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on Military Forces and Personnel,
Committee on Armed Services,
House of Representatives

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OPERATION DESERT STORM

Problems With Air Force Medical Readiness





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The Honorable Ike Skelton
Chairman, Subcommittee on Military
Forces and Personnel
Committee on Armed Services
House of Representatives

Dear Mr. Chairman:

At the request of the former Chairman, we reviewed the capabilities of the Air Force medical units that supported Operations Desert Shield and Storm. Specifically, we determined whether (1) Air Force medical and evacuation units were prepared to perform their assigned missions and (2) the Air Force's system for staffing medical and evacuation units was effective. In addition, we examined efforts to change medical operations in response to the Air Force's lessons learned. We have issued similar reports on the preparedness of Army and Navy medical units.¹

Background

Broadly stated, the Air Force medical mission during Operations Desert Shield and Storm was to provide in-theater combat medical trauma care and aeromedical intra- and inter-theater evacuation.² In addition, as the lead service for joint regulating, the Air Force was to provide a communications system that regulated the movement of patients to appropriate medical facilities.

Tasking requirements for Air Force participation in Operations Desert Shield and Storm were based on casualty estimates provided by the U.S. Central Command Surgeon's staff. To set these requirements, the staff considered factors such as the nature and duration of the operations planned, expected combat intensity and casualty rates, estimates of disease and nonbattle injuries, evacuation policy, and types and capabilities of medical units available. Specific tasking was forwarded to Air Force commands and agencies, which in turn determined how personnel would be mobilized and deployed.

¹Operation Desert Storm: Full Army Medical Capability Not Achieved (GAO/NSIAD-92-175, Aug. 18, 1992) and Operation Desert Storm: Improvements Required in the Navy's Wartime Medical Care Program (GAO/NSIAD-93-189, July 28, 1993).

²The Air Force is charged with the responsibility for the movement of patients by fixed-wing aircraft for all services. However, within the combat zone, the Army moves the bulk of patients from the battlefield to collection points.

In response to the theater command's tasking, the Air Force provided a medical force of about 11,700. It included 4,800 personnel (2,300 active duty and 2,500 reserves) for in-theater operations and 6,900 personnel (3,900 active duty and 3,000 reserves) deployed to Europe to support the aeromedical evacuation system and the hospitalization of patients. Troops sent to Europe were needed to receive, care for, and prepare patients for movement back to the United States.

In appendix I, we describe the Air Force system used to provide medical care and explain the organizational structure used in Operations Desert Shield and Storm.

Results in Brief

The medical and evacuation units requested by the U.S. Central Command and provided by the Air Force would not have been sufficient to handle the large number of predicted casualties. Further, even though the units had to treat fewer casualties than were predicted, the units still experienced difficulty accomplishing their mission. Deployed units did not have enough or the right mix of personnel; supplies were often incompatible with the equipment, missing, or outdated; many personnel were not appropriately trained; and the system used to regulate the movement of patients did not function adequately. Steps to improve the Air Force's ability to provide wartime medical support have been recommended in numerous unit after-action reports and lessons learned submitted by major commands. We did not evaluate the recommendations contained in these reports. However, Air Force officials believe that after the approved recommendations are implemented, the Air Force's ability to deploy in the future will be improved significantly.

The Air Force's system of forming teams to meet staffing requirements was problematic. Specifically, Air Force personnel we interviewed stated that the system was biased and promoted short-term degradation of unit cohesion. Also, several after-action and lessons-learned reports discussed low troop morale and other problems that were associated with this system and recommended changes to it. Air Force officials believe that this issue will be resolved through better education and training at the unit level.

Units Would Have Had Difficulty Handling the Predicted Number of Casualties

Three factors could have prevented the Air Force from adequately caring for, evacuating, and regulating the predicted number of casualties. First, the units were given missions by the theater command that they were not designed, staffed, or equipped to perform; even at authorized levels, many units lacked the necessary composition of medical specialists. Second, the units were burdened with supply and equipment problems. Third, many of the medical personnel had not been adequately trained for deployment conditions.

Units Undersized for Assigned Missions

Our interviews with over 150 active and reserve officers and enlisted personnel from selected organizations support the view that it was impractical to expect the units, at their authorized levels of deployment, to treat, evacuate, and regulate the predicted number of casualties.³ This view is also supported by the various Air Force after-action and lessons-learned reports we examined. What follows are examples of concerns expressed in these interviews and reports:

- An official located at an aeromedical staging facility stated that her staff was not sufficient to handle the facility's projected casualty rate of 250 to 500 patients per day.
- A decontamination team member told us that his team could not have handled the projected casualty flow and gotten adequate rest and recuperative time. An after-action report from another location also described this same concern.
- Aeromedical evacuation liaison teams, which had one medical service corps officer and two radio operators, were expected to provide 24-hour service. Air Force officials we interviewed stated that this was not possible without severe degradation of capability.

