Chapter 13

THE AEROMEDICAL EVACUATION

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INTRODUCTION

Aeromedical evacuation is the movement of patients under medical supervision to and between medical treatment facilities by air transportation.[1] The global war on terror has been the largest sustained combat operation by the US military since the Vietnam War. Almost 2 million US military personnel have deployed to support Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). The current aeromedical evacuation system used in support of OIF/OEF is one of the factors that is credited for the greatly improved survival rate for combat-wounded personnel in Iraq.[2] The current survival rate is approximately 90%, and it is the highest in recorded history; it is a significant increase from the 74% to 75% survival rate of wounded personnel in the wars in Korea, Vietnam, and the Persian Gulf.[2]

This chapter will review the aeromedical evacuation of patients from military battlefield locations and other operational locations, to include the types of aircraft used, the functioning of contingency aeromedical staging facilities (CASFs), guidelines and principles for evacuation of medical and psychiatric patients, and the pertinent military regulations and instructions that guide the evacuation process. A particular emphasis of the chapter is on aeromedical evacuation in support of OIF and OEF.

EVOLUTION OF MILITARY MEDICAL EVACUATION

A Brief History of Military Medical Evacuation

Throughout history many different approaches have been used to evacuate combat casualties from the battlefield to receive medical care. In the United States, the earliest recorded reports of the need for a military medical evacuation system occurred during the American Revolutionary War.[3] In April of 1777, the US Congress passed a bill recommending that "[a] suitable number of covered and other wagons, litters, and other necessaries for removing the sick and wounded, shall be supplied by the Quartermaster or Deputy Quartermaster General; and in case of their deficiency, by the Director or Deputy Director General."[3(p36)] However, there are no records that indicate that any such vehicles were actually built or supplied at that time.

The first reports of the actual use of a medical evacuation system occurred during the American Civil War,[4] which resulted in many battle-injured patients who challenged the military medical community.[5] As a result, significant changes were made in how soldiers were evacuated. During this time, at least 10 different designs were proposed for ambulance wagons that were to transport sick and wounded military personnel. Dr Jonathan Letterman was the first to create an organized system of medical evacuation during the Civil War. His pioneering work formed the basis for the present military medical evacuation system. President Lincoln commissioned railroads and riverboats during the Civil War for the medical transport of patients.[6]

The invention of automobiles was followed shortly thereafter by the invention of motorized ambulances to transport emergency medical patients.[7,8] More than 2 years prior to the United States' formal entry into World War I, teams of US military surgeons and their support personnel had already been deployed to France.[9] The collaboration of military and civilian surgeons at the Ambulance Americaine in Paris led to the use of ambulances to evacuate injured military personnel throughout Europe during World War I.

The invention of aircraft led to evolutionary changes in the medical evacuation of military patients throughout the 20th century.[10] The potential use of aircraft for the medical evacuation of injured military personnel was conceptualized in the early 1900s.[11,12] Marie Marvingt, a French nurse, was one of the most influential and effective proponents for the use of aircraft to evacuate the wounded in combat settings.[13] In 1913, Colonel Samuel F Cody demonstrated the potential use of a biplane as an air ambulance at Farnborough, England.[14] The initial conversion of military aircraft into air ambulances by the US Army occurred during the period from 1918 to 1924.[15] However, the concept of aeromedical evacuation of military medical patients did not gain widespread acceptance until World War II.[16] At that time, naval vessels were the most common form of transport for movement of military personnel to and from the war zone. Ships were also the most common means of transporting casualties to the United States for more definitive medical care. However, transport by ship could take weeks; there was a need to provide faster medical evacuation for more seriously injured military personnel. Subsequently, extensive use of military aircraft for patient evacuation began during 1945 when approximately 625,000 casualties (25% of all patients) were aeromedically evacuated to the United States.[16]

The first widespread use of helicopters for aeromedical evacuation occurred during the Korean War.[17] Use of helicopters was instituted because of the necessity to move patients rapidly from the battle area over rugged and inhospitable terrain. Helicopter evacuation

Figure 13-1. The UH-60 Black Hawk. The UH-60 Black Hawk can hold up to six litters for patient transport and is the Army's front-line helicopter for aeromedical evacuation in Iraq and Afghanistan.
Reproduced from: US Air Force Link photo library. www.af.mil/shared/media/photodb/photos/030822-F-7709W-005.jpg.

