. In the next updating, several deficiencies identified in this report should be corrected. Most importantly, the Plan should address the needs of the entire ARE, with the EMS Demonstration Project as only one part of the response.

In support of this planning function, special studies and evaluations should be commissioned as especially difficult or complex problems are identified. A short-term need for four such studies is discussed in the report; these studies should be completed as early as possible and the results reflected in the next Plan revision:

- A study of the feasibility of an injury prevention demonstration project in a medium-sized Egyptian city

- An operations research study to determine the most cost-effective combination of ambulances, deployment patterns, and communications systems to attain specified response time performance in various areas of the ARE, both urban and rural, and leading to a specific plan for future ambulance deployment and EMS communications systems throughout the ARE

- A survey by a team of sanitarians, construction engineers, and doctors or nurses to determine specifically what will be required to bring all emergency departments, reception rooms, and first aid facilities over a five- or ten-year period to a point where they are environmentally safe and adequately equipped to provide minimally acceptable emergency medical services

- A study by a high-level interagency group to produce disaster plans for a variety of conceivable disaster types, involving preplanned coordination of emergency medical, police, and civil defense (fire) services, and possibly also the military

All other recommendations in the report should be implemented only in accordance with the overall EMS Comprehensive Plan.

Beyond this fundamental recommendation, action is recommended in three specific areas.

First, the experience of using the new data collection system in the EMS Demonstration Project area should be evaluated carefully. If findings are favorable, the system should be extended immediately to ambulances and hospital emergency departments and reception rooms throughout the ARE. This will require not only distribution of new forms but also training of designated personnel in their use.

Second, the momentum built up in the manpower training and utilization area should be sustained. Experiments should be run in the EMS Demonstration Project area in Cairo in using the telemetry equipment, possibly adopting an MDH proposal to assign ACLS-trained doctors from nearby emergency departments to accompany ambulances on expected cardiac emergency calls. Until favorable evaluation findings are developed in this experiment, however, manpower training emphasis should be heavily on extending training in Basic Life Support to emergency department and reception room personnel, ambulance crews, and other health care personnel throughout the ARE, and then training in CPR to various types of first responders, such as policemen and firemen.

Finally, the performance of the various types of critical care facilities should be evaluated carefully, and further investment in this area should be restrained until a systematic comparison is made of the relative impact on health status of these investments compared with comparable investments in various types of preventive and primary health care.

EMERGENCY MEDICAL SERVICES IN THE ARAB REPUBLIC OF EGYPT

1.0 INTRODUCTION

In this report, emergency medical services throughout the Arab Republic of Egypt (ARE) are described and assessed, and several recommendations for their improvement are set forth. This report is one component of a comprehensive health sector assessment conducted by and for the United States Agency for International Development (USAID). No attempt is made here, however, to weigh the relative importance of future investments in emergency medical services against future investments in other types of health care, except through a few comments questioning the wisdom of investing heavily now in highly sophisticated critical care units.

The report is based on a three-week in-country effort, during which information was drawn from three sources. First, a number of background documents, supplied principally by USAID, were reviewed. These documents, which are listed in Appendix A, are all available in the USAID/Cairo Health Sector Assessment reference library (later to be incorporated into USAID/Cairo's Development Information Center). Second, field visits were made to a number of health care facilities and ambulance stations throughout the ARE; these are listed in Appendix B. Finally, discussions were held with a number of people directly or indirectly involved in Egyptian emergency medical services, either during the site visits or in separate conferences; a partial list of these people is contained in Appendix C.

Before addressing the central subject of the report, I wish to express sincere appreciation for the outstanding and gracious cooperation of officials at all levels of the Ministry of Health. In particular, the strong interest and support of Dr. Mahamed Saad El-Din Fouad, First Undersecretary of State for Health, was conspicuous throughout. Dr. Mahmoud Selim, Director of EMS and Specialized Services, and Dr. Sobhy Fahmy, Director of the Cairo EMS Demonstration Project, provided valuable insights and greatly facilitated productive application of my time in the field. Dr. Hassan El Kalla and Dr. Ibrahim Abd El Hamid were of immense help during the site visits themselves.

In Section 2.0 below, the history of EMS in Egypt is recounted briefly, and EMS is put into the general context of health services in the ARE. The current status of EMS in the ARE is described and assessed in Section 3.0. Finally, in Section 4.0, a series of recommendations and associated priorities are discussed.

2.0 OVERVIEW OF EMS IN EGYPT

In this section, the historical background of emergency medical services in Egypt is described briefly, then the interaction of the major components of the Egyptian health care system in providing emergency medical services is explained in general terms.

2.1 Short History Of EMS In Egypt

A fascinating description of early efforts to provide ambulance and first aid services in Egypt is provided by Dr. Naila Amer in her doctoral dissertation for the High Institute of Public Health in Alexandria:

> According to the bibliographic review by the Alexandria Ambulance Association (1952), the first ambulance center in Alexandria was opened on the 3rd of August, 1902. Its founder and first president was Mr. Pietro Vasay, an Italian who lived in Alexandria at that time. Its aim was to provide free first aid services to anyone in need as well as to assist in combating the cholera epidemic which had swept all over Alexandria at that time. The "Combined Ambulance Association", as it was then called, was the first of its kind in all Egypt. At the beginning all its members were foreigners, mainly Italians, and French. It was only in 1908 that the first two Egyptian volunteers joined the Association. In 1909 the first Egyptian became a member of the administrative board. It was not until 1914 that the first Egyptian was elected President of the administrative board. The number of Egyptian volunteers increased annually and in 1952 there were 93 Egyptians and 3 foreigners.
>
> Ever since its foundation the Ambulance Association had an established statute of its own. One of the main problems facing the association was the financial support which was almost entirely derived from donations. The first ambulance bicycle was bought in January 1906, before that the volunteers used to carry patients in hand-pulled carts or chairs. In 1908 El Khedavi Abbas II donated the association a horse cart which is still kept in the ambulance museum. In 1915, Sultan Hussein Kamel donated a piece of land on which the headquarters building was erected in 1917. In April 12th 1922, the first night pharmacy in Alexandria was established by the Association as a result of the long felt need for such night service. Also around that time a number of clinics, free of charge, were opened by the Association, in which several physicians volunteered to work without pay. The first Union between the Ambulance Associations of Alexandria, Cairo, Tanta and Port Said, was founded in 1924. In 1925 a large polyclinic was established to serve the public free of charge and a doctor was appointed during the same year to service the ambulance volunteers.
>
> The idea of the First Aid Units distributed along the different beaches was first developed in 1925 through common agreement between

> the Association and the Alexandria Municipality. Around that same year, the headquarters building was getting to be too crowded with clinics and personnel therefore the Egyptian government donated a piece of land facing the Municipality Stadium on which a new head-quarters building was erected and officially opened in 1928. This is the same building where the present Main Ambulance Headquarters is situated.* . . . Later in 1931, the birth of a new and vital idea took place, i.e., the establishment of the first blood bank in the Middle East by the Alexandria Ambulance Association. The fabulous success of the services provided by this bank encouraged the development of similar banks later on in the Cairo Ambulance Association, the Greek Hospital in Alexandria (Cotsica) and the University Hospitals. . .
>
> During the Second World War, the Association contributed in providing first aid courses to the public at large. The volunteers worked hard during all hours of the day and night and many of them died or were wounded on duty. In 1944, the first official ambulance school was established in both the French and Arabic languages. Later in 1947 when cholera epidemic invaded Alexandria, the Association devoted two cars to work day and night in the transport of cholera victims to hospitals and gave over 60,000 vaccine injections to the Alexandria population. (Amer, 1976)

Thus, emergency medical services in Egypt are founded on a long and distinguished history. Through the 1950s and early 1960s, however, the Alexandria Ambulance Association and its counterparts in other Egyptian cities experienced increasing difficulty in deriving adequate financial support from public donations. The crisis coincided with the trend in Egypt toward increasing nationalization of services. In 1966, Statute No. 8 was enacted, which stated in Section 1:

> .ambulance services shall become one of the organizations governed by the state. Ambulance centers and units shall be affiliated to the Governorate Council which shall be responsible for their administration. Such an administration shall be in accordance with the general policy set by the Ministry of Health. (Amer, 1976)

At Section 2, the statute added:

> .ambulance centers and units shall have their own regulations independent of the usual rules and regulations governing other governmental agencies. Such regulations should be authorized by the Minister of Health and the Nation's Minister of Local Administration. (Amer, 1976)

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* In 1982, this building continues to house the Alexandria Ambulance Headquarters and also the EMS Demonstration Project; it contains also the ambulance museum, in which several of the ambulances used in the early 1900s are displayed.

Later that year, and under the authority of the statute, Ministerial Decree No. 403 established the administrative structure for ambulance services throughout the nation, providing among other things for a "Council for Ambulance Affairs" in each governorate, responsible to the Governorate Council.

Despite the way in which ambulance services were singled out in Statute No. 8, emergency medical services were given relatively little emphasis throughout the next ten years. Functionally, they consisted of little more than transportation of critically ill or injured patients to the nearest hospital, with virtually no medical care either at the scene or en route. Upon arrival in the "reception room" of the hospital, the patient was typically admitted directly to inpatient care; the reception room was equipped to provide no more than the most elementary first aid for minor injuries and illnesses.

The situation changed dramatically in the latter half of the 1970s. As a result of studies by experts from abroad, the Ministry of Health (MOH) became conscious of the importance of EMS in the overall scheme of health services. In 1976, a Presidential Decree established the High Council for First Aid, headed by the Minister of Health and including the Ministers of Interior, Finance, and Cultural Affairs. The High Council became operational in December 1976 and started immediately to collect data on the then existing EMS situation throughout the ARE. The need for improving hospital reception rooms was recognized early, and L.E. 5 million was allocated annually to this purpose starting in 1976.

In 1977, the Joint Working Group on Medical Cooperation, established by the governments of the ARE and the United States, designated emergency medical services (including neonatal intensive care) as a high priority area. USAID provided $6 million from the Commodity Import Program (CIP), most of which was earmarked for EMS and neonatology projects. Specifically, an EMS Demonstration Project was established to cover a portion of Cairo and a portion of Alexandria, designed to determine the impact of a radical upgrading of all aspects of EMS in those areas. This project is described in greater detail later in this report.

Meanwhile the EMS administrative structure established by Statute No. 8 prevails today. The Ministry of Health is responsible for establishing overall policy and standards for emergency medical services throughout the ARE and for providing resources to the governorates from the national budget. The governorates are responsible for day-to-day operation of emergency medical services within their geographical jurisdictions. As the following, more detailed descriptions of the structure indicate, however, the government's absolute monopoly on ambulance services established by Statute No. 8 has not entirely persisted.

2.2 Interaction Of Major Health Care Components In Providing EMS

As noted, the MOH is the dominant factor in EMS services in the ARE. The situation cannot be understood fully, however, without an appreciation of how the various organizational components of the MOH interact in providing these services, both among themselves and with other elements of the Egyptian health care system.