Unit composition was reported to be a problem for the Air Force. According to an after-action report from the theater air evacuation squadron commander, the full range of specialists required to adequately support the large-scale operation expected by theater command was not available. He reported that many of the people operating the control center did not possess the necessary skills. As a result, medical service corps officers were required to manage communications operations, flight nurses were assigned to medical logistics assignments, aeromedical technicians performed administrative and transportation duties, and

³A single numerical figure of total predicted casualties cannot be given because the U.S. Central Command Surgeon staff's estimates varied by unit. For example, predicted casualties for an aeromedical staging facility ranged from 250 to 500 per day. On the other hand, predictions for the evacuation of patients out of theater ran as high as 2,500 per day.

aerospace ground personnel performed many civil engineering functions. In another report, a physician reported that physicians were not always on evacuation flights involving fixed-wing aircraft because they were not considered an integral part of the flight crews. The physician reported that personnel evacuated from the front lines on fixed-wing aircraft experienced changes in condition during the flight and needed qualified physicians to deal with these changes.

During the 6-month buildup period of Operation Desert Shield, the Air Force experienced unexpected staffing problems because of the need to treat a large number of noncombat-related illnesses. The proper mix of professional medical staff and support personnel was not always readily available in the air transportable hospitals to treat these illnesses. For example, there were not enough gynecologists to support the women that had deployed. Also lacking were orthopedic doctors and technicians. Officials we talked with at air transportable hospitals commented that many people from all services incurred bone, joint, ligament, and tendon injuries that required orthopedic care.

The Air Force experienced a number of noncombat-related illnesses among medical personnel in part because health and fitness standards were not closely scrutinized during the call-up and deployment periods. Both active and reserve officials pointed out that reserve and national guard medical personnel generally were not screened and disqualified because of unsuitable medical, physical, or mental fitness. For example, there were several reports of personnel being deployed to the theater with pre-existing medical conditions significant enough to require return to the United States. According to doctors and other hospital officials we interviewed, a number of medical personnel would not have been physically able to carry numerous casualties on litters through the sand in a heavy casualty flow.

Inadequate Supplies, Equipment, and Logistic Systems

Typical supply- and equipment-related problems that could have hindered the Air Force medical units included aircraft, equipment, and supply shortages; the reliance on prepositioned stocks; use of the inefficient single-item manager system operated by the Army; safety problems inherent with the use of outdated medicines and supplies; incompatibility between some supplies and associated equipment; and the unavailability of certain equipment parts that would have hampered the repair and maintenance process.

An Air Force after-action report by the commander of the theater aeromedical evacuation squadron stated that the predicted flow of casualties would have overwhelmed the aeromedical evacuation system because not enough aircraft were allocated to evacuate patients. Planning estimates made in December 1990 called for moving up to 2,520 patients per day out of the theater on 28 aircraft with each carrying 90 patients. According to the author of this report, although 28 aircraft were needed, the theater commander could not commit more than 15 a day for these missions because of other demands. Consequently, there existed a potential daily shortfall for 1,170 patients. An official from the Air Force Surgeon General's office told us that other aircraft would have been available had they been required. However, even if aircraft had been available, it is not apparent that the evacuation problem would have been solved because, according to the in-theater squadron commander, shortfalls existed in crews and in-flight evacuation equipment.

In addition, Air Force hospitals and those of the other services did not have the people or equipment to fulfill an Air Force requirement intended to protect patients needing dedicated care during evacuation flights. Under this requirement, a hospital unit sending a patient needing constant attention had to provide an in-flight medical attendant and any needed specialized equipment, such as ventilators and cardiac monitors.

A critical shortage of aeromedical evacuation kits would have hindered patient movement missions.⁴ According to an in-theater deputy squadron commander we interviewed, the number of strategic evacuation kits available at the outbreak of hostilities would have only supported the system for about 2 days. The primary reason for this shortage was that units deploying to Southwest Asia were ordered not to take the kits with them because the leadership believed that prepositioned kits and new ones expected to be assembled and forwarded would be adequate. However, the deputy commander doubted the supply generated from these sources would have been sufficient to keep pace with expected patient flow. An after-action report supported the commander's position. The report stated that the only air medical equipment available for the first 4 months was the equipment brought by the air crews. Also, a lessons-learned report by the Air Force Reserve Command stated that critical items issued to aeromedical evacuation forces were not usable because the items had not been properly maintained and they were not

⁴These kits contain the medicines and supplies that the medical evacuation crew needs to take care of patients while in the air. Items generally include pain killers, dressings, fluids, syringes, linens, and a cardioscope. There is usually one kit per plane. The makeup of the kits varies slightly according to the mission—strategic (inter-theater) and tactical (intra-theater).

based on current approved lists of allowable equipment. This report described the program at that location as "a major medical disaster."