led to the successful transport of nearly 22,000 patients and is attributed to a reduction in the casualty mortality rate.[17] The combat experiences of the United States in Korea, the British in Malaya, and the French in Indochina proved that rotary-wing aircraft were invaluable in reducing battlefield death rates.[18] During the Vietnam conflict helicopters were firmly established as an essential component of aeromedical evacuation on the modern battlefield.[18] Operations Desert Shield and Desert Storm involved the deployment of 1,950 aeromedical evacuation personnel to support medical airlift.[19] Aircrews were deployed to 17 locations in the region and more than 12,500 patients were successfully airlifted using converted cargo aircraft.[19] The majority of these patients were general medical patients and not battle-related injuries.

Figure 13-2. The CH-46 Sea Knight. The CH-46 can accommodate up to 15 patients and was used extensively by the Marines during the battle of Fallujah in November 2004. Here, Marine Reserves—the "Moonlighters" from Marine Medium Lift Helicopter Squadron 764, based at Edwards Air Force Base, Calif—pause for refueling and servicing by the US Navy flight deck crew aboard the USS *New Orleans*, participating in a nine-country training excercise called Partnership of the Americas, July 3, 2010. Photographer: MSgt Peter C Walz.
Reproduced from: US Marines Web site. www.marines.mil/unit/marforsouth/PublishingImages/NewsStoryImages/2010/100703-M-3168W-008.jpg.

Figure 13-3. The C-9 Nightingale. The C-9 is the only military aircraft that was specifically designed for the aeromedical evacuation. Nicknamed the "Cadillac of Medevac," the C-9 was the workhorse of medical evacuation. It was phased out in 2003.
Reproduced from: US Air Force Link photo library. www.af.mil/shared/media/photodb/photos/021202-O-9999G-007.jpg.

Figure 13-4. The KC-135 Stratotanker. The KC-135 is used primarily for air refueling, but it can be configured with patient-support pallets and used for aeromedical evacuation.
Reproduced from: US Air Force Link photo library. www.af.mil/shared/media/photodb/photos/ 060613-F-4192W-808.jpg.

Figure 13-5. The C-17 Globemaster III. The C-17 is the most commonly used fixed-wing aircraft for aeromedical evacuation out of the combat theater to military medical centers.
Reproduced from: US Air Force Link photo library. www.af.mil/shared/media/photodb/photos/091118-F-3431H-513.jpg.

Currently, the military uses a variety of vehicles for transport of patients to include medical ground vehicles, nonmedical ground vehicles, watercraft, rail transport, and sometimes whatever vehicle of convenience is available.[20] However, today virtually 100% of casualties requiring transport away from areas of insurgent activities or out of the war zone are moved by aircraft.

Aircraft Used for Aeromedical Evacuation

Rotary wing aircraft are the primary vehciles used for casualty evacuation from the battlefield. These aircraft, in addition to improved body armor and advancements in casualty care, are thought to contribute to the increased survival rate that has occurred during the military actions in Iraq and Afghanistan.[2]

The Army and Marines operate most of the rotary wing aeromedical evacuation aircraft. The UH-60 Black Hawk (Figure 13-1), the Army's front-line utility helicopter, is used for air assault, air cavalry, and aeromedical evacuation. The UH-60 can hold up to six litters for patient transport. UH-60s can travel at high speeds, land on rough terrain in remote locations, and evacuate most injured patients for emergency department care within one hour—"the golden hour"[21] of critical importance to casualty survival. The CH-46 Sea Knight (Figure 13-2) is a larger twin-engine heavy-lift helicopter similar to the CH-47 Chinook and can accommodate up to 15 litters. CH-46s and CH-47s are vital aircraft dur-

Figure 13-6. KC-10A Extender. The KC-10A is another air refueler that can be configured for aeromedical evacuation when loaded with patient-support pallets.
Reproduced from: US Air Force Link photo library. www.af.mil/shared/media/photodb/photos/091013-F-3140L-112.jpg.

Figure 13-7. The C-130 Hercules. The C-130 is the most versatile fixed-wing aircraft used for aeromedical evacuation. It can carry up to 70 litters and can operate in austere locations.
Reproduced from: US Air Force Link photo library. www.af.mil/shared/media/photodb/photos/031030-F-9629J-005.jpg.

ing intense offensive military assaults when potentially large numbers of casualties need aeromedical transport during a short period of time. The AH-1W Cobra is an attack helicopter that often provides in-flight protection for rotary wing evacuations.