2.2.1 Ambulance Services Outside The EMS Demonstration Area

In the typical situation in which emergency medical services are required, patients transport themselves (or are transported by relatives, friends, or bystanders) to the nearest MOH hospital. Transportation is by private automobile or taxi or, particularly in rural areas, by animal or on foot.

In fewer cases, someone at the scene of the injury or sudden illness may call for an ambulance. This may be done by any of the means above or by telephone, although telephone service is still unreliable in much of the ARE. On the main highways from Cairo to Alexandria and from Cairo south to Aswan, the call for an ambulance is said to be carried most often by a passing taxi or private automobile. In the large cities, an ambulance may be called by a policeman, using a "walkie-talkie" radio.

Ambulances are deployed to geographically dispersed satellite stations in all districts, so that the distance from the ambulance station to the scene is seldom more than a few kilometers. Despite this, response time is often excessive because of congested traffic and poor road conditions, even in rural areas. When the ambulance does arrive at the scene, the main emphasis is still on transporting the patient most rapidly to the nearest MOH hospital; ambulance crews are seldom prepared to provide more than elementary first aid at the scene or en route except in the EMS Demonstration Project area.

In addition to their use in genuine emergencies, ambulances are used routinely to transport doctors stationed at the ambulance centers to various locations for house calls. An person may call the ambulance center to request a house call, for which a fee (typically L.E. 3) is charged. This fee is divided in predetermined shares among the doctor, the ambulance crew, and the ambulance service.

2.2.2 MOH Hospitals, Rural Health Centers, Rural Health Units

Distances from any location in populated Egypt to the nearest hospital are seldom great, although they often may seem to be so in the context of a true medical emergency. A relatively large (e.g., 200 to 400 bed) general hospital with all principal specialities is located in the capital city of each governorate, and smaller hospitals (typically 100 to 150 beds) are located in the capital of each district (of which

there are typically eight or ten comprising each governorate).* Thus, few locations in the heavily populated areas of the ARE (i.e., the Nile Valley and Delta)** are more than about 20 km. from the nearest hospital.

Upon arrival at any but the largest MOH hospitals, the patient is seen first in a "reception room," usually by a "house officer" (equivalent to an intern in the U.S. medical system). If the condition is deemed to be minor, the patient is treated and released; treatment may include suturing of reasonably severe lacerations and often includes provision of oral or injectable medicines. Minor surgery may be done without use of even local anesthesia. If the presenting condition is considered more serious, the patient is admitted immediately to inpatient service. As in hospital emergency facilities in most nations of the world, the overwhelming majority of patients seen in the reception rooms requires only routine outpatient care; only a small percentage represents true emergencies.

In many larger MOH hospitals, the situation differs only in that separate emergency rooms and outpatient departments are provided. The outpatient departments are rarely open for more than three or four hours in the morning, so the emergency departments (which are open 24 hours a day) continue to be swamped by non-emergent cases. These emergency rooms also are often equipped and staffed to provide a somewhat broader scope of services than those in smaller hospitals, but still well short of a full range of normal emergency medical care.

The MOH currently is implementing a program of upgrading the emergency departments of 25 of its hospitals.* These projects range from major renovation of existing facilities (often converting space previously used for other purposes to emergency department use) to construction of multistory buildings dedicated to emergency department use (often including burn unit services and other critical care services).

This system of hospitals is supplemented by a network of MOH rural health centers and rural health units. Both are predominately outpatient facilities, but the rural health centers usually have an inpatient unit of 10 to 12 beds. The rural health centers also are larger, each designed to serve a population of 15,000 to 20,000 people; the rural health centers supervise two to three rural health units, each designed to serve about 5,000 people. Although the rural health centers and units

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* The number and distribution of hospitals in the ARE is tabulated in another component report of the Health Sector Assessment.

** Ninety-nine percent of the people of the ARE are compressed into 3.5 percent of the nation's area in the Nile Valley and Delta; the population density in these locations is one of the highest in the world--2,400 persons per square mile.

rarely, if ever, receive ambulance cases, they do treat many of the much larger number of patients who transport themselves for care, including emergency care, to these centers and units. At best, the rural health centers and units are equipped to provide emergency medical care only at about the level of the reception rooms of the hospitals; they differ significantly, however, in that a doctor is in attendance only a few hours each day. Thus, these centers and units are important to the EMS system through draining off a large number of non-emergent outpatients who might otherwise swamp hospital emergency departments, but are not important as actual providers of true emergency medical care other than in exceptional circumstances.

2.2.3 University Hospitals

In addition to the system of MOH hospitals, there is also a number of university hospitals, administered under the Ministry of Higher Education. From the perspective of the EMS systems, these differ from the MOH hospitals principally in that they typically are larger (several are more than 1,000 beds) and have a greater range of sophisticated critical care services. The trend in these hospitals is to establish critical care centers--encompassing burn units, CCUs, ICUs, complete laboratories and radiology facilities, surgical theatres, and other specialized care and research facilities--rather than emergency departments only. Ain Shams University Hospital includes the only Poison Control Center in Egypt.

The critical care facility of Cairo University has been renovated quite recently, those at Ain Shams and Alexandria Universities are currently in late stages of construction or renovation, and an entirely new 1,200-bed hospital (including a critical care center) is nearly completed at Assiut University.

MOH ambulances transport patients to university hospitals interchangably with MOH hospitals.

2.2.4 Other Hospitals*

In addition to the government-operated hospitals described above, there is a considerable number of governmental and non-governmental hospitals that serve only specifically identified patient types or provide only highly categorical services.

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* Because the hospitals described in this section appeared not to be central to the EMS situation in the ARE, none of them were visited. The information contained in this section is derived entirely from discussions with MOH officials and with other members of the Health Sector Assessment Team.

One group of such hospitals is the group operated by the Health Insurance Organization (GHIO), which is described in greater detail elsewhere in the Health Sector Assessment reports. Generally, these are relatively large, well equipped general hospitals which serve an enrolled membership, consisting mostly of employees of industrial and governmental organizations. These hospitals have their own ambulances, which transport members needing emergency medical care who call the GHIO hospitals for such services. If an GHIO member suffering an injury or sudden illness is picked up by an MOH ambulance, he or she will be transported on request to an GHIO hospital but must pay for this ambulance service. If the GHIO member is unconscious and not known to the ambulance crew as an GHIO member, he or she is transported automatically to an MOH or university hospital.

Another group of hospitals outside the government system consists of private hospitals, mostly owned by physicians or groups of physicians. Most of these hospitals are small (e.g., 10 to 15 beds) and provide no emergency services. A few, however, are larger and reportedly provide some emergency services. At least one, a 120-bed hospital in Cairo, is reported to have its own ambulances that travel to the scene of an injury or illness accompanied by one or two doctors, specialized according to the nature of the case.

Still another group of hospitals, government-operated but outside the regular system of hospitals available to the public, is comprised of hospitals that serve only employees of designated government organizations. One such system is composed of hospitals for employees of the railroad company, another is a group of four hospitals for police officers. Methods of handling emergency care in these hospitals were not investigated.

A final group of hospitals in Egypt encompasses a variety of categorical hospitals, such as those for chest diseases, eye diseases, infectious diseases, psychiatry, and leprosy--mostly operated by the MOH. Although some of these may be equipped to handle emergencies in their categorical area, such services were considered to be outside the scope of this investigation.

2.2.5 The Informal Health Care System

A description of the ARE health care system would be incomplete without some mention of the informal health care system, an important element particulary in the rural areas. This element is discussed at greater length elsewhere in the Health Care Assessment Reports and is considered here only with respect to its significance to emergency medical services.

Possibly the most important informal providers of health care are the "dayas" or traditional midwives. They are reported to attend more than 90 percent of births in the rural areas and perhaps more than half the births in urban areas. Undoubtedly, they encounter frequent obstetrical emergencies in this activity. The practices of the dayas has not been

observed directly as part of this EMS assessment; secondary sources suggest, however, that they are quite experienced in recognizing emergencies beyond their competence and in securing professional help in these cases. In this respect, they act from much the same position as members of the general public calling for ambulance assistance.

A similar function is performed by the "bone setters," who have been the traditional first choice among rural residents in cases of fractures and related illnesses, and the "health barbers" who traditionally have treated many routine illnesses. Secondary sources are less clear with respect to these two classes of informal providers but suggest that they, too, are not reluctant to seek professional help when encountering cases beyond their competence.

In fact, the most recent information concerning all three types of informal providers discussed above suggests that the link between the informal health care system and the formal health care system is becoming much stronger. Informal providers often work in rural health centers and clinics, learning new techniques and establishing referral relationships in the process. Rather than diminishing or interfering with their informal practices, these links appear to enchance the prestige of the informal providers in their villages. (Nadim, 1982)

Thus, the informal health care system, seen from the EMS perspective, is important primarily as another--and possibly quite effective--point of entry to the regular EMS system, not particularly as an alternative or competitive system. The informal system may have important screening or triage functions which, if appropriate, actually may enhance the overall effectiveness of the formal system's EMS efforts.

2.2.6 The EMS Demonstration Project

The five sections above describe the health care system from the EMS perspective as it operated throughout the ARE until about five years ago and still operates today in most of the nation. Creation of the High Council for First Aid in 1976 and the Joint Working Group for Medical Cooperation in 1977 started a chain of events that changed the EMS situation substantially in two small but important areas of the ARE.

The key event in this chain was initiation of an EMS Demonstration Project covering a small section of the northern part of Cairo and most of the western part of Alexandria. The principal features of this project are described in Section 3.0, below. In general, however, the project was designed to demonstrate how emergency medical services in these two areas are affected by:

- Deploying a fleet of modern, well equipped ambulances throughout the Demonstration Project areas

- Equipping these ambulances and five hospitals (three in Cairo and two in Alexandria) with sophisticated communications systems, including telemetry capability

- Upgrading the emergency departments of the five hospitals with respect to facilities, capabilities, and operational practices

- Training personnel from both the ambulance service and the hospital emergency departments to function in the new EMS environment

- Evaluating the project in detail, upgrading data collection procedures as necessary to this purpose

One indication of the extent to which the EMS Demonstration Project covers each of the cities is that, of all ambulance runs made with Emergency Medical Technicians in November 1981, only 6.9 percent of those in Cairo but 68.5 percent of those in Alexandria were within the project area.

Most aspects of the Demonstration Project have now been implemented, but evaluation is still in its earliest stages. Further description of the project is woven throughout Section 3.0, below.

3.0 CURRENT STATUS OF THE EMS SYSTEM: DESCRIPTION AND ASSESSMENT

Against the backdrop painted above, the various elements of the EMS system are examined in greater detail below.

3.1 Need For Emergency Medical Services

There are no reliable statistical indicators of the need for emergency medical services in the ARE.

Part of the problem lies in the limited availability and quality of ARE health care data generally, discussed elsewhere in the Health Care Assessment. A particular problem in this regard is inability to differentiate problems requiring emergency medical services from non-emergent problems in the statistics that are available.