The Operation Desert Storm experience showed that prepositioned medical supply and equipment packs were not appropriately managed and updated. According to officials at one air transportable hospital, their hospital was relocated and, therefore, had to be set up a second time. Each time the hospital was set up it used a different prepositioned package of supplies and equipment. Even though the first package had only been in place since September 1989, no apparent attention had been given to the management of equipment and perishable supplies. Equipment was missing, batteries had exceeded their storage life, critical chemicals for lab areas were missing, and medicines and supplies were outdated. The second package was much newer and had been sent to Southwest Asia after the outbreak of hostilities. This package was also deficient, lacking such items as ventilators, cardiac monitors, and microscopes. An official at another hospital told us that his hospital had to spend about \$1.5 million on local purchases to obtain or replace needed items. About half of this amount was used to replace items in its prepositioned package.

To facilitate the resupply of medical units in-theater, the Army was designated the single-item manager for medical supplies in November 1990. In this capacity, the Army was expected to support medical supply requirements for all military services. However, supply support was not adequate for or entirely compatible with the needs of either the Navy or the Air Force.⁵ For example, according to Air Force personnel, the Army system was overwhelmed by the number of requisitions it received, and the supplies it received from the United States and Europe were not separated by service or stored in an efficient manner. An after-action report from the contingency hospital stated that the time required to fill requisitions averaged 3 weeks; the report concluded that the resupply system was unresponsive. After the Air Force provided its own logisticians to assist the Army in processing requisitions, delivery time was reduced to about 4 days.

⁵In the case of the Navy, inadequate communications and the incompatibility between the Navy's automated supply system and the Army system resulted in order and shipping times being increased significantly. In addition, the hospital ships were equipped with many items not common to the other operational medical units and not included in the Army's supply system. Consequently, the Navy was able to obtain only about half of its supplies from the Army's single-item manager. See Operation Desert Storm: Improvements Required in the Navy's Wartime Medical Care Program (GAO/NSIAD-93-189, July 28, 1993), p. 9.

Medical personnel we interviewed stated that, in many instances, intravenous fluids and sterile and pharmaceutical items had expired before they were needed for use. In order to quickly replace these items, emergency requisitions had to be placed and, in some cases, these outdated items were used to treat patients. For example, one hospital's dental unit had to use expired anesthetics. To compensate for the deterioration of the drug's potency, hospital officials stated that they increased the dosage that they gave patients. In another case, hospital personnel used expired intravenous fluid because they were told it was safe. One hospital refused to use outdated supplies and submitted emergency requisitions for these supplies and purchased some locally.

Air Force hospitals were faced with incompatible supplies and equipment. Laboratory officials at one hospital said that they found lab chemicals in their prepositioned pack that could not be used with available laboratory equipment. Some chemicals dated back to the 1950s and others were missing. For example, some prepositioned packages had chemicals unsuited to run tests through analyzers. One hospital's after-action report cited different items of laboratory equipment that were never used due to the lack of proper chemicals. Also, in some cases, X-ray film coming through the supply system was incompatible with the hospital's existing X-ray equipment. When the supply system failed to provide needed materiel, efforts were made to procure these items in the local market. If that failed, the laboratories either had to use available materials or transfer patients to facilities with adequate capability.

Equipment technicians lacked certain tools and parts needed to keep hospital machinery maintained and repaired. According to officials at one air transportable hospital, they lacked key items of maintenance equipment such as an oscilloscope—a diagnostic tool for identifying and correcting problems with equipment. However, the officials told us that even if the oscilloscope had been available they would have still had problems because many essential items were missing from tool kits needed to make repairs. Officials at a second hospital stated that spare parts needed to keep equipment (such as X-ray machines) operating smoothly were difficult or impossible to obtain from any source.

Inadequate Training

Medical support personnel of active and reserve units arrived in theater with only limited training in their medical specialty to fulfill the assigned missions or cope with their new environment. The medical teams that deployed to Operations Desert Shield and Storm, in some cases, were

staffed with persons whose specialty skills were not current. For example, hospitals had a number of senior active and reserve component nurses that had been involved in administrative functions and had not maintained their proficiency as nurses. Nevertheless, they deployed to provide primary nursing skills. We were told that it took time for people in these situations to retrain and regain their proficiency. In addition, according to an official at the Air Force contingency hospital, many enlisted reservists had unrelated civilian occupations and were not proficient in their military skills prior to deployment. An after-action report stated that many aeromedical evacuation crew members had not flown actual missions or were not familiar with certain types of aeromedical evacuation equipment.

Further, prior to deployment, base level exercises were often too short and not much attention was given to the condition of equipment used for training. Some bases lacked essential equipment to provide adequate training. Officials at one hospital stated that during training exercises, only a very small portion of the hospital—about three temperature-controlled tents—was set up and not all associated items of field equipment were used or tested. Two after-action reports from one hospital stated that use of more realistic annual training exercises could have avoided the hospital's internal operational problems during deployment. One of the reports recommended that all personnel assigned to deploy exercise with the hospital during set-up and operations.

As was the case in the other services, the air transportable hospitals were supplied with older generations of medical equipment. Consequently, many medical personnel had not seen or used this equipment in many years. For example, personnel from all of the units we visited stated that extensive training on the hospital equipment was obtained in-theater. The chiefs of laboratory services at two hospitals told us that their technicians taught themselves to operate equipment contained in the prepositioned packs.