Fixed-wing aircraft are the primary means of aeromedical evacuation out of theater and from outside the continental United States (OCONUS) to the continental United States (CONUS) medical facilities. These are controlled by the Air Force. The C-9 Nightingale was introduced in 1968 and is the only military aircraft that was specifically designed for the aeromedical evacuation (Figure 13-3). However, the C-9 was phased out in 2003 and all medical evacuations now utilize "aircraft of opportunity." The development of patient-support pallets has increased the ability of alternative aircraft to be used for aeromedical evacuation. PSPs are built on a standard cargo pallet that can be loaded onto a variety of mobility aircraft. They provide support for six litters or a combination of three airline seats and three litters. The KC-135 Stratotanker (Figure 13-4) and KC-10A Extender (Figure 13-6) are aircraft used for air refueling that can be configured for aeromedical evacuation when loaded with patient-support pallets.

The C-17 Globemaster III (Figure 13-5) is the newest and most flexible long-range mobility aircraft. It was designed to support aeromedical evacuation as a secondary mission. The operational and tactical capabilities of the C-17 aircraft have led it to become the primary aircraft for airlift out of Iraq and Afghanistan. The design of the C-17 allows it to land on austere airfields. It can take off and land on runways as narrow as 90 feet and as short as 3,000 feet. It can be configured to carry 48 litters and 40 ambulatory patients. The C-17s are used to transport patients from theater to Landstuhl Army Regional Medical Center in Germany to Andrews Air Force Base in Washington, DC.

The C-130 Hercules (Figure 13-7) is a four-turboprop aircraft. First used by the Air Force in the 1950s, it is the oldest aeromedical evacuation aircraft. Its versatility, reliability, and capability of operating from rough, dirt strips make it an invaluable resource in deployed settings. Within theater, the C-130 Hercules can carry 70 all-litter loads, or a combination of 50 litters and 27 ambulatory patients. In Iraq, C-130s are often used for intratheater missions to Qatar and Kuwait.

THE DEPARTMENT OF DEFENSE PATIENT MOVEMENT SYSTEM

The mission of the Department of Defense Patient Movement System is to transport US military casualties and other medical patients from combat zones to field hospitals or other fixed medical treatment facilities located in or out of the combat theater.[22] Medical evacuation of military personnel injured in combat begins on the battlefield. Patients are assessed and treated across echelons of care. After combat life-saving care or forward surgical team intervention is provided at the initial injury site, the next echelon of care is often at an Army combat support hospital or an Air Force theater hospital. Navy medical hospital ships, such as the USNS *Comfort* (T-AH 20) or USNS *Mercy* (T-AH 19), are also sometimes available as a first echelon of care in deployed locations. Patients not expected to be able to return to duty within 7 days (or the established combat theater evacuation policy standard) will normally be evacuated to the next level of care once they are approved for aeromedical evacuation.

If patients require further evacuation, they are transported by fixed wing aircraft, rotary wing aircraft, or ground vehicle to a CASF, where they are prepared for aeromedical evacuation out of theater. Table 13-1 includes a summary of primary aeromedical evacuation instructions, regulations, and reference guidelines.

Patient movement is tracked through a computerized system at entry and during transit, and completed at exit from the aeromedical evacuation system. Patient movement requirements (PMRs; also called "patient movement requests" and "patient movement records") are medical requests to transport a patient to a higher echelon of care. The US Transportation Command is responsible for intertheater patient movement. Patients who require intertheater aeromedical evacuation are entered into the US Transportation Command Regulating and Command and Control Evacuation System (TRAC2ES), which allows their movement to be tracked by various facilities and the Joint Patient Movement Requirement Centers. The Global Patient Movement Requirements Center (GPMRC) is an organizational element of US Transportation Command that manages patient movement. The GPMRC integrates intertheater and CONUS medical regulation services, mission requirements, clinical validation, and related activities that support patient movement requests. Using TRAC2ES, the GPMRC and the Theater Patient Movement Requirements Center receives, consolidates, and processes PMRs to coordinate aeromedical evacuation requirements with available airlift operations, health service support capabilities, and available bed space.