For example, the MOH report, Basic Statistical Information of Health Services, July 1981 (which includes morbidity and mortality statistics on patients in MOH hospitals only), includes the data shown in Table 1, following this page. In these data, it is impossible to know whether all of the incidents covered in the category "Accidents, Poisonings and Violence" represent emergent cases (unlikely), what proportion of the incidents covered in such categories as "Diseases of Circulatory System" or "Deliveries and Complications of Pregnancy, Childbirth, and Puerperium" were emergent, or whether "illnesses" include admissions only or also include outpatient visits.

TABLE 1

DISTRIBUTION OF MAJOR CAUSES OF ILLNESS

IN GENERAL HOSPITALS (1977)

Males	
1 - Accidents, Poisonings and Violence	31.7
2 - Diseases of Digestive System	21.0
3 - Diseases of Respiratory System	10.1
4 - Diseases of Circulatory System	8.1
5 - Others	29.1
TOTAL	100.0
Females	
1 - Deliveries and Complications of Pregnancy, Childbirth, and Puerperium	34.9
2 - Accidents, Poisonings, and Violence	12.9
3 - Diseases of the Genito-Urinary System	12.9
4 - Diseases of the Digestive System	11.1
5 - Others	28.2
TOTAL	100.0

Despite these problems, the statistics are persuasive that a large percentage of the workload of the MOH general hospitals represents emergent or urgent conditions at the time of admission. Other data in the same report indicate, however, that the category "Accidents, Poisonings and Violence" accounted for only 5.4 percent of male deaths and a smaller percentage (apparently less than 3 percent) of female deaths in the total population in 1979.

Another problem with data concerning activity in emergency departments (by no means unique to the ARE) is that only a small proportion of the patients seen genuinely need emergency care. MOH officials estimate the percentage to be less than 10 to 15 percent. It is impossible to verify this estimate, however, unless the data system is designed to capture this specific information--which has not been the case until quite recently. Two highly imperfect indicators are shown in Table 2, following this page.

TABLE 2

EMERGENCY DEPARTMENT STATISTICS FOR
EMS DEMONSTRATION PROJECT AREA

Hospital and Month		Percentage of Patients Received In E.D. Delivered By Ambulance	Admitted To Hospital
El-Sahel	7/81	0.9	7.4
	11/81	0.8	7.2
Shubra	7/81	2.2	11.9
	11/81	2.3	14.8
Nasser	7/81	0.8	8.9
	11/81	1.3	10.4
Ras El Teen	7/81	1.8	10.1
	11/81	2.0	7.9
El Gomhorria	7/81	1.1	2.8
	11/81	0.6	3.5

These data confirm that, at least in these hospitals, less than 15 percent of the patients seen in the emergency department have conditions serious enough to warrant hospital admission. Even more interestingly, they show that in all but two instances (November at Ras El Teen, and July at El Gomhorria), less than 20 percent of the admitted cases arrive by ambulance (assuming that all who do arrive by ambulance are admitted). It should be remembered that the five hospitals shown are the

principal hospitals involved in the EMS Demonstration Project; similar statistics from other hospitals, and particularly from the district hospitals in rural areas, undoubtedly would show lower percentages in both columns.

One final set of statistics sheds a small amount of light on one important need for emergency medical services: automobile accidents. The data shown in Table 3, following this page, are extracted from the ARE's EMS Comprehensive Plan; they relate to five of the most heavily traveled inter-city roads in Egypt.

TABLE 3

HIGHWAY DEATH AND INJURY DATA

Highway	Km.	No. of Amb. Sta.	1978 Deaths	1978 Injuries	1979 Deaths	1979 Injuries
Cairo-Alex. Agric. Rd.	220	19	295	1,814	302	1,962
Cairo-Alex. Desert Rd.	230	6	17	104	24	181
Cairo-Fayoum Desert Rd.	100	2	8	87	8	38
Cairo-Suez Desert Rd.	134	5	23	148	6	91
Cairo-Ismailia Desert Rd.	120	2	21	80	26	137
Total	804	34	364	2,233	368	2,409

In the end, however, the data in all three tables above--which are typical of the best data found--raise more questions than they answer. An improved data collection system has been implemented in the EMS Demonstration Project, starting in January 1982, but no useful data have been derived from it yet. When this system has been fully "debugged", it will be expanded to include ambulance services and emergency departments, at least in MOH hospitals, throughout the nation.

In the meantime, it is safer to rely on observational and anecdotal information. Several readily apparent conditions suggest a proportionately greater need for emergency medical services in the ARE than in more heavily industrialized nations:

- The streets and roads of the ARE are manifestly unsafe. The streets of Cairo are among the most congested in the world, and roads in the rural areas--particularly the agricultural road from Cairo to Alexandria--are little better. There is an almost total disregard of the most elementary rules of traffic safety by both drivers and pedestrians. Mass transit, where it exists, exacerbates rather than relieves the problem; people jump on moving, already overcrowded vehicles and hang in precarious positions on the sides, back, and top. It is inconceivable that the traffic accident and death rates are not appalling.

- The extremely high infant death rate from diarrhea undoubtedly is associated with a high rate of admissions to hospitals of infants in advanced stages of dehydration. Indeed, the principal investigator of the neonatal intensive care project confirmed that this is the most frequent cause of admission to the neonatal units. (This indicates, incidentally, that the neonatal units are not limited to treating neonates but actually are functioning also as pediatric intensive care units.)

- Widespread use of kerosene and butane burners for heating and cooking reportedly results in a high incidence of life-threatening burns.

- A remarkably high incidence of smoking among males probably results in a correspondingly high rate of heart attacks, one of the most common reasons for true emergencies in emergency departments.

The list could be extended, but the case for an effective and highly accessible emergency medical services system is relatively self-evident.

One additional argument in support of such a system in the ARE is sometimes put forth: that availability of a system capable of transporting patients rapidly and comfortably over relatively long distances will reduce the pressure to expand district hospitals with respect to both number of beds and range of services, because serious cases can be treated more readily in the governorate general hospitals. Although this argument is plausible, the pressure to expand district hospitals undoubtedly arises from factors in addition to the current difficulty of transporting patients. This issue should be examined more refully in the future; until a definitive cost-effectiveness study is e, however, the argument should not be accepted at face value.

3.2 Organization And Management

The general organizational structure of the MOH system of health care facilities--the most pertinent to emergency medical services-- has been described earlier in this report and in considerably greater detail in other component reports of the Health Sector Assessment.

To reiterate the salient points briefly, responsibility for the governmental aspect of health care has been decentralized to the governorate level. Each governorate, of which there are 26, operates one or more relatively large general hospitals, with most specialties, in its capital city, and also smaller general hospitals in each district, of which there are typically eight to ten in a governorate.

With respect to ambulance services, each governorate has a Council for Ambulance Affairs. Ambulances are deployed to a central ambulance headquarters in the capital city and also to satellite stations throughout the governorate, typically several in each district. The governorates are responsible also for providing ambulance services along the major highways running through them. In most cases, this is done by placing ambulance satellite stations at intervals of from 10 km. to 50 km. along the highway, the distance depending on how busy the highway is and what ambulance resources are available.

Administration of the MOH health care system thus is almost totally decentralized, as is planning at the operational level. Broader, long-range planning, however, remains centralized. One product of this broad-scale planning is the ARE EMS Comprehensive Plan, which was revised most recently in April 1980. In most respects, this is a commendable effort. It is based on a sound recognition of the essential elements of an effective EMS system, and it indicates quite clearly what the MOH intends to accomplish with respect to each element. Furthermore, the MOH has recognized that this is a dynamic document that must be updated frequently. Despite the considerable effort that has gone into the Plan, however, it has several important deficiencies:

- It does not differentiate clearly enough between long-term aspirations and concrete, short-term objectives. Although it contains a comprehensive program implementation schedule with milestones, the milestone dates for most events not yet completed are in vague terms such as "Incomplete" or "Started, not yet complete." Furthermore, events listed as "Complete" are mostly complete with respect to the EMS Demonstration Project only; thus, the Plan actually is partly a plan for the EMS Demonstration Project, partly a comprehensive EMS plan for the nation, but it is difficult to determine which is which.

- The Plan is inconsistent in its level of detail. For example, it goes to great lengths in describing the justification for and planned configuration of a sophisticated communications sytem, but treats most other areas much more generally.

- Perhaps most seriously, the plan does not address the question of cost effectiveness at all. In each area, the plan describes something approaching an "ideal" situation and proceeds on the assumption that this is the objective to be achieved. Although the pursuit of excellence cannot be criticized in principle, the plan does not address directly what can be realistically accomplished within the specified planning time period (given the applicable environmental and financial constraints) and what tradeoffs are being made. For example, upgrading the communications systems may make it possible to provide equal or better services with fewer ambulances, and thus at lower overall cost. The results of analyses of this type are not evident in the priorities assigned to various events in the implementation schedule.

Deficiencies of these types indicate that greater effort needs to be put into the planning effort and supporting analyses. Once a definitive plan and detailed implementation schedule are available, they can be used for more effective monitoring of system implementation.

One consistent observation during this assessment confirms the need for such monitoring. Several of the facilities visited are still under construction. When asked when the facility would be operational, the responsible administrator rarely offered a specific date but rather offered a general target such as "30 days" or "three months"--targets that invariably seemed implausible considering the current state of completion and the time already spent in reaching that state.

In one other area, planning apparently is totally lacking: no evidence was found of planning for any of the most probable types of disasters.

3.3 Manpower Training And Utilization

An area to which considerable attention has been paid for some time in the EMS system in the ARE is manpower training and utilization. As the discussion below indicates, a surprising amount has been accomplished already, but the system is plagued by a few apparently intractable problems.

3.3.1 First Responders

The initial link in an EMS system is the "first responder"--the person who, because of his or her official duties, is often the first to reach the scene where emergency medical services are needed. The two most important types of "first responders" are policemen and firemen. More broadly interpreted, however, various other job classifications are sometimes included, such as taxi and bus drivers, train conductors, airline cabin attendents, and designated people in places where large concentrations of people are found regularly, such as office buildings and sports arenas. In Egypt, dayas might be included in the list.

No organized training has been provided to "first responders" in the ARE. The potential value of such training has been recognized, however. In a visit during this assessment to the Police Academy in Cairo, where commissioned officers are trained for the police force throughout the ARE, the deputy director of the Academy expressed considerable interest in a proposal to establish a training center at the Academy for training cadets in Cardiopulmonary Resuscitation and other first aid skills. Instructors in the center would be Police Physicians (of which there are already a significant number in the police force) trained initially in the instructor training courses at the EMS Demonstration Project headquarters, following the same curriculum already tested on physicians who will train Emergency Medical Technicians (EMTs) and emergency department doctors and nurses in Basic Life Support.

If this plan is implemented successfully, it could be expanded rapidly throughout the entire police establishment and concurrently to other types of "first responder" organizations. (In the United States and other more industrialized nations, training in CPR and other first aid skills has been extended successfully to large numbers of the general public as well as most "first responders"--a possible long-term goal for the ARE.)