Because there were no chemical warfare casualties in Operation Desert Storm, the ability of the Air Force's decontamination teams and associated health care capabilities was not tested. Once in the desert, the decontamination teams conducted training exercises to train inexperienced members and refresh the skills of existing members. For example, we were told by one member of a decontamination team, who had no prior decontamination training, that personnel became proficient by participating in the many drills and exercises held during Desert Shield. As the chemical threat lessened, team members were released either to

their specialty tasks such as public health, environmental engineering, or dental unit duties or assigned to other positions, such as security and perimeter guards.

System for Regulating Patient Movement to Available Medical Facilities Was Inadequate

Several factors caused patient flow problems and resulted in the ineffective use of hospitalization and evacuation assets. First, joint regulating officials were not involved in directing the movement of all patients; rather their span of control was limited to those patients moved by Air Force aircraft. Second, communications problems occurred both inside and outside the theater, which inhibited system efficiency. Third, computer systems used by joint regulators could not be adequately integrated, so the systems operated in the more time-consuming peacetime mode.

Span of Control

The joint medical regulating system was to serve a traffic management function designed to direct casualties to appropriate sources of care to facilitate patient flow and optimize the use of hospitalization and evacuation assets. This function is essential when numerous treatment facilities are available. The European Command's Joint Medical Regulating Office in Germany and the Armed Services Medical Regulating Office in United States were to carry out this function for patients moved out of the theater.

The theater command established a Joint Medical Regulating Office and two area suboffices to coordinate the movement of patients in-theater and provide information to the regulating offices in Germany and the United States for the movement of patients out of the theater. These in-theater offices—referred to as joint regulators—were responsible for maintaining information on the status and capability of all medical facilities in theater, determining the medical facility best capable of receiving specific casualties, and coordinating requests from medical facilities for the movement of patients.

However, in compliance with the command's procedures, the joint regulators only regulated patients that were evacuated by Air Force fixed-wing aircraft. Most in-theater moves between two Army or between two Navy medical facilities were made without informing the joint regulators. Neither were they informed of any ground movements of Air Force patients between Air Force medical facilities. According to one official involved in the joint regulating operation, the way joint regulators

knew about patient movements was by reading the daily bed count reports. As a result, the regulators were getting information after the fact and not controlling the movement of patients.

Communications

The plan for regulating patient movement assumed that the joint regulators would maintain direct contact with other types of regulating units (Air Evacuation Control Centers, Air Evacuation Liaison Teams, etc.) that supported the evacuation process and with the Air Force's airlift control center, which furnished evacuation transportation. Also, direct contact was required with all the services' medical headquarters units, hospitals, ambulance units, and individual ambulances (both air and ground).

According to officials responsible for medical evacuation of all three services, communications problems were the biggest limitation they had to overcome. Troops in the battlefield could not communicate with ambulances, and ambulances had difficulty communicating over long distances. As we stated in our report on the Army's medical operations in the Persian Gulf,⁶ ambulances often could not communicate more than 15 miles away, even though conditions required communicating distances 10 times that range and more. Thus, ambulance crews had great difficulty efficiently talking to any regulators or hospitals and took patients only to the hospitals whose locations they knew. Unfortunately, these hospitals were not always the ones best suited to the ailments of the patients.

Service hospitals had difficulty communicating with anyone. As previously reported, patients would arrive at hospitals without notification from the medical regulator or the ambulances. Air Force hospital officials experienced similar problems; they did not know who was coming and could not adequately prepare for the patients and ensure that the correct specialists were available when patients arrived.

The primary joint regulating office in theater had difficulty contacting and maintaining communications with its area suboffices and with its counterpart in Europe. For example, a lesson-learned report from the Air Mobility Command stated that communications problems resulted in 43 percent of the patients' arriving at the wrong airports and being rerouted to appropriate medical facilities.

⁶Operation Desert Storm: Full Army Medical Capability Not Achieved (GAO/NSIAD-92-175, Aug. 18, 1992), pp. 45-9.

Computer Systems

Each of the services had its own specifically designed computer systems. The incompatibility of these individual systems severely limited the services' ability to communicate with one another during the war. For example, a lessons-learned report on contingency automated medical regulating discussed the complications of using multiple computer systems to regulate patients' movement. The report stated that rigidly designed systems do not accommodate changing requirements or procedures that deviate from the original system design.

Attempts to operate the wartime patient regulating system failed. The joint regulators had two computer software programs available to them for regulating patients: one for peacetime and the other for wartime.⁷ When regulating officials in Southwest Asia tried to convert to the wartime program on the first day of the ground war, they were unable to communicate with regulators in Europe. According to an Air Force after-action report, the European office did not try to convert to the wartime program until the fifth day after the ground war had started. Eventually, regulators came to rely solely on the peacetime program because they could not adequately establish a wartime software interface between the European and in-theater automated systems.