Aeromedical Evacuation Movement Precedence

When a patient requires aeromedical evacuation, the attending physician is responsible for determining the

TABLE 13-1

AEROMEDICAL EVACUATION PUBLICATIONS

Title	Publication Date	Brief Description
Air Force Policy Directive 41-3 *Worldwide Aeromedical Evacuation*	July 29, 1994	Establishes responsibilities and authorities for aeromedical evacuation with the Air Force Surgeon General, Air Mobility Command, Air Combat Command, and the surgeon generals of the US Air Force Reserves and National Guard.
Air Force Instruction 41-301 *The Worldwide Air Medical Evacuation System*	August 1, 1996	Provides an overview of the entire aeromedical evacuation process.
Air Force Instruction 41-303 *Aeromedical Evacuation Dietetic Support*	March 27, 1995	Provides guidance and procedures for dietetics departments in medical treatment facilities that feed patients in the aeromedical evacuation system during peacetime and contingency operations.
Air Force Instruction 41-305 *Administering Aeromedical Staging Facilities*	December 1, 1997	Delineates requirements to set up and operate a contingency aeromedical staging facility including staffing and equipment lists.
Air Force Instruction 41-307, Attachment 6 *Aeromedical Evacuation Patient Considerations and Standards of Care*	August 20, 2003	Provides information on nursing care requirements and general guidelines for aeromedical evacuation of psychiatric patients. Includes descriptions of flight-specific medical issues, such as Boyle's Law. Outlines the special considerations for psychiatric patients.
Air Force Instruction 41-309 *Aeromedical Evacuation Equipment Standards*	November 1, 2001	Provides a listing of approved Air Force Research Laboratory and US Army Aeromedical Research Laboratory medical equipment, which can be used on fixed and rotary wing aircraft.
Air Force Joint Instruction 41-315 *Patient's Regulated to and Within the Continental United States*	March 30, 1990	Prescribes uniform procedures and establishes responsibilities during peacetime and contingencies for regulating the transfer of patients from overseas to the CONUS, the transfer of patients between uniformed services, VA, or civilian medical treatment facilities within the CONUS, and the assignment of beds in VA Medical Centers for members of the uniformed services who will require further hospitalization or nursing home care after separation or retirement from all military services.
DoD Directive 4500.9E *Transportation and Traffic Management*	February 12, 2005	Establishes DoD policy for transportation and traffic management. States that DoD transportation resources should be used for official purposes only. DoD transportation resources may be used to move non-DoD traffic only when the DoD mission will not be impaired and movement of such traffic is of an emergency or life-saving nature, specifically authorized by statute, in direct support of the DoD mission, or requested by the head of an agency of the government.
DoD Directive 6000.12 *Health Services Operations and Readiness*	January 20, 1998	Establishes patient movement policy and assigns the Commander, US TRANSCOM responsibilities as the DoD single manager for patient movement, other than intratheater patient movement. The Commander, US TRANSCOM is responsible for establishing and maintaining a system for medical regulating and movement.
DoD Regulation 4515.13-R *Air Transportation Eligibility*	April 9, 1998	Implements DoD policies governing the use of DoD-owned or DoD-regulated aircraft and establishes criteria for passenger and cargo movement. Chapter 5, "Aeromedical Evacuation" of DoD Regulation 4515.13-R is used to determine eligibility for patient movement.

(**Table 13-1** *continues*)

Table 13-1 *continued*

DoD Instruction 6000.11 *Patient Movement*	September 9, 1998	Establishes procedures for the movement of patients, medical attendants, and related patient movement items on DoD-provided transportation. Addresses the evacuation of patients through the Air Force fixed-wing aeromedical evacuation system and the medical regulating of patients to appropriate locations of care. Establishes aeromedical evacuation patient priorities that are used by competent medical authorities to classify a patient as a candidate for patient movement.
Joint Pub 4-02.2 *Joint Tactics, Techniques and Procedures for Patient Movement in Joint Operations*	December 30, 1996	Delineates requirements and considerations for joint patient movement planning. Includes special aspects of special operations and military operations other than war. Describes doctrine of the exercise of command and control by joint force commanders engaged in all types of operations and exercises.
Army Technical Manual MED 289 *Aeromedical Evacuation: A Guide for Health Providers* (also known as Armed Forces Pamphlet 164-4)	November 1, 1991	Provides guidance to physicians and other healthcare providers who select and prepare patients for transport on all types of aeromedical evacuation aircraft. It applies to all DoD facilities using the aeromedical evacuation system, including Air National Guard and Air Force Reserve units and members.
United States Naval Flight Surgeon Handbook	1998 (2nd ed)	Provides a brief summary of aeromedical evacuation as it applies to Navy medical personnel. It includes details on patient movement, patient classification, movement precedence, and special in-flight considerations regarding physicians and patients.