3.3.2 Telephone Operators And Dispatchers

When the telephone is used to call an ambulance in the EMS Demonstration Project area, the call is taken in the central ambulance headquarters by a telephone operator, of which there are several on duty at any one time. The telephone operator records basic information--location, type of incident, caller's identity, time--on a sheet of paper, which is then passed to the ambulance dispatcher. The dispatcher records the information in a log book, selects an ambulance to respond, alerts the selected ambulance by an alarm system, and, after the ambulance is "rolling", conveys the information received by telephone to the ambulance crew. (Additional details of the communications aspects of this process are provided in Section 3.5.1.)

Outside the EMS demonstration area but within the urban areas, the procedure is essentially identical, except that the available

communications systems are less complex and a few ambulances (mostly outside the Cairo and Alexandria areas) do not have radio equipment. In these latter cases, information is conveyed to the ambulance crews in person or by telephone before they leave their stations.

In the rural areas, calls for ambulances are more often received from people who come to the ambulance station. Regardless of whether the call is received in person or by telephone, however, the essential information is entered into a log book and then conveyed by any available means--usually direct contact or telephone--to the ambulance crew before the ambulance leaves the station. At the satellite stations where only one ambulance is posted, of course, the dispatcher typically is also the ambulance driver or EMT.

Throughout the system, no special training is provided to the people who receive calls for assistance or dispatch ambulances. In contrast to the practice in many EMS systems in the more industrialized nations, the telephone operators and dispatchers are not expected to perform a "triage" function (i.e., to determine whether there is a genuine need for emergency medical services) or to provide simple advice or referrals if the call appears not to justify dispatching an ambulance.

3.3.3 Emergency Medical Technicians

Throughout the ARE, an ambulance responding to a call for assistance normally carries a driver and an Emergency Medical Technician (EMT).

EMTs are trained in a way that corresponds roughly to the way in which nurses are trained in the ARE. After finishing elementary school (six years) and preparatory school (three years), male students are eligible to enter the EMT secondary school. This is one of several secondary school options, the choice being determined for any one student principally by preparatory school graduation examinations.

The EMT secondary school, a three year program, follows a curriculum that includes the standard secondary school subjects: Arabic, English, religion, and various other academic subjects. Woven into this are courses in basic first aid skills, essentially equivalent to the United States Department of Transportation (DOT) 81-hour EMT course.

An alternative program is offered for those who have already graduated from another secondary program. This is a 12-day program, conducted at 18 training centers in the governorates, which covers essentially the same material with respect to first aid skills as the EMT secondary school curriculum.

Upon passing graduation examinations at the end of either program, EMTs are qualified to begin performing at the entry level in the ambulance service. Although they undoubtedly acquire a substantial amount of additional knowledge and skill through their working

experience, there appears to be no program of formal on-the-job training or internship.

Until quite recently, there was no provision for continuing education or periodic retesting of competence. This is changing rapidly now. Responding to a new consciousness of the importance of quality control, several of the EMT training centers have planned six-day refresher training courses, to be completed by EMTs at roughly annual intervals. The refresher training program currently is operational, however, only in Alexandria.

EMTs are paid near the lowest end of the wage scale in the ARE; entry level salaries are about L.E. 30 a month, and annual increments are in the order of five percent. "Incentives" (i.e., bonuses) are paid occasionally to EMTs who have performed well in situations involving multiple casualities or other unusually difficult conditions. On the other hand, the EMTs are held personally responsible for the equipment in their ambulances. Taking all factors together, the position of EMT is not a preferred occupation in the ARE.

Despite this, there appears to be an adequate supply of EMTs throughout the nation, and turnover is not excessive. In the ambulance centers and satellite stations visited, the EMTs were invariably clean, appropriately dressed, and appeared to have good morale.

3.3.4 Ambulance Drivers

Ambulance drivers are responsible exclusively for driving the ambulances to scenes of injuries or sudden illnesses, and from these scenes to a designated hospital. Undoubtedly, they also assist the EMT as necessary in patient handling, but they are not trained formally for this function.

Despite their more limited function, ambulance drivers are paid significantly more than EMTs--entry level salaries reportedly are in the order of L.E. 45. The discrepancy arises from the fact that the ambulance driver is held responsible for his vehicle and must pay for any damages to it. Reportedly, drivers are eligible also for an "incentive" of half a month's pay if they go for three months without requiring anything for their vehicles beyond routine maintenance.

The normal practice in more industrialized nations is for both members of the ambulance crew to be trained as EMTs, and for them to alternate in assuming driving responsibilities. This allows the crew members to assist each other effectively at the scene of an injury or sudden illness, and it greatly increases the probability that patient handling will be done correctly and without the risk of exacerbating the patient's condition.

Cross-training has been considered impracticable in the ARE. The possibility of training drivers as EMTs has been rejected because the drivers are generally older and considered less trainable. Trained EMTs reportedly are unwilling to assume driving responsibilities, however, because the incremental pay involved is not sufficient to justify the risk entailed. The lack of cross-training is a severe limitation on the capability of the ambulance crews.

3.3.5 Emergency Department Physicians And Nurses

Except in the largest hospitals, the emergency departments and reception rooms are staffed principally by "house officers" (i.e., interns, in the American system), often without supervision by residents or attending physicians. As is discussed in greater detail elsewhere in the Health Sector Assessment reports, house officers begin their service with virtually no clinical experience. They receive no special training for work in the emergency department, and the practice of rotating house officers through the various services precludes their gaining much practical experience in emergency medicine.

The situation is considerably better in the larger hospitals and particularly in the critical care units of the university hospitals. There, emergency departments are more often staffed by residents (possibly with house officers in addition) and are usually under the direct supervision of a senior faculty member. The residents are relatively well trained in their areas of specialty but not more broadly in emergency medicine.

In both large and small hospitals, emergency department staffing by physicians is complicated by the low salaries paid to MOH physicians. As a result, they are seldom motivated to perform beyond the minimum level, work only short hours in the emergency departments, and leave for other situations on slight provocation.

The nurse staffing situation is quite similar. In the smaller hospitals, the emergency departments and reception rooms are staffed by, at best, graduates of the secondary nurse training schools. Much of the work of a nursing type is actually done by untrained attendants. Emergency departments and critical care units of the larger hospitals are more likely to have graduates of the High Institutes for Nursing (i.e., baccalaureate level nurses), but almost always in a supervisory position. In either case, the nurses typically have only on-the-job training for work in the emergency departments, although a few nurses have completed the EMT training programs in the EMT training centers.

The most serious problem with respect to nurses, however, is not their training but rather turnover. Nurses in the ARE are neither well paid nor socially respected. They are highly susceptible to employment offers at significantly higher salaries from abroad, particularly from other Arab nations. Consequently, even the most sophisticated critical

care units have difficulty keeping nurses for more than a few months after they have been trained in the units. The resulting severe nursing shortage appears to be the most serious single constraint on operation and upgrading of emergency departments and critical care units throughout the ARE. The health sector has attempted to respond by expanding the nurse training programs, but they have experienced considerable difficulty in attracting an adequate supply of students.

3.3.6 EMS Physician Instructors

Although a significant amount of effort thus has gone into training various types of personnel, particularly EMTs, over the years, it has become increasingly apparent that the level of training is not adequate to support a general upgrading of emergency medical services throughout the nation. Especially in the EMS demonstration area, the technical capabilities of new ambulances and upgraded hospital emergency departments were outrunning the competence of the personnel expected to use those capabilities. Therefore, it became obvious that a new generation of training and retraining in emergency medicine was needed.

This need has been addressed in a short-term project conducted by two officers of the United States Army--one a physician and the other a nurse--under the auspices of Project Hope. This team developed and implemented a program in which physicians are trained to instruct other health care personnel--emergency department physicians and nurses, EMTs, and others--and additional physician instructors in modern techniques of emergency medicine. Their assignment has been completed, and 33 graduates of their program (31 physicians and two High Institute of Nursing nurses) are now ready to begin spreading the improved training program throughout the ARE.

The curriculum for this course was intended initially to encompass the DOT 81-hour EMT, Basic Life Support, Basic Cardiac Life Support, and Advanced Cardiac Life Support courses, all as used routinely in the United States. In the initial sessions, however, the project team discovered that more instruction was needed in patient handling and a few other areas not covered in depth in the planned courses, so it developed a new course in "Essentials of Emergency Medicine" to rectify the problem. The curriculum for this course is attached as Appendix D.

It also became evident that the physicians enrolled in the class were going to be severely handicapped in using what they were learning because none had had any prior experience or training in teaching; therefore, a short course in "How To Teach" was added.

The program incorporates practical skill testing at frequent intervals, including a final exercise in which each participant is required to teach one class under observation.

As part of its work, the project team also developed a plan for an ideal training center in which to conduct the program on an on-going basis. The recommended facilities, equipment, and staffing of the proposed center are adequate to train two classes of 16 students each simultaneously to the Advanced Cardiac Life Support level. The center is not capable of conducting training in Advanced Trauma Life Support, however, principally because it lacks the animal facility essential to the practical sessions of that course.

Although this program is in its earliest stages, it has a clear potential, if sustained, of substantially enlarging and upgrading the training of personnel at all levels of the EMS system.

3.3.7 Technicians

One final aspect of manpower training and utilization requires mention. For much the same reasons as apply to nurses, there is a chronic shortage in the ARE of technicians of all types, such as biomedical technicians, X-ray technicians, and laboratory technicians. Shortages in all these areas affect the EMS system adversely. The unavailability of biomedical engineers is particularly crippling, because much of the equipment used in the emergency departments is manufactured by companies which do not maintain a resident service capability in the ARE.

3.4 Ambulance Fleet

Before 1977, the supply of ambulances throughout the ARE consisted almost entirely of Skoda vehicles, manufactured in Czechoslovakia. These vehicles were relatively unequipped for use other than as patient transport vehicles; in the words of one Soviet engineer surveying the situation in the early 1970s, in fact, they were fit "only for cadavers."

Modernization of the fleet began with the provision of 135 Dodge modular ("big box") ambulances with funds from the Commodity Import Program in 1977. As these vehicles arrived (often behind schedule), they were assigned to the EMS Demonstration Project: 90 to Cairo and 45 to Alexandria. Although they represented an enormous improvement over the vehicles previously used, they were not without problems. Their large size was a handicap in the congested traffic and often narrow streets of Cairo and Alexandria. They were inadequately ventilated, which made them not only uncomfortable for the crew but sometimes detrimental to the condition of the patient in the hot Egyptian climate. They lacked the folding chair type of stretcher, often essential to removing the patient from buildings and from other constricted spaces. Except for the size problem, of course, these problems were correctable, and the new ambulances soon became a valuable part of the EMS system.

Since this initial increment, the MOH has added another 832 modern ambulances to the fleet, using a combination of MOH, World Health

Organization, and World Bank funds. About half of these are the Dodge modular type, the balance is a mixture of Dodge, Plymouth, and Peugot van types. Seventy of the Dodge vans are air conditioned. These additional ambulances have been deployed to all 25 governorates.