The peacetime program proved to be slow and unreliable. The Air Force after-action report on contingency automated medical regulating stated that, with the exception of contingency medical regulating exercises conducted during Operation Desert Shield, the Air Force used the peacetime format exclusively. This format takes about 30 seconds to transmit one patient record using the dial-up computer link to Germany, not counting initial log-on and identification procedures. Anytime during the telephone connection it was very possible (and usually probable) to lose the line and the transmitted data. It often took regulators 30 minutes or longer to dial and establish a connection through the international commercial telephone system. According to the report, it was easily demonstrated that it was next to impossible to transmit data on the projected number of patients through the peacetime program.

⁷The peacetime program required that almost 100 fields of data (such as medical diagnosis, medications, medical history, etc.) be kept on each patient. The wartime program basically required only data on the number of patients and the type of injuries each one had. These injuries could be classified by one of eight medical categories.

System for Forming and Deploying Medical Units Adversely Affected Troop Morale

Although Air Force personnel had trained as if they would deploy as functional units, they did not go to war that way. Instead, before deployment individuals were put on medical teams that were put together to form new units in theater.

Unit officials we interviewed stated that this system did not consistently provide personnel who were best qualified to serve on teams. For example, upon receiving a staffing request, reserve units assigned individuals that unit leadership considered to be the best for the assignment. These officials stated that after the second or third request, they were to the point of just trying to identify anyone who was available. The result was that teams formed and deployed later lacked the knowledge and experience of the teams formed earlier. These officials told us that mixing and matching personnel had an adverse effect on morale.

This opinion is supported by after-action and lessons-learned reports submitted regarding this situation. For example, one in-theater unit's after-action report stated that, by dividing the originally formed reserve unit, the Air Force destroyed both the formal and informal leadership and group dynamics of the unit. This condition led to an environment of distrust and created, among the personnel, a sense of being abandoned by the leadership of the unit and the reserves.

Many individuals we talked to said that breaking up pre-existing units had an adverse effect on people that were suddenly faced with having to go into a combat zone. Also, they believed that the selections made to form certain teams were biased. For example, it was perceived by some that certain people who did not want to deploy were not selected even though they seemed to be the most logical candidates for particular teams. On the other hand, others were selected with no apparent criteria applied. Still others felt that certain people were selected to deploy as punishment for past activities and personality conflicts. Although it is difficult to prove the validity or extent of these problems, the system of calling up selected individuals rather than units can invite bias or the perception of bias.

An Air Mobility Command lesson-learned report concluded that personnel should serve in the units they trained with rather than in newly formed units for morale purposes. The report stated that there would be fewer management problems under unit deployment. The report states simply "train together and deploy together." Air Force officials believe that the cohesion problems brought about by the Air Force's system of selecting

teams to form units will be resolved through better education and training at the unit level.

Initiatives to Implement Lessons Learned May Improve Response to Future Contingencies

The Air Force has taken steps to improve its ability to provide better overall wartime medical support to its troops. Unit reports officially yielded 233 lessons-learned reports describing problems associated with all phases of medical activities. These reports flowed to the Air Staff-Surgeon General through Air Force major commands from units in the field. After reviewing the lessons learned and removing duplicates and nonmedical subjects, the Air Force considered 140 to be of primary concern. As of May 21, 1993, 79 lessons were closed with action completed, corrective action had been identified for 52, and 9 still had action pending. Air Force officials believe that after implementation of the recommendations from these lessons learned is complete, the Air Force's ability to deploy in the future will be improved significantly.

Twenty-seven lessons learned concerned mission-related issues dealing with subjects such as individual and unit qualifications and mobilization. Types of remedial actions addressed included reconfiguration of medical units as to specialty and size, changes to the reporting responsibilities for aeromedical staging facilities, and policy changes to enhance medical teaching quality. Action had been completed on 17, 9 were in progress, and 1 had no corrective action identified.

Thirty-four logistics deficiencies were identified, which included shortages in prepacked and prepositioned supplies and equipment, lack of sufficient air evacuation kits, and dated medical supplies. Suggested improvements included taking periodic inventory and making quality assessments of war reserve materiel, providing security for certain medications, and reviewing hospitals' inventory lists to ensure the proper items are available in adequate amounts. Action has been completed on 20 of these initiatives, 13 are still in process, and 1 requires identification and implementation of a corrective action.

Twenty-one lessons learned addressed deficiencies associated with training on equipment, specialty skill proficiency, and battlefield preparedness. Types of training suggested included combat medical operations, primary skills refreshers, and battlefield sanitation management. Officials indicate that action has been completed on 7 of these initiatives, 11 have corrective action identified, and 3 still require identification and implementation of corrective action.

Six lessons learned related to issues dealing with regulating patient movement to appropriate facilities. The types of actions suggested include combining agencies to integrate patient regulation and flow and improvements in tracking patient movement. Action has been completed on 1, 4 are in progress, and 1 has no corrective action identified.