CONUS: continental United States
DoD: Department of Defense
MED: medical
Pub: publication
TRANSCOM: US Transportation Command
VA: Veterans Affairs

movement precedence, in accordance with the urgency for transport, to the destination medical facility.

Urgent. The urgent precedence applies when immediate aeromedical evacuation is required to save life, limb, or eyesight or prevent complications of serious illness. The attending physician is required to coordinate with an accepting physician at the destination facility for urgent patients.

Priority. A priority precedence is used when there is the need for prompt medical care not available locally. Similar to urgent cases, the attending physician must coordinate directly with the accepting physician for priority patients and the goal is to transport the patient within 24 hours.

Routine. The routine precedence applies to all other patients.

Patient Classification Codes for Aeromedical Evacuation

A patient classification code is used as a management tool to track types of aeromedical evacuation patients. Table 13-2 includes the patient classification codes for aeromedical evacuation. Mental health patients are classified in several different categories based on their diagnosis and risk prior to being manifested on an aeromedical evacuation flight. Attachment 6 of Air Force Instruction 41-307, *Aeromedical Evacuation Patient Considerations and Standards of Care*,[23] outlines the aeromedical evacuation psychiatric categories. The psychiatric patient categories include:

- *Category 1A*. This category is for the severely ill psychiatric patient who requires close supervision during the entire aeromedical evacuation process. Category 1A patients should be transported wearing hospital clothing or physical training gear. They should be chemically sedated and restrained on a dressed litter during the flight. These patients are required to have a medical attendant with a minimum rank of E-5 (sergeant). To help ensure patient safety, medical attendants for category 1A patients must be trained in neurological and circulatory checks and the proper use of restraints.

TABLE 13-2

AEROMEDICAL EVACUATION PATIENT CLASSIFICATION CODES

Code	Classification
1 (Psychiatric)	
1A	Severe psychiatric patient
1B	Intermediate psychiatric patient
1C	Moderate psychiatric patient
2 (Litter)	
2A	Immobile patient
2B	Mobile patient
3 (Ambulatory)	
3A	Nonpsychiatric, non–substance-abuse patient going for treatment
3B	Recovered patient returning home
3C	Drug or substance abuse patient going for treatment
4 (Infant)	
4A	Infant or child under 3 years old in bassinette or car seat
4B	Recovered infant or child requiring seat
4C	Infant in incubator
4D	Child under 3 years old on a litter
4E	Outpatient under 3 years old
5 (Outpatient)	
5A	Ambulatory, nonpsychiatric, or substance abuse outpatient going for treatment
5B	Ambulatory, psychiatric, or substance abuse outpatient going for treatment
5C	Psychiatric outpatient going for treatment and/or evaluation
5D	Outpatient on litter for comfort and/or safety going for treatment
5E	Outpatient returning on litter for comfort and/or safety
5F	All other returning outpatients
6 (Attendant)	
6A	Medical attendant
6B	Nonmedical attendant

- *Category 1B*. Category 1B is for moderately to severely ill psychiatric patients. These patients also should be chemically sedated, wear hospital clothing or physical training gear, and be transported on a litter. However, restraints are not routinely applied for Category 1B patients. A set of restraints must be readily available during the aeromedical evacuation flight and should be secured to the litter or maintained by the patient's attendant.
- *Category 1C*. Cooperative, reliable, and moderately severe psychiatric inpatients traveling in ambulatory status are placed in Category 1C. These patients may wear their military uniforms and may have a medical or nonmedical attendant. They may administer their own medication based on the evaluation by the mental health provider and flight surgeon.
- *Category 3C*. This category is for ambulatory patients who are being evacuated for inpatient treatment for substance use disorders. These patients wear their military uniforms during aeromedical evacuation. A nonmedical attendant usually accompanies them.
- *Category 5B*. Ambulatory patients evacuated for outpatient treatment for substance use disorders are placed in Category 5B. A nonmedical attendant usually accompanies them.
- *Category 5C*. This category is for outpatient mental health patients evacuated for evaluation or treatment of psychiatric disorders. This category is rarely used when transporting a patient from the area of responsibility. It is more common when patients are transferred from Germany (OCONUS) to CONUS locations.