An important consideration with respect to the ambulance fleet is their communications capability. This is dicussed in Section 3.5.

Before turning to that subject, however, some mention of vehicle maintenance is essential. In the large cities where the ambulance fleets are relatively large, centralized maintenance shops have been established. In other areas, ambulances are maintained and repaired mostly by private automobile repair shops. It is evident that maintenance of the ambulance fleet is a chronic problem, partly because of difficulty of maintaining spare parts inventories. The problem is particularly troublesome in the rural areas, where it has been exacerbated by sending ambulances made by several different manufacturers to a single location. At any given time in either an urban or rural location, upwards of a third of the available ambulances may be out of service for maintenance.

3.5 Communications Systems

Communications is the lifeblood of an EMS system.

When an emergency occurs, the first communications requirement of an EMS system is a method by which a call for assistance can be transmitted rapidly and accurately from the scene of the emergency to the EMS system--typically to the ambulance dispatch center.

As in any emergency services system--police, fire, rescue, medical, and others--instant and positive command and control of available resources is also of great importance. A central command post must have instantly available information concerning the location, capabilities, and status of all pertinent resources within its assigned jurisdiction and must be able to direct those resources on a minute-to-minute basis to respond to requirements as they evolve.

A sophisicated EMS system has additional communications requirements. It must have the capability of transmitting clinical information from the scene of the emergency or from an en route ambulance to a designated hospital, so that the hospital can be prepared to receive the patient upon arrival and frequently so that clinical advice and direction can be transmitted from the hospital to the ambulance crew. When several emergencies occur simultaneously, and particularly in disaster situations, it often is highly desirable for hospitals and even ambulances to be able to communicate among themselves. In many situations, it is also highly desirable for the ambulance dispatch center or the ambulances at or en route to the scene of the emergency to be able to communicate with other emergency personnel--police, fire, rescue, and others.

Until quite recently the EMS system in the ARE had virtually none of these capabilities. The situation is changing rapidly, however, as the next three subsections demonstrate.

3.5.1 Methods Of Calling For Ambulances

Historically, the weakest link in the EMS chain in the ARE has been the methods available to the public for calling for ambulances. This is a flaw, not in the EMS system itself but rather in the nation's communications situation overall. The telephone system--the normal and most logical way of calling for an ambulance in most nations--has been highly unreliable throughout the ARE. In many areas, particularly in rural Egypt, telephones are not readily accessible to many people.

Lacking reliable telephones, people have used a variety of less satisfactory ways for calling for ambulances. As noted earlier, ambulances often are summoned by taxis or private vehicles passing the scene, particularly along the highways. Where policemen are equipped with "walkie-talkie" units, they may use these to call for an ambulance. In the worst situations, relatives, friends, or bystanders go personally to the nearest ambulance station to report the need for an ambulance.

The situation is improving gradually, particularly in Cairo and other major cities. In Cairo and Alexandria, special telephone lines have been set aside for use in calling emergency equipment: "122" for police, "123" for ambulance, and "125" for fire. (Actually, these lines have been dedicated to this purpose for several years but had never been activated.) Concurrently, reliability of telephone service has improved noticeably.

Dramatic further improvement is expected by communications specialists on the technical staff of USAID/Cairo. A major multinational project of upgrading the ARE telephone system is in full swing and should be essentially completed in two years. At that time, use of the telephone for calling ambulances should no longer be a problem anywhere in Egypt, according to this source.

3.5.2 EMS Radio Networks

Until initiation of the EMS Demonstration Project in Cairo and Alexandria, the EMS system depended for radio communications on the police Very High Frequency (VHF) radio network. This was an unsatisfactory situation, however, for several reasons. The police radio network for a time covered only part of the ARE, although it now covers the entire nation. More importantly, only a few ambulances were equipped with VHF receivers. Police radio traffic reportedly was given priority over EMS traffic.

This is still the situation in the ARE outside the Cairo and Alexandria EMS Demonstration Project area, except that all Cairo and

Alexandria ambulances not included in the Demonstration Project, as described below, are now equipped at least with VHF radio transceivers so that they can use the police radio network.

In the EMS Demonstration Project area, however, the situation is markedly different and becoming even more so. One of the major features of the EMS Demonstration Project has been installation of a dedicated EMS ultra high frequency (UHF) radio system, technically the equal in most respects of the most sophisticated systems used in major cities of the more industrialized nations.

A multichannel UHF transceiver is installed in every ambulance in the EMS Demonstration Project area (except the pre-1977 vehicles used for patient and staff transport only). These vehicles also have VHF transceivers, so that they can operate on the police network frequencies if necessary. Using Demonstration Project funds, base stations have been installed at the Cairo and Alexandria ambulance headquarters and in each of the five hospitals selected for participation in the EMS Demonstration Project. Using MDH funds, identical base stations currently are being installed in an additional six hospitals in the Demonstration Project area.

With these systems, any base station can call any ambulance selectively by dialing the ambulance number on the console. If the ambulance is at its station and the crew is not in the vehicle guarding the calling channel, the base station can activate an alarm at the station to alert the crew that it is being called. When the ambulance responds, its number is displayed on the base station console. Calls from the ambulance can be patched through the telephone system to any telephone in the ARE, allowing, for example, any physician specialist to be put on the circuit to advise the ambulance crew. Under base station control, ambulances can communicate with each other; in disaster situations, for example, one ambulance on the scene can be designated as a mobile command post. Base stations can communicate freely among themselves.

3.5.3 Telemetry Systems

In addition to voice communications capability, all UHF-equipped ambulances in the EMS Demonstration Project area are equipped to transmit EKG telemetry signals to the hospitals equipped with base stations. Only six of the vehicles are equipped with monitors, however, to permit reading the EKG at the scene; the rest are equipped with EKG leads only. The telemetry link is operational with only one hospital at the moment, but the other four demonstration hospitals are expected to have operational links shortly.

From a communications viewpoint, the telemetry system thus is almost ready to become fully operational on the limited scale described above. It cannot become actually operational, however, until two major problems are solved.

First, provisions must be made to have a physician capable of interpreting the EKG trace available 24 hours a day in each hospital designated to receive telemetry signals. This has been done to date in only one hospital, although it appears that there is no inherent reason why it cannot be done soon in the other four hospitals.

Second, and more importantly, a decision must be made about what to do at the emergency scene with the information derived from telemetry. None of the ambulances are equipped with Lifepacks (i.e., defibrillators and associated equipment), and EMTs are neither trained nor authorized by law to administer injections (except, for some obscure reason, on the beaches of Alexandria) or to use a defibrillator. Thus, the telemetry system accomplishes nothing unless either a limited number of EMTs are trained to the paramedic level and are legally authorized to use this training, or a physician accompanies each ambulance going on a suspected cardiac call.

One plan that has been proposed is to train a select group of house officers (or residents) in Advanced Cardiac Life Support, station them in emergency departments near the ambulance stations, and have the ambulance pick them up on the way to a cardiac call. In view of the surplus of physicians in the ARE, this plan has considerable appeal and does avoid the unattractive alternative of having the physicians standing by idly in the ambulance stations waiting for the occasional cardiac call. On the other hand, it does entail additional time in responding to cardiac calls, when time is often critical. The practicality of the proposal can not be known for certain until it is tested on a small scale.

3.6 Hospital Emergency Departments And Other First Aid And Critical Care Facilities

The final link in the EMS chain is the facility to which the ambulance transports to injured or seriously ill patient for definitive treatment. Unless this facility is ready with the equipment, environment, and trained staff to provide this definitive care competently and safely, all the work committed to upgrading the prehospital phase is to no avail.

As the next subsections indicate, this is the area in which the most disturbing problems were found in the EMS system of the ARE.

3.6.1 Hospital Emergency Departments And Reception Rooms

Until emphasis was put on emergency medical systems over the last five years, the sole point of intake of injured or critically ill patients--even in the relatively large hospitals--was the "reception room." This room and its staff, usually consisting of house officers, nurses, and mostly untrained attendants, was expected only to determine whether the patient was in serious enough condition to be admitted to inpatient service and, if not, to provide elementary first aid.

These reception rooms, which are still the prevailing model in MOH hospitals, are disgraceful. Typically, they have a dooorless opening onto an unpaved courtyard and have open windows, often without screens. Flies, dust, bystanders, children, and sometimes animals move through the room unimpeded. Both staff and bystanders smoke without inhibition. Equipment in the room typically is limited to a metal table with chipped paint, covered by a sheet of questionable cleanliness; no equipment of value in resuscitation (other than possibly an oxygen tank) is available. Tiles are missing from the floor, and paint is peeling from the walls. Reportedly (although this was not observed), nurses may ignore patients if they are not given "baksheesh" (tips).

In larger hospitals, the situation differs only in that the reception room becomes an emergency department, with somewhat larger and more isolated quarters and possibly additional, rudimentary equipment.

In all fairness, the difficulty of the environmental problems contributing to the situation must be acknowledged. Most of the hospital buildings are quite old. Doors and windows cannot be closed without air conditioning, which most of the hospitals do not have. Dust is ubiquitous in Egypt. Although these conditions explain some of the problems observed, however, they will not go away and must eventually be addressed if the EMS system is ever to reach the desired level of performance.

The unacceptability of the existing situation has been recognized by the MOH, which has launched a program of emergency department upgrading, initially involving 25 of the larger MOH hospitals at various locations throughout the ARE. This upgrading may take the form of renovating existing facilities, but more often involves constructing an entirely new building to house the emergency department and associated critical care units.

At this moment, two of these projects have been completed and are operational. Construction has been finished for another seven, which will become operational after installation of equipment and final cleanup. The other 16 are in the early stages of construction and reportedly are experiencing recurrent delays.

In some of these projects, important problems still prevail. Wooden window frames are not fitted tightly, allowing dust to enter presumably "sterile" areas; this is particularly disturbing with respect to the surgical theatres. Floor and wall coverings are of a type that will soon deteriorate unless scrupulously maintained (an unrealistic expectation in the ARE).

These problems apparently have been recognized, because they are not seen in the most recently completed facilities. Aluminum-framed windows have become standard; these can be fitted to be nearly airtight. Durable, hard, easily cleaned materials have been used on floors and the lower two meters (approximately) of walls.

The most acceptable conditions were observed in the various specialized critical care units, described later in this section. These units are putting considerable effort into attaining the highest level of sanitation possible, given the inherent environmental constraints.

3.6.2 Rural Health Centers And Rural Health Units

The rural health centers and rural health units are capable of providing services at about the same level as the reception rooms of the smaller hospitals. As noted earlier, however, they are not capable of handling any genuine emergency conditions, so they are not a true part of the EMS system.

This is not an inherent limitation of these types of facilities, of course. Some of the most life-threatening types of conditions can be handled, at least for short times, by people who have been trained in certain basic life-saving techniques, such as CPR, removal of airway obstructions, and checking arterial bleeding--even without equipment. When equipment is present, such training improves the effectiveness with which it is used. At present, however, the personnel of rural health centers and units are not uniformly trained in these skills.