Thirty-two initiatives addressed ways to improve the Air Force's ability to deploy. These primarily dealt with activation procedures, health and fitness standards, records management, transmission of deployment information, and reserve human resource management. The types of deployment improvements the Air Force foresees include regular updates of changes in a service person's skills, standardizing active and reserve exemptions, enforcing medical condition and fitness standards, and improved management of a deployed medical provider's training and medical records. According to Air Force officials, 21 of these items have been closed because satisfactory action has been taken, corrective action has been identified for 10 initiatives, and 1 is still being considered.

In addition to the initiatives relating to issues discussed in this report, the Air Force is working on 20 other lessons learned dealing with inadequate command, control, communications, and blood supplies. Of these lessons learned, 13 items have been closed, corrective action has been identified for 5, and 2 still need action to be taken.

Agency Comments

Comments provided by the Department of Defense dealt primarily with technical accuracy and clarification. We have made changes to the report, as appropriate, based on these comments. The Department did not disagree with the report's primary findings and conclusions.

Scope and Methodology

We focused our review on Air Force medical and evacuation units that deployed in support of Operations Desert Shield and Storm. We selected Air Force medical and evacuation organizations and units that provided teams that formed combat medical units in theater and in Europe. The organizations we visited were not selected statistically; however, our selection represented a cross-section of deployed units. A complete listing of locations we visited is in appendix II.

The organizations that we visited supported three air transportable hospitals, one contingency hospital that operated in theater, two aeromedical staging facilities (fixed and mobile), three decontamination

teams, and two aeromedical evacuation squadrons. These included both active and reserve component units.

We interviewed active, reserve, and national guard personnel, including command staff, physicians, nurses, medical technicians, logisticians, maintenance, and administrative representatives. We also interviewed Air Force medical command officials at headquarters and Air Combat, Air Mobility, and Air Training Commands.

We examined documents including unit contingency support plans, mobility rosters, deployment rosters, regulations, instructions, and training plans. Additionally, we reviewed after-action and lessons-learned reports compiled by medical units and major commands operating in the Persian Gulf War but did not evaluate the proposed corrective actions contained in them. We conducted our review from April 1992 through September 1993 in accordance with generally accepted government auditing standards.

We are sending copies of this report to the Chairmen of the House and Senate Committees on Armed Services and on Appropriations, the House Committee on Government Operations, the Senate Committee on Governmental Affairs, the Secretary of Defense, the Secretary of the Air Force, and other interested parties upon request.

Please contact me at (202) 512-5140 if you or your staff have any questions concerning this report. Other major contributors to this report are listed in appendix III.

Sincerely yours,



Mark E. Gebicke
Director, Military Operations
and Capability Issues

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Air Force's System for Providing Medical Care

To manage combat casualties, the Air Force divides its in-theater medical care into four levels (or echelons). The Air Force's organizational structure that supported these echelons during Operations Desert Shield and Storm extended from the forward edge of the battlefield to the continental United States. What follows is an explanation of the four echelons and the organizational structure intended to support them.

Four Echelons of In-Theater Medical Care

The Air Force distinguishes between the four echelons by the level of care provided rather than by the size or structure of facility involved. As the echelon of care increases, so does the level of capability provided at a given facility. The goal of the medical care system is to treat casualties at the lowest level possible and return the personnel to duty within a prescribed time frame.

The first echelon of care is provided at or near the site of the injury. Provided by nonmedical personnel, the care consists of (1) the basic first aid necessary to return a person to duty and (2) emergency life-saving procedures sufficient to stabilize a patient for evacuation to the second echelon of care.

The second echelon of care is the first level at which treatment is provided by trained medical personnel. The goal at this echelon is to rapidly return the minimally injured patient to duty and stabilize the more seriously injured patient for transport to the third or fourth level of medical care. Treatment includes resuscitation; examination; emergency or lifesaving measures; continual observation and care to ensure that the airway remains open, bleeding is controlled, and shock and further injury are minimized; care of disease and nonbattle injuries; and care of combat stress.

The Air Force provides the third echelon of care in air transportable hospitals. This echelon is the first to provide inpatient medical care including resuscitative and definitive health services and hospitalization. At this level, injured personnel are given extended evaluation and treatment in theater.

In the fourth echelon, the patients receive definitive, comprehensive medical care in an in-theater contingency hospital. This hospital is the final in-theater stop for patients with medical conditions that do not permit them to return to duty within the time allowed by evacuation policy. From this hospital, casualties are either returned to duty following

convalescence or strategically evacuated to hospitals in Europe and the United States.

Organizational Structure Intended to Support the Four Echelons

Air Force medical personnel were organized according to the basic functions of providing in-theater combat medical trauma care, supporting the aeromedical evacuation of injured personnel, and regulating patients' movement.¹ The personnel responsible for performing these functions were selected and organized into medical teams. Referred to as unit type codes, these teams were made up of personnel or a package of equipment required to perform specific wartime missions. The teams cared for patients from all services.

In-Theater Combat Medical Trauma Care

Medical personnel were assigned to 15 air transportable hospitals, 1 contingency hospital, 14 patient decontamination teams, 1 patient retrieval team, and 3 blood transshipment centers.