Completion of Patient Movement Records

The *Aeromedical Evacuation Patient Record* (Air Force Form 3899) is used for the initiation of an aeromedical evacuation. In most deployed locations, the PMR is completed in a handwritten format. A sample PMR is included in Exhibit 13-1. The Air Force Form 3899 includes information pertaining to treatment, diagnosis, medication, status as an inpatient or an outpatient, and the attending physician. Although PMRs are required to be signed by an attending physician, in many deployed locations where a psychiatric patient requires aeromedical evacuation, a mental health provider will complete a draft of the PMR and have it cosigned by the attending physician.

An electronic version of the PMR has recently been developed. This form was previously only available on

EXHIBIT 13-1

SAMPLE PATIENT MOVEMENT REQUEST

PATIENT MOVEMENT REQUEST
DATA PROTECTED BY PRIVACY ACT OF 1974

Created on: Lo-Side **Run Date:** 079 2007

PATIENT DEMOGRAPHICS Cite # 0630746017

Patient Name: [redacted]
Status: A11
ID: [redacted]
Nationality: UNITED STATES
Grade: E02
Age: 22 Year
Tracking Number: .
Cite Number: 0630746017
Gender: Male
Will Return: U
Precedence: Routine
Classification: 1A
Special: N
CCATT: N

ADMINISTRATIVE DATA Cite # 0630746017

Originating MTF: 28th CSH - BAGHDAD
Destination MTF: LANDSTUHL REGIONAL MED CTR GE
Appt:
Casualty Event: OIraqF-Disease/NonBl
Origination ICAO: ORBD
Destination ICAO: ETAR
Transport Mode: MA
Planned Departure Date:
Ready Date: 307 2006
Reason Regulated: CC
Source System: T-WEB
Planned Arrival Date:

Attending Physician: [redacted]
Ward Name: .
Last PMR State Changed by: [redacted]
Accepting Physician: .
Max Stops: .
Max RONs:
DSN Phone: . **Com Phone:** .
DSN Phone: . **Com Phone:** .
DSN Phone: . **Com Phone:** .
DSN Phone: . **Com Phone:** .
Altitude Restriction: .
Comm Travel?: .

CLINICAL DATA Cite # 0630746017

Primary Med Spec: Psychiatry (Male General Care)
Secondary Med Spec: Neurosurgery
Other Med Spec: .
Primary Diagnosis: BP I DISORD,1 MNIC EPISD,UNSPC
Secondary Diagnosis: BACKACHE NOS
Other Diagnosis: .

Patient History: Pt is 22yo MWM E-2/PV2 with 1yr TIS, 1yr TIU with 3mo TIC on first deployment as 91W/line medic. For past few weeks he has been experiencing SI and has been put his weapon in his mouth 4-5 times with safety off. Pt stated his plan was to committ suicide by gunshot or pills or with the Morphine he carries as a line-man. He also expresses HI to his peers b/c he stated, "they call me 'fat-boy' , 'Pog' and alot of name calling. Pt states for the past 2 weeks he has only had 2hours sleep each night. He states he has very little interaction with others b/c his only friend was airevaced out b/c he was hit with an IED. Pt denies any feelings of guilt. He admits to being "cynical, reckless, and disrespectful" to his Platoon SGT. He admits to dangerous display of behavior by kicking an IED and laughing. He stated during this event he was praying for death. He admits hedoes not feel safe, has continued SI/HI and is unable to contract for safety. Denies AH/VH. Pt stated he would be cooperative with the airevac process. VS within normal limits. 4 pt litter restriant; q15min restraint checks; q2hr vitals; q1hr offer food/water/hygiene needs; do not remove restraints during transport. The attendant is a psyc tech and can administer meds to patient. *please see remark section for FS update.