3.6.3 Ambulance Substations

Ambulance substations, most of which serve as the base for one or two ambulances, typically have a small treatment room as part of their layout. The substations are manned by an ambulance crew (driver and EMT) for each ambulance, working 12-hour shifts. The EMTs use the treatment rooms to administer vaccinations, immunizations, and minor first aid procedures for people who come to the substations.

3.6.4 Specialized Critical Care Units

A neonatology Demonstration Project has been in progress in the ARE for about 30 months. The initial neonatology center established under this project is at Al Galla Teaching Hospital in Cairo; this unit has 36 incubators, organized in a progressive care mode. A second unit of about the same size has been established in Kasr El Aini Hospital in Cairo, and another unit is currently operational in Alexandria. Smaller units are planned for Assiut University Hospital (a 1,200-bed hospital currently under construction and nearing completion) and for another Cairo hospital. The units already functioning are operating near capacity.

As part of the general upgrading of emergency departments, burn units are being established in most of the facilities being renovated or constructed. The most elaborate of these is the 25-bed burn unit of Ras El Tine Hospital in Alexandria, which is the only burn unit serving Alexandria and three surrounding governorates. The rest of the burn units are not yet operational, but several are expected to be so within a few months. The Ras El Tine unit appears to be quite well set up and

managed; it does suffer from lack of some important types of equipment and of any physical therapy capability. Like most emergency care facilities, however, its most important problem is attracting and retaining an adequate nursing staff.

The nation's only Poison Control Center is located at Ain Shams Hospital in Cairo. The Center had some initial difficulty because the WHO poison data base did not include a number of drugs found in Egypt; therefore, substantial time and effort had to be committed to creating a complete data base. The Center still is short of some important types of antidotes, although its inventory is expanding steadily. There are plans to establish a 12-bed toxicology critical care unit at the Center as soon as possible; space has been allocated and only funds for completing construction and equipping the unit are lacking.

In upgrading emergency departments, a growing trend is to establish comprehensive critical care centers, including intensive care units, cardiac critical care units, and burn units. In one case--Boulah Dakroun Hospital in Giza--the new critical care facility contains 120 beds for various types of emergency and critical care. The functionally most sophisticated critical care unit is the critical care facility at Cairo University, which is described briefly in Appendix E (a translation of an Arabic document prepared by the director of the center).

3.6.5 Maintenance Of Hospital Equipment

A shortage of biomedical technicians was noted earlier. The predictable consequence is a chronic problem in maintaining laboratory and other equipment vital to operation of the emergency departments. Contract maintenance typically is unrealistic: in one illustration offered, an initial one-year maintenance contract for a blood gas analyzer costing L.E. 9,000 would also cost L.E. 9,000 unless the purchaser wished to have an maintenance technician resident in Egypt, in which case the maintenance contract would cost L.E. 18,000.

One solution to the problem, instituted in the critical care facility of Cairo University Hospital, is to install two essentially redundant laboratories.

Another experiment in this area, potentially quite promising, has been instituted at Boulah Dakroun Hospital. Here, a complete mechanical, electromechanical, and electronics maintenance facility has been established in its own building. This facility serves not only the Boulah Dakroun Hospital but also hospitals from throughout the Giza governorate and several surrounding governorates.

3.7 Data Collection And Evaluation

At an earlier point in this report, the observation was made that there are no reliable data on the EMS system in the ARE. This is not

entirely true, for every ambulance station and emergency department does keep a log book in which the most important information about each patient entering the EMS system is kept. With an enormous effort, this information could be extracted. The cost of such an effort undoubtedly would considerably exceed its value.

Some multicopy forms have been used in the ambulance stations and emergency departments to capture more detailed information on each case. These forms were not well designed, however, particularly for convenient subsequent tabulation.

Underlying this situation has been a lack of a specific plan for data collection and analysis, and apparently lack of serious interest in this area.

The situation in the EMS Demonstration Project is somewhat different. The need for systematic evaluation of the project was recognized early, and a plan for evaluation was developed about two years ago. Unfortunately, a variety of delays were experienced in implementing the first step of this plan--introduction of new forms for data collection at the ambulance stations and emergency departments.

These delays now have been overcome, however, and the new forms were in use in all ambulance stations and hospitals of the EMS Demonstration Project as of January 1, 1982. As these forms are collected at MOH headquarters, they are being key punched into a computer. The first tabulations and analyses will be made shortly. Initial indications are that the new data collection system is working well. One beneficial side-effect of the new system is a significant reduction in the recording burden on all the personnel involved, because the new forms are designed so that most information can be checked off rather than written in.

4.0 RECOMMENDED ACTION PLAN AND PRIORITIES

The situation described above clearly offers a multitude of opportunities for constructive action. Before proposing an action plan focused directly on the EMS system, however, it is important to recognize that some of the most important problems faced by the EMS system in the ARE are problems that derive from the economy as a whole and affect the entire health care system. Thus, they are not truly within the control of the officials directly responsible for managing the EMS system.

One such problem is manpower supply, utilization, and motivation. Some of the skill categories critical to effective operation of an EMS system, and indeed to the entire health care system, are in critically short supply. The low wages paid to the people at all levels expected to make the EMS system operate saps their motivation; attempting to alleviate the problem by paying frequent "incentives" for performance above minimum expectations only compounds the problem by making it difficult to get anything but substandard performance without paying the

"incentive." Shortages in some categories and surpluses in others tend to distort effective utilization of hard won skills, such as doctors' performing tasks more appropriate to the nursing profession. This problem can be solved, if at all, only in the context of the entire economy.

Another problem transcending the EMS system itself involves aseptic practice. The unsanitary condition of many reception rooms and other facilities has been described earlier in the report. An attempt could be made to isolate and clean up those areas and the habits of the people who use them. It is quite clear, however, that this problem pervades the entire health care system and that much of it derives from basic attitudes and traditions of the society at large. Any attempt to solve it wholly within the context of the EMS system is probably futile.

The problem of hospital equipment supply and maintenance is another problem that undoubtedly affects the EMS system no more or less than the health care system as a whole, and which therefore is more suitable for attack on a systemwide scale.

Although problems of life style described earlier in this report also transcend the EMS system and the control of the officials in charge of the system, they do have a more direct impact on the need for and ability to deliver emergency medical services. As noted at that earlier point, traffic congestion in Cairo and a few other areas makes it nearly impossible to move an ambulance to an emergency scene rapidly, and it contributes to a rate of traffic injuries and deaths that almost certainly is one of the highest in the world. The latter problem may be aggravated by the Muslims' traditionally fatalistic attitude toward accidents. The predeliction of Egyptian males to smoking undoubtedly adds substantially to the work of emergency departments and critical care units. Unsanitary practices have a heavy impact on the health of the people, particularly infants and young children, many of whom become additional cases for the emergency departments. No data are available on occupational injuries, but there is every reason to believe that the occupational injury rate, too, is high.

In total, these conditions increase the need for emergency medical services and add to the difficulty of implementing an effective EMS system in the ARE, but are generally beyond the control of officials responsible for the EMS system. One practical implication is that the rate of improvement in EMS system performance will be slower than it might otherwise be, despite the level of investment committed.

Against the background of these general remarks, the recommendations below are offered.

4.1 Update And Refine The EMS Comprehensive Plan

The central recommendation arising from this assessment is that the EMS Comprehensive Plan must be made even more comprehensive, specific,

and realistic. This need is discussed more fully below. The recommendations in later sections should be implemented only in accordance with the revised EMS Comprehensive Plan; as part of Plan revision, priorities and the associated implementation schedule should be reviewed and confirmed or altered.

The MDH should continue to regard the EMS Comprehensive Plan as a dynamic document, subject to frequent revision. A full review and updating should occur at least once each year. One senior official of the MDH should be assigned responsibility for ensuring that the Plan is maintained and regularly updated.

In the first such revision, the specific deficiencies of the plan as it is now constituted, identified earlier, should be addressed. In particular, the Plan should be clearly a plan for the entire ARE, with the EMS Demonstration Project as just one facet. The implementation schedule should be laid out in even greater detail, with specific target dates for each event.

At a minimum, the Plan should indicate unequivocally what the MDH intends to do, on what scale, where, and when, in each of the areas discussed in this report, namely:

- Organizational structure, management, and planning (including, but not limited to disaster planning)
- Manpower training, utilization, and motivation
- Configuration and deployment of the ambulance fleet
- Configuration of the communications system, including telemetry, particularly outside the EMS demonstration area
- Emergency department and critical care unit upgrading and expansion
- Data collection and evalution

The plan also should designate the person responsible for completing each action by the indicated target date.

As planning in these areas is done, problems that are particularly difficult, or about which existing knowledge is inadequate, are likely to be encountered. When this occurs, it should be seen as an indicator of the need for a special study focused on that problem. Five such problems were identified during the current assessment; they are described in the next five subsections below. The recommended special studies should be completed as early as possible, and their results should be incorporated into the EMS Comprehensive Plan as they become available. Additional studies of this type should be commissioned as the need for them is recognized.

4.1.1 Study The Feasibility Of An Injury Prevention Demonstration Project

Regardless of how sophisticated and well equipped the EMS system is in the ARE, it will never equal the demands on it unless something is done to prevent injuries and sudden illnesses before they become candidates for emergency medical services.

A major component of the high rate of traffic injury and death problem is attitudinal. Injury and death rates would almost certainly decline sharply if both drivers and pedestrians observed elementary rules of traffic safety and if existing traffic laws were enforced. Even as simple a change as routine use of seat belts and headrests undoubtedly would have a measurable impact.

The underlying attitudes and habits are deeply ingrained, however, and it may not be possible to change them appreciably in the short run at reasonable cost. A demonstration project to test the feasibility of injury prevention could be implemented, however, at modest cost. If successful, it might point the way to an approach far more effective than continued expansion and upgrading of the EMS system itself.

At first glance, the fact that the problem is most severe in Cairo suggests that the demonstration should be done there. Any demonstration probably would be of limited effectiveness and efficiency, however, unless done on a community-wide basis, so Cairo is probably not the ideal initial demonstration site. It would be illogical, for example, to attempt stricter enforcement of traffic laws in only one part of Cairo, and almost any mass media campaigns would be difficult to focus exclusively on one section of the city.

Therefore, it would be more logical to select a smaller but still relatively urbanized city. The project should test various ways of inducing attitudinal changes. If effective and feasible ways are found, they probably could be replicated effectively in other cities in the ARE, including Cairo, and be modified only slightly for use in rural areas.

4.1.2 Conduct An Operations Research Study Of The Communications System And Ambulance Deployment

Over the last five years, the MOH, USAID, and other foreign donors have invested substantially in modern ambulances and a sophisticated communications system for the EMS Demonstration Project area (and in new ambulances for other areas of the ARE as well).