The 15 air transportable hospitals were 50-bed facilities that were to provide second- and third-echelon trauma care. They were primarily deployed to Southwest Asia in support of the fighter wings. These hospitals were supposed to be capable of providing resuscitation, emergency care, initial wound surgery, splinting or casting of fractures, pre- and post-operative intensive care, and limited specialty care in the fields of orthopedics, dentistry, and other specialties. Since fighter wings are generally away from the battle lines, the air transportable hospitals tend to be in the rear areas. Staffing can vary depending upon the type of specialty care required. Typical personnel would include medical service corps officers, general practitioners, surgeons, nurses (for emergency, operative, and convalescence care), pharmacists, dentists, laboratory technicians, bioenvironmental engineers, medical technicians, equipment repair people, mental health specialists, radiological specialists, administrative specialists, and logisticians.

The in-theater contingency hospital provided by the Air Force during Desert Storm was a 250-bed facility with nearly 400 staff providing third- and fourth-echelon hospital care. The facility's services were more definitive and comprehensive than those intended to be provided by the air transportable hospitals, and the staff could provide more surgical subspecialties. The patients sent to this hospital were more severely injured and generally required more time to heal. Patients either returned

¹The Air Force is the lead service for jointly regulating the movement of patients.

to duty following convalescence at this hospital or were strategically evacuated. Also, the hospital provided other specialties that an air transportable hospital may not have.

Fourteen of the 15 air transportable hospitals had a patient decontamination team. It was the responsibility of the team to decontaminate anyone who arrived at the hospital and was biologically or chemically contaminated. The 19-person teams were made up of enlisted personnel who were to have specialized training in decontamination procedures.

The patient retrieval team consisted of 13 people—1 officer and 12 medical technicians—who were to pick up patients wherever they were on an Air Force base and move them to a hospital. This team was to go to collection points, pick up patients, and take them to a second-echelon hospital. The Air Force allowed the liberal substitution of personnel for this team because driving vehicles and carrying heavy loads did not require special training.

The three blood transshipment centers—each staffed by six laboratory technicians—were logistical stopovers for shipping blood supplies. The staff at each center was to receive incoming blood, check it for spoilage, repack it in ice, repackage it, and send it where needed. These centers only held blood for a few hours at most.

Aeromedical Evacuation

The Air Force, through its aeromedical evacuation system, was responsible for transporting patients from one medical facility to another (whether in theater or out of Southwest Asia) that had the capability to address the patient's particular problem. To accomplish this task, the Air Force established 5 inter- and 12 intra-theater aeromedical staging facilities, 149 aeromedical evacuation crews, and 23 aeromedical evacuation liaison teams and control centers.

The 5 inter-theater aeromedical staging facilities were located on or in the vicinity of an air base or air strip that acted as an entrance or exit point for the theater. These facilities had as many as 200 beds, and they were staffed with varying numbers of medical specialists and support personnel. This staff cared for patients until they could be transferred to a local hospital or evacuated out of theater.

The 12 intra-theater aeromedical staging facilities were highly mobile and provided care similar to that provided by the fixed facilities. However, these were usually set up in forward positions supporting Army and Marine concentrations and usually did not hold patients for more than 2 hours. Some were collocated with inter-theater staging facilities to handle patients transferring from the tactical to the strategic aeromedical evacuation system. These units were usually staffed by 4 officer nurses and 19 enlisted personnel, mostly medical technicians and administrative staff.

Aeromedical evacuation flight crews provided patient care during evacuation movements. A typical crew consisted of two flight nurses and three flight medical technicians. In some cases, the tactical evacuation flight crews were augmented by a doctor.

In Southwest Asia, aeromedical evacuation liaison teams were responsible for communicating patient movement requirements and coordinating evacuation movements with the hospitals. The liaison teams consisted of a medical service corps officer and two radio operators. The aeromedical evacuation control center, which was located in Riyadh, Saudi Arabia, managed the aeromedical evacuation assets in the theater. Its functions included crew member management and training, contingency evacuation planning, logistical management, and squadron personnel management. The center was staffed by medical service corps officers, flight surgeons, nurses, administrative support personnel, radio operators, and logisticians.