MEDICATIONS (5 Rows) Cite # 0630746017 **IVs (0 Rows) Cite # 0630746017**

Medication Name	Dose	Frequency	IV Location	IV Type	Solution	Rate cc/hr
Valium	5-10 mg	Q 4-6 PRN sedation	.	.	.	.
Motrin	800mg	TID pm pain with food				
haldol	5mg	PRN agitation				
ativan	2mg	PO IM PRN agitation				
benadryl	50mg	PO IM PRN agitation				

Special Diet: .
Amount: .
Formula: .
Infusion Rate: .
Allergies:
N-NKDA

VITAL SIGNS, LABS AND ARTERIAL BLOOD GASES: CITE # 0630746017

Temperature: 97.9 F **Pulse:** 80 **Respiratory:** 16 **BP:** 128 /70 **Wt:** 220.0 lbs **Oxygen Rate:** .
HGB: **HCT:** **WBC:** **Date Taken:** 307 2006 **Oxygen Mode:** .
SPO2 Rate: 99 **FIO2:**

Drainage (0 Rows) Cite # **Orthopedic (0 Rows) Cite #**

Drainage Location	Type	Suction Type	Suction Amount	Type	Location

PMI DATA CITE # 0630746017

Cardiac Monitor: N **Suction:** N **Pulse Ox:** N **Incubator:** N
Ventilator: N **Pump:** N **Stryker:** N **Traction:** N

TRANSPORTATION INFORMATION: CITE # 0630746017

Orig Transport Name: . **POC:** . **Com Phone:** . **DSN Phone:** .
Dest Transport Name: . **POC:** . **Com Phone:** . **DSN Phone:** .

MOVEMENT INFORMATION: CITE # 0630746017

Transport ID: .
Transport Origin: .
Transport Destination: .
Movement Remarks:
.

ADMIN REMARKS:

1A: Pt will be in pajamas or PT gear, will be sedated and on a litter with restraints in place. Pt can only carry small amount of money ($25), ID, ring and watch. Attendant is familiar with keys and opening restraints in case of emergency. JD 307, 3 NOV 06, 1830z BALAD FS update: 22y.o medic with increased levels of SI/HI. Unable to contract for safety. No pain currently. No current backpain. Alert, awake, NAD. A/p Depression with active SI, agree with 1A routine status. Stops OK, no alt restrictions. Medicate assist/ egress. Cleared CASF & AE to LRMC. -Dr. [redacted]. JPMRC UPDATE-AE crew will manage psychiatric patients in accordance with AFI 41-307, atch 6. Pt will be sedated and restrained prior to flight. Cleared for Routine AE/skc.

ATTENDANTS (1 Rows) Cite # 0630746017

Attendant Name	Status	Grade	Age	Gender	Type
[redacted]	Army Active Duty	Enlisted Grade E5	0 Year	Male	Psychiatric Technician

paper, which sometimes resulted in clerical errors or loss of information. The electronic version of the PMR developed at Landstuhl is automatically populated with data from the European Composite Health Care System on a daily basis. All aeromedical evacuation personnel working at the first geographic CONUS sites encountered in patient transport (eg, Andrews Air Force Base, Landover, Maryland; the National Naval Medical Center [known locally as "Bethesda"], Bethesda, Maryland; and Walter Reed Army Medical Center, Washington, DC) can access a real-time version of the electronic PMR.

AEROMEDICAL STAGING FACILITIES

Aeromedical staging facilities (ASFs) are medical facilities similar to a medical passenger terminal that are used to stage patients prior to aeromedical evacuation. Some ASFs are permanent facilities that operate in peacetime as well as times of military conflict (eg, ASF at Andrews Air Force Base). Contingency aeromedical staging facilities (CASFs) are temporary facilities placed at strategic locations to facilitate the aeromedical evacuation of patients. The mission of a CASF is the safe medical airlift of combat- and noncombat-related casualties from deployed locations to a higher echelon of medical care. CASFs operate around the clock to reassess, stabilize, stage, and transport US military medical patients. Other patients are sometimes transported through CASFs, including coalition military personnel, Department of Defense civilians, and patients engaged in humanitarian missions.

The typical staffing composition of a CASF includes 60 military medical personnel: 45 nurses, 2 flight surgeons, 6 administrative personnel, 3 mental health staff, and 1 individual from each of the logistics, bioenvironmental engineering, pharmacy, and nutritional medicine specialty areas. The CASF mental health team includes one officer and two enlisted mental health technicians. The officer position is usually filled by a psychiatric nurse or advanced practice psychiatric nurse. However, the specific staffing composition and requirements may be modified depending on the location and mission of the CASF.