In the context of a demonstration project, these expenditures have been entirely appropriate. It is clear, however, that to expand this level of sophistication from the EMS Demonstration Project area to all of the ARE would be exorbitantly expensive. Merely to include all major Cairo hospitals would require, according to MOH preliminary plans,

installation of UHF base stations in 40 hospitals, at a cost of about US$300,000 each. A substantial number of ambulances also would have to be upgraded to UHF capability.

On the other hand, the most obvious alternative to upgrading the communications system--particularly in the rural areas of the ARE--is to increase the number and geographic dispersal of well equipped ambulances. Without a detailed analysis, taking into account such factors as the enormous traffic congestion in many areas of the ARE, it is difficult to know whether this alternative is more or less expensive as a way of providing any given level of response time capability, than further investments in communications equipment.

This identical problem has been of considerable concern to several major cities of the United States and other industrialized nations. Some of the most useful research on it has used the techniques of "operations research," in which a large number of alternative configuration and deployment schemes can be compared mathematically quite rapidly, and the relatives merits of various tradeoffs can be examined in detail.

Such a study is recommended for the ARE now. Although it would be premature to suggest here the detailed design of this study, it probably should examine the situations separately in Cairo, Alexandria, possibly two or three other major cities, and the rest of the ARE. The objective should be to determine, for each area, what combination of ambulances, deployment patterns, and communications capabilities would ensure response to a call for an ambulance within a designated time period (or possibly several levels of response time) at least cost.

The study probably should be limited now to consideration of general purpose ambulances and ambulance crews only. Technically, however, there is no reason why it could not be extended at a later date to consider various types of specialized ambulances and crews also, such as mobile cardiac intensive care vehicles.

Near the end of this study, it may be advisable to involve specialists in ambulance configuration and communications engineers. Two specific products of the work should be:

- A detailed plan for bringing the ambulance fleet in each governorate to a specified level of capability and readiness, and for keeping the fleet at that level over time

- A similarly detailed plan for EMS radio communications throughout the ARE, including provisions for communications links with other emergency services

In these later phases, it would be appropriate to consider also what contribution, if any, the use of helicopters might make to the EMS system in the ARE. Two conditions suggest that helicopters might be highly

advantageous (although possibly not cost-effective) in some situations: the extreme congestion in many parts of the ARE, making it difficult to move ambulances to emergency scenes rapidly, and the great distances in the thinly populated 96.5 percent of the land area of the ARE.

In this connection, it is nearly inconceivable that the EMS system itself could justify and support a medical evacuation helicopter service on its own. The obvious alternative is a cooperative agreement with the military services; reportedly, preliminary discussions have occurred on this subject, with a receptive attitude shown by the military.

As this subject is pursued, it is well to consider the experience of aeromedical evacuation services in other nations. A particular useful summary of ten years of experience in the State of Maryland, USA, appeared in a recent publication:

> "The Maryland Med-Evac Helicopter Program has proven that helicopters can be used effectively and efficiently to increase the survival of the critically injured or ill patient whose life is at the threshold of death. The survival rate is documented at eighty percent.
>
> The following conclusions have resulted through the ten years of experience:
>
> To be cost effective a Med-Evac helicopter must have mission responsibilities other than medical transport responses.
>
> A Med-Evac helicopter dedicated only to medical transport will increase costs ten fold.
>
> In order to offer an acceptable response time (ten minutes or less) to the incident scene, the helicopter must be airborne on routine assignment (patrol) when requested for a Med-Evac transport.
>
> The Med-Evac helicopter observer crews must complete superior training at a level far above the required surface ambulance training.
>
> The communications network must interface with all emergency resources and medical facilities, to include ambulances, fire departments, police departments, helicopters, hospitals, definitive care centers and specialty referral centers.
>
> The Emergency Medical Services Sytem vested with the responsibility for emergency medical care must constantly monitor and evaluate the Air Med-Evac operations in order to maintain the "Golden Hour Concept" of less than sixty minutes from incident to defnitive care.

- A Med-Evac Helicopter Program properly implemented will not only save lives but will also conserve medical manpower and resources and thus avoid costly duplication of services and training." (Aeromedical Evacuation, 1981)

The first three of these points underscore the importance of developing a helicopter medical evacuation service, if at all, only in cooperation with another organization such as the military, not solely as a MDH operation.

4.1.3 Conduct A Survey Of Emergency Departments And Reception Rooms

The MDH has embarked on an agressive program of upgrading emergency departments of larger MDH hospitals throughout the ARE. Plans for each project are approved at the highest level of the MDH, ensuring a reasonable degree of consistency and quality. This program is unquestionably as important as anything being done in the EMS area and is to be commended.

At the same time, a problem of possibly even greater urgency exists in the smaller hospitals, rural health centers and units, and ambulance stations, where large numbers of people are being treated. In some cases, it is quite likely that patients' health is threatened as much by the environment in which this treatment is provided as by the injury or illness that brought them to these facilities.

Clearly, these problems cannot all be corrected at once, and the costs and potential benefits of upgrading facilities throughout the ARE must be weighed against the costs and potential benefits of other health care, disease prevention, and injury prevention programs. A rational plan cannot be developed, however, without a specific idea of what must be done to bring up to an acceptable standard all facilities in which first aid and emergency medical services are provided, and the time requirements and costs of such a program.

To obtain such information, a representative sample of such facilities (possibly including all MDH hospitals) should be surveyed by a team of Professional Sanitarians, construction engineers, and physicians or nurses experienced in emergency medicine. In each facility visited, the team should determine what must be done to bring the emergency room or reception room up to the minimum level in which it is environmentally safe and adequately equipped to to render the level of emergency care appropriate to that type of facility, which would need to be established beforehand. The survey team should also estimate the cost of required renovation, equipment purchases, or other action. To document its findings, the team should collect bacteriological samples, photographs, and other suitable evidence.

As one facet of the survey, the team should determine how much of the problem in these facilities arises from lack of training of emergency department or reception room personnel in basic techniques of asepsis. If this is found to be a significant problem, as suspected, the team might enlarge its scope of work to include training a group of Egyptian physicians, nurses, and sanitarians as instructors of emergency department or reception room personnel--following the pattern already established in developing instructors of Essentials of Emergency Medicine.

The team should give some consideration also to the interaction of the outpatient department and the emergency department or reception room in each hospital. Emergency departments clearly are treating a large number of non-emergent cases, solely because the outpatient departments are open only a few hours each day. Would it be more cost-effective to reduce this emergency department load by extending the hours of the outpatient departments? Would it be feasible to do so, considering existing shortages of personnel? Could effective triage be established, so that the required care could be effectively provided in each case by the required level of provider, either in the emergency section or facility or elsewhere?

At the conclusion of its work, the survey team should develop a comprehensive plan, working with appropriate MOH officials, for upgrading emergency departments and reception rooms throughout the ARE over an appropriate time period--possibly five to ten years. Priorities should be established in this plan so that the most urgent problems, considering the seriousness of conditions and numbers of patients treated, are corrected first (a triage concept applied to health care facilities).

One concern that should be considered before the recommended survey is implemented is whether it should be limited to emergency departments and reception rooms. Where unacceptable conditions exist, they probably are not confined to these areas. The incremental cost of expanding the survey to include the entire facility in each visit might not be large. A conclusion as to the need for such an expansion is, however, beyond the scope of this assessment.

4.1.4 Evaluate The Cost-Effectiveness Of Centralized Equipment Maintenace

As noted earlier, one of the chronic problems of the hospitals visited is maintenance of laboratory and other equipment. This derives mostly from a shortage of qualified biomedical technicians, but it also relates to other problems such as shortages of spare parts.

It was also noted earlier that the Giza governorate has attempted a new solution to this problem through centralizing the maintenance of all types of hospital equipment at Boulah Dakroun Hospital. This is a promising approach, and it should be evaluated carefully, following a well designed evaluation plan. For example, the amount of down time for

each major type of equipment in each hospital served by the maintenance center should be recorded for a test period, and the costs of operating the center during that period should be determined. These results should be compared with the down time and cost experience of a similar group of hospitals in another governorate in which hospital equipment is maintained in the conventional manner.

4.1.5 Requirements And Alternative Approaches To Disaster Planning Should Be Studied

The complete lack of disaster planning in the ARE was noted earlier. In a nation as large and densely populated as the ARE, this is a serious omission.

Disaster planning is intrinsically a multiagency activity. At a minimum, it must be done collaboratively by officials reponsible for Emergency Medical Services, police, fire, and civil defense affairs. Logically, it should include the military also, but this is not always done because of political and security reasons.

A multiagency group such as this should be created in the ARE; the impetus might well come from the High Council for First Aid. The group should decide, in considerable detail, how responsibilities will be divided, how and by whom command will be exercised, what communications links will be used, what resources will be committed, and how each agency will support each other agency, in a wide variety of conceivable disaster situations. The situations might include, but not be limited to:

- Aircraft crashes
- Train wrecks
- Highway accidents with multiple casualities
- Major explosions
- Fires in high rise buildings or congested areas
- Building collapse
- Earthquakes
- Floods
- Military activities affecting civilian population

For each situation studied, a written plan should be prepared, endorsed by each agency involved, and distributed to all people who have a responsibility for some portion of the plan.

4.2 Expand And Upgrade Data Collection And Evaluation Efforts

A major stride forward has been made early this year in the implementation of new data collection procedures in the ambulances and participating hospital emergency departments of the EMS Demonstration Project. Early indications are that these new procedures are working well and are producing data of a higher quality and more readily tabulated than prior procedures.

If these early indications are confirmed, particularly as the newly available data are first analyzed and tabulated, the new procedures should be replicated in hospital emergency departments, reception rooms, and ambulance services throughout the ARE. This will involve more than just distribution of new forms, of course. Experience in the EMS Demonstration Project underscores the need for obtaining the genuine support of the directors and senior staffs of the hospitals and for training thoroughly the people who will be responsible for completing the forms. The enormous value of the data that can be derived from this system, however, readily justifies the required effort.

4.3 Continue Emphasis On Manpower Training And Utilization

Excellent progress has been made in the last three months in establishing an effective program for training EMS personnel of all types. The capability now exists to train such personnel to the Advanced Cardiac Life Support level. The important question now is whether the momentum established in this area can be maintained, and whether it can now have a direct impact at the operating level.

At this point, continuation of the program in two directions is recommended. First, ways should be tested of applying personnel newly trained in Advanced Cardiac Life Support (ACLS) to the use of the telemetry capability being established in the EMS Demostration Project area. As noted earlier, the most practical solution may be to station ACLS trained doctors in emergency departments near the stations where fully-equipped ambulances are based and sending these doctors on suspected cardiac calls. Other solutions should not be precluded, however, if they are proposed. The experience of the EMS Demonstration Project in this area should be evaluated carefully.

Until the results of this evaluation are available, further investments should not be made in equipping ambulances or hospitals with telemetry equipment, or in training additional people to the ACLS level.