Air Force Organizations Visited

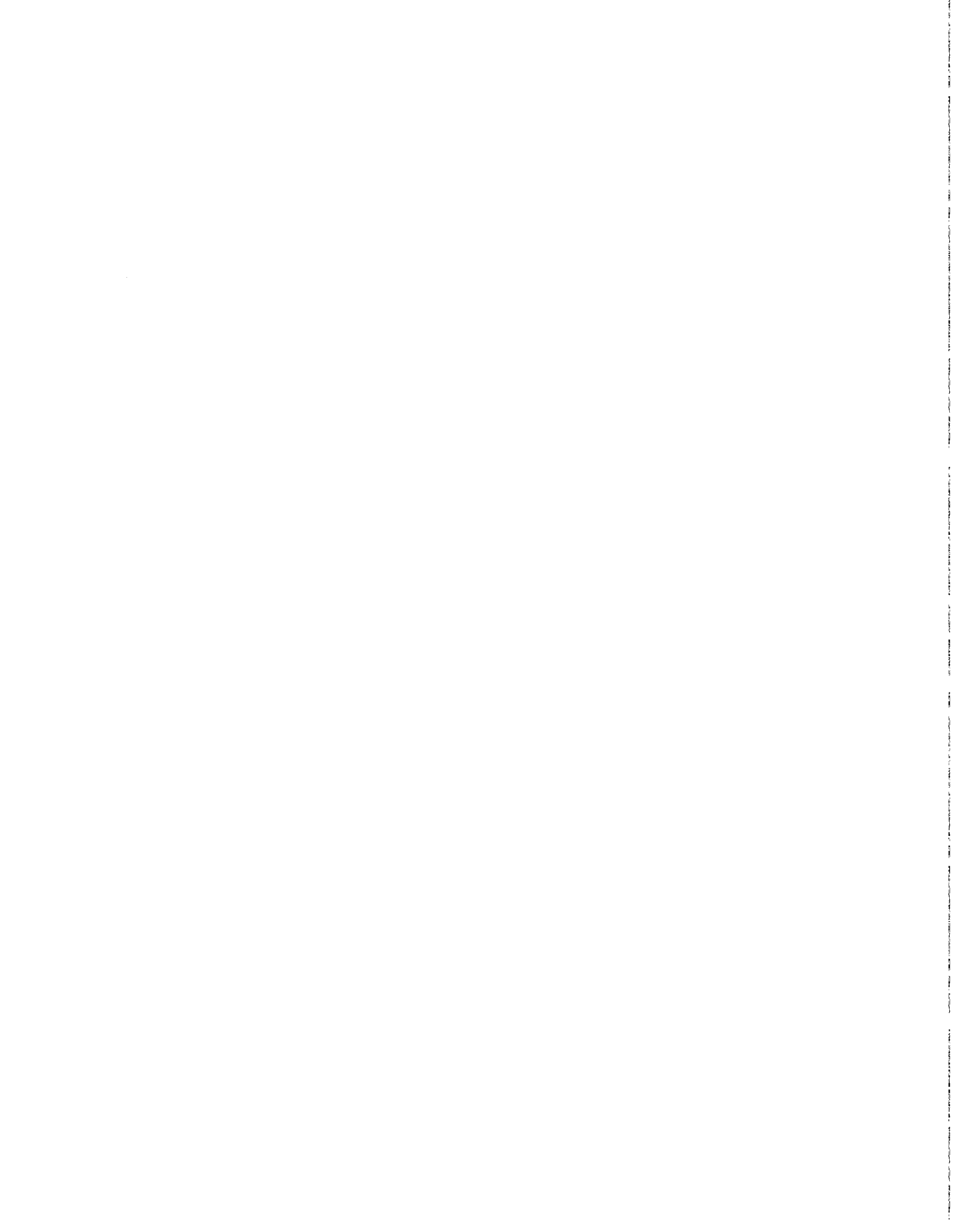
The following is a list of organizations we visited during our review of the capabilities of Air Force medical units in Operations Desert Shield and Storm.

- Office of the Air Force Surgeon General and Office of the Air Force Reserve Command Surgeon, Washington, D.C.;
- U.S. Central Command, 37th Aeromedical Evacuation Group and 56th Medical Group, MacDill Air Force Base, Tampa, Florida;
- U.S. Air Force Air Mobility Command, Armed Services Medical Regulating Office, Scott U.S. Air Force Medical Center, 52nd Aeromedical Patient Staging Squadron, and 13th U.S. Air Force Contingency Hospital, Scott Air Force Base, Belleville, Illinois;
- U.S. Air Force Air National Guard Air Surgeon's Office and 60th Aeromedical Evacuation Squadron, Andrews Air Force Base, Camp Springs, Maryland;
- 4th Medical Group, Seymour Johnson Air Force Base, Goldsboro, North Carolina;
- 32nd Aeromedical Evacuation Group and 34th Aeromedical Evacuation Squadron, Kelly Air Force Base, San Antonio, Texas;
- Air Force Medical Support Agency, Brooks Air Force Base, San Antonio, Texas;
- U.S. Air Force Air Training Command and Air Force Military Personnel Center, Randolph Air Force Base, San Antonio, Texas;
- Wilford Hall Medical Center, Lackland Air Force Base, San Antonio, Texas;
- 396th Medical Training Wing and 384th Medical Training Squadron, Sheppard Air Force Base, Wichita Falls, Texas; and
- U.S. Air Force Air Combat Command and 1st Medical Group, Langley Air Force Base, Hampton, Virginia.

Major Contributors to This Report

National Security and
International Affairs
Division, Washington,
D.C.

Norman J. Rabkin, Associate Director
Charles F. Rey, Assistant Director
Dade B. Grimes, Evaluator-in-Charge
Jay Willer, Site Senior
Leslie E. Schafer, Evaluator



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