The second direction recommended, of much greater apparent urgency, is to expand training in Basic Life Support as rapidly as possible to all ambulance personnel (including drivers), emergency department personnel, and reception room personnel who are not already trained to this level, then expand CPR training to receptive groups of first responders. Through this action, the lives of a great many more people in serious cardiopulmonary distress undoubtedly can be affected positively than through any reasonable short-term expansion of more sophisticated cardiac life support services.

Experimentation in one additional area related to manpower training and utilization should be initiated. Experience in other large EMS systems indicates that more efficient use is made of available resources if telephone operators and dispatchers in ambulance dispatching centers are trained in simple triage. To facilitate this, a standard protocol

for answering the telephone, with branching depending on the caller's responses, is provided to each person routinely receiving calls. Using this protocol, the telephone operator determines whether each call represents an authentic emergency; if not, the operator provides an appropriate referral to other sources of help, again following the standard protocol.

This approach should be tested on a small scale. The Alexandria ambulance headquarters may provide the most appropriate test site. If results are favorable, the approach should be extended immediately to the Cairo ambulance center and to any other locations handling a significant number of calls for ambulances each day.

4.4 Reexamine Expansion Of Specialized Critical Care Units

The appeal of sophisticated critical care units is undeniable. Indeed, this has been an area of dramatic expansion over the last decade in the medical systems of the most highly industrialized nations. It is often in the critical care units that the "miracles of modern medicine" take place. Lives are saved which unquestionably would have been lost without such units. The units provide research and training opportunities which may contribute greatly to improvement of the medical system overall.

In the ARE, critical care units are undergoing rapid expansion, too. Several comprehensive critical care facilities have recently been opened or are about to open. New emergency department facilities frequently contain burn units, ICUs, and CCUs. A neonatal project is spreading new neonatal care units throughout the nation. Egypt's first poison control center has become operational recently.

Although these specialized critical care units testify to the sophistication, aspirations, and vigor of the ARE medical system, their cost-effectiveness must be questioned. The issue is not whether the considerable investment in each unit is justified in the abstract sense, for any expenditure to save a single human life cannot be readily criticized. Rather, the issue is whether, in a situation of limited resources and high morbidity and mortality rates, the funds invested in these critical care units might not have a substantially greater impact on the health status of the nation if invested instead in preventive health programs and other forms of primary care.

With this concern in mind, restraint on further replication of critical care units is recommended until the performance and results of units already operational or about to become so are evaluated thoroughly and weighed against the potential benefits of investing the same funds in other types of programs, as suggested above. The evaluation should provide not only information about the cost-effectiveness of these units, but also insights into practical operating problems in these unique environments, such as the problems of attracting and retaining qualified nursing staffs and the problems of equipment maintenance.

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Appendix B(1)

LIST OF SITES VISITED

Ambulance Facilities

Cairo Ambulance Headquarters
Cairo Ambulance Satellite Station
Alexandria Ambulance Headquarters
Assiut Ambulance Headquarters
Manfalut Highway Ambulance Station
Aswan Ambulance Headquarters

Hospital Emergency Departments And Reception Rooms

Manfalut District Hospital, Manfalut
Nasser General Hospital, Shubra El Kheima*
Shubrah General Hospital, Cairo*
Ain Shams University Hospital, Cairo*
Ras El Tine General Hospital, Alexandria*
Goumhoureya General Hospital, Alexandria
Aswan General Hospital, Aswan*
Cairo University Hospital, Cairo
Hewamdelyah District Hospital, Hewamdelyah*
Boulah Dakroun General Hospital, Giza*
Alexandria University Hospital, Alexandria*

Burn Units

Nasser General Hospital, Shubra El Kheima*
Shubrah General Hospital, Cairo*
Alexandria University Hospital, Alexandria*
Cairo University Hospital, Cairo*
Boulah Kakroun General Hospital, Giza

Cardiac Care Units And Intensive Care Units

Ain Shams University Hospital, Cairo
Cairo University Hospital, Cair*
Boulah Dakroun General Hospital, Giza*

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* Under construction

Appendix B(2)

Poison Control Center

Ain Shams University Hospital, Cairo

Neonatal Units

Al Galla Teaching Hospital, Cairo
Boulah Dakroun General Hospital, Giza*
Cairo University Hospital, Cairo*

Miscellaneous

Police Academy, Cairo

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* Under construction

LIST OF PRINCIPAL PERSONS INTERVIEWED

Ministry Of Health

Dr. Mohamed Saad El-Din Fouad, First Undersecretary of State for Health
Dr. Abd El Ghaffar Khallaf, Undersecretary of State for Health for Manpower Development and Studies
Dr. Mahmoud Selim, Director of Emergency Medical Servies and Specialized Services
Dr. Sobhy Fahmy, Director, EMS Demonstration Project, Cairo
Dr. Shawky Nessem, Director, EMS Demonstration Project, Alexandria
Dr. Helmi El Baramawi, Director of Planning
General Amin Sabbour, Communications Consultant
Engineer Mohamed Hussein, Communications Consultant
Dr. Ibrahim Abd El Hamid
Dr. Hassan El Kalla, Director, Data Management and Statistics, EMS Demonstration Project

Governorates

Dr. Monir Nazir Risk, Director, Ambulance Services, Assiut
Dr. Nasein, Director, Ambulance Services, Aswan
Dr. Shawky Nessen, Director, Ambulance Services, Alexandria
Mahmud Selim, Director, Ambulance Services, Cairo

Other

Prof. Dr. Bahira Fahim, Professor of Toxicology, Ain Shams University
Dr. Farouk El Alfy, Director, Ain Shams University Hospital
Prof. Dr. Fayez El Tehami, Director, Neonatology Unit, Al Galla Teaching Hospital
Prof. Dr. M. F. Fathalla, Dean of the Faculty of Medicine, Assiut University
General Hossam Abdel Ghani, Deputy Director, Police Academy, Cairo
Major Charles L. Wright, U.S. Army Medical Corps
Major Paul Farineau, U.S. Army Nurse Corps

(Plus the Directors and selected professional staff members of the health care facilities listed in Appendix B)

Appendix D(1)

REVISED ESSENTIALS OF EMERGENCY MEDICINE SCHEDULE

Day One

0900-1100	Basic Cardiac Life Support
1200-1400	Practical session: 1-rescuer CPR; 2-rescuer CPR

Day Two

0900-1030	Initial assessment of the trauma patient
1030-1130	Basic EKG
1200 1400	Practical session: --infant CPR --obstructed airway, unconscious patient --obstructed airway, conscious patient

Day Three

0900-1000	Introduction to the use and administration of intravenous solutions
1000-1100	Introduction to the Emergency Medical System
1200-1300	Hemorrhagic shock
1300-1400	Shock (anaphylactic, cardiogenic, septic)

Day Four

0900-1000	Introduction to ACLS and airway
1000-1100	Dysrhythmia recognition
1200-1300	Myocardial infarction
1300-1400	Sudden cardiac death

Day Five

0900-1100	Cardiovascular Pharmocology I
1200-1400	Practical session--ACLS stations: 1. Airway and adjuncts 2. Dynamic EKG 3. Intravenous lifelines 4. Static EKG and therapeutics 5. Defibrillation

Day Six

0900-1100	Cardivascular Pharmocology II
1200-1400	Practical session--ACLS stations: (as on Day Five)

Appendix D(2)

Day Seven

0900-1030	Acid base balance (including how to draw arterial gases)
1030-1130	Resuscitation of infants and children
1200-1400	Practical session--ACLS stations: (as on Day Five)

Day Eight

0900-1000	Head trauma
1000-1100	Spinal trauma
1200-1400	Practical session: --cervical collar --improvised cervical collar --long and short spine boards

Day Nine

0900-1000	Thoracic trauma
1000-1100	Extremity trauma
1200-1400	Practical session: --air splints --care traction spint bandaging --transportation

Day Ten

0900-1000	Abdominal trauma
1000-1100	Coma
1200-1300	Burns
1300-1400	Drowning and near drowning

Day Eleven

0900-1000	Emergency childbirth
1000-1100	Intravenous and invasive techniques
1200-1400	Practical session: --central venous pressure manometer --intravenous infusion trainer --MAST trousers

Day Twelve

0900-1100	General approach to poisoning
1100-1200	Radiocommunication and telemetry
1300-1400	Practical session: radio

Appendix D(3)

Day Thirteen

0900-1000	BCLS written test
1000-1100	Integration of BCLS and ACLS
1200-2200	Integration of BCLS and ACLS

Day Fourteen

0900-1100	ACLS station testing
1100-1400	ACLS written test

Day Fifteen

0900-1100	Essentials of Emergency Medicine written test

Appendix E(1)

MEMORANDUM ON THE INTENSIVE CARE CENTER IN CAIRO UNIVERSITY HOSPITALS

The Intensive Care Center in Cairo University Hospitals is considered one of the most up to date centers in the ARE. It is the first and biggest complete unit for treatment of emergency cases in all the required fields of specialization. It includes a general intensive care unit consisting of 10 beds distributed between surgery, neurosurgery, and abdominal, besides a coronary care unit consisting of six beds, an intermediate care unit of four beds, and a dialysis unit of two beds. It also includes two laboratories, one of which is a main lab and the other an auxiliary one, both working on a 24-hour basis to carry out all required chemical analyses.

The Center also includes a heart catheter with a radiotherapy apparatus (Philips Model 500 amp. cap.) and a recording unit with 12 channels for heart electrophysiological studies. A cardiogenic shock unit is also provided that contains an aortic balloon pump for treatment of cardiogenic shock cases, and a computer set.

Accordingly, the Center is equipped to receive and treat patients in need of intensive care and in cases of failures of different body organs, heart attacks, irregular heart beat, electrocardiogenic shock, assessment of blood pressure within heart chambers using mobile apparatus capable of carrying out all this right at the patient's bedside.

The Center is also capable of undertaking a high standard of research on emergency cases, as it has the apparatus necessary for this work.

The Center was built on an area of 1,400 square meters at the old reception part of the Manial University Hospital, after it had been rearranged and centrally air conditioned. It also now incorporates an independent unit for gases, a sterilization center, a room for developing X-rays, a library, a lecture hall, a mosque, and a self-service cafeteria. The Center works on a full 24-hour basis.

Feasibility studies for this project occupied one year. The first step in its execution was during the time when Dr. Hassan Hamdy was Dean of the Faculty of Medicine, when the sum of US$100,000 was transferred from the World Health Organization to buy medical apparatus for the Center. Engineering work started January 1, 1979, and was completed January 1, 1982, i.e., occupied three years, and was done by one of the

public sector companies. Total expenditure on the project amounted to L.E. 940,000, covering sums included in 1976, 1977, 1978, 1979, and 1980 budgets, apart from money contributed by hospitals; total expenditures covered L.E. one million.

Seven resident doctors work at the Center, in addition to a group of specialists in various fields: 25 graduates of the Higher Institute for Nursing, 16 nurses, four B.Sc. graduates as lab assistants, four engineers, 12 ordinary laborers, and the secretariat employees.

As the year 1982 starts, a wave of hope and optimism is felt that the Center wil meet all expectations attached to it.