Aeromedical evacuation personnel provide medical care and treatment to patients during aeromedical evacuation flights according to published guidelines. Prior to cosigning the PMR and writing medication orders, a flight surgeon must ensure the patient is physically stable for flight. The aeromedical evacuation of psychiatric patients includes additional medical and logistical issues that must be considered for the safety of patients and aircrew members.[24] Psychiatric patients should be given special consideration and attention during all phases of the aeromedical evacuation to safeguard their personal dignity and to help ensure respect for cultural, psychological, and spiritual values. The overall goal is to use the safest and least restrictive measures to control behavior of psychiatric patients during aeromedical evacuation. However, some psychiatric patients may place the aircraft, crew, and other patients at risk. The use of in-flight restraints is sometimes necessary for patients who present a clear risk to flight safety.[23] A physician's order is required for restraints and their use should be limited to cases in which there is a clear indication of a flight safety risk. Restraints should not be used merely for the convenience of the aeromedical evacuation crew.

Mental health staff members play an important role in advising the flight surgeon regarding the patient's mental health diagnosis, prognosis, and the need for aeromedical evacuation for psychiatric reasons. When a patient is manifested for aeromedical evacuation, a psychiatric category is determined depending on the severity of the illness, diagnosis, and mental status. It is the responsibility of the CASF mental health team to regularly reassess the patient to ensure that the assigned psychiatric category is appropriate. The CASF staff should alert the flight surgeon if a category requires changing or if other modifications are needed regarding medications, need for restraints, appropriateness for flight, and need for a medical or nonmedical attendant. Almost all mental health patients require either a medical or nonmedical attendant prior to entering the aeromedical evacuation system. Nonmedical attendants are usually a member of the patient's military unit and are required to be the same gender and of higher military rank. Nonmedical attendants are assigned to accompany stable and cooperative mental health patients during the aeromedical evacuation. Medical attendants can include mental health technicians, mental health nurses, or other medical personnel who accompany more severe mental health patients during aeromedical evacuation. CASF mental health personnel ensure the patient's attendant is briefed and educated on the responsibilities prior to the aeromedical evacuation flight. Furthermore, psychiatric patients are often asked to complete a behavioral contract form agreeing to comply with aeromedical evacuation system standards.

Contingency Aeromedical Staging Facilities

To provide medical support for operational missions, CASFs are positioned in key locations to facili-

tate the aeromedical evacuation of patients. For OIF, a CASF was initially established in Baghdad adjacent to the Baghdad International Airport. The CASF was moved from this location because Baghdad International Airport was converted back to commercial use. The 332nd CASF was established at Joint Base Balad, which became the primary air hub in the region for all US operations. At Balad, about 25% of patients are direct transfers from one of several CSHs located throughout the area of responsibility. The largest proportion of the patients at the Balad CASF is first transferred to the Air Force Theater Hospital at Balad, where the patients are screened and treated prior to transfer to the CASF. A small number of stable patients not requiring medical screening are transferred directly to the CASF. Aeromedical evacuations from Balad depart for Germany several times per week. The frequency of flights depends on the number of medical patients requiring transport; more frequent flights are arranged when necessary. Critical care air transport flights are mobilized for the most seriously injured or ill patients who require urgent aeromedical evacuation after initial patient stabilization. The critical care air transport team consists of a physician, a nurse, and a cardiopulmonary technician, which allows ventilated patients to be evacuated. Burn patients are often evacuated on these critical care transport missions.

The CASF at Kuwait has a significantly smaller mission than the Balad CASF. Patients with less severe injuries or ones who can be adequately treated in Kuwaiti hospitals are evacuated to the Kuwait CASF. Many of these patients are ones who are expected to be able to return to duty in the deployed setting after their medical care.

Currently, there is no CASF to support the transport of medical patients at Bagram Air Base in Afghanistan. Patients requiring aeromedical evacuation from Afghanistan are transferred to Bagram using rotary or fixed-wing aircraft. Patients are then transported to the CASF at Ramstein Air Base, Germany, on C-17 aircraft.

Patients evacuated from the combat zone in Iraq and Afghanistan are received at Landstuhl. Once there, patients are reassessed and may undergo additional surgery or medical treatments prior to aeromedical evacuation to CONUS.

The Ramstein Air Base Contingency Aeromedical Staging Facility

The 435th CASF at Ramstein Air Base, Germany, is staffed by a contingency of 96 medical personnel. This includes two flight surgeons, 18 registered nurses, and 76 medical technicians and administrative support staff. The medical staff is responsible for receiving patients aeromedically evacuated from all OIF and OEF locations. The ambulatory patients are housed in the CASF, which has a 60-bed capacity. Ambulatory patients are transported to CONUS on the next available flight. The more critically injured patients are transferred via ambulance bus from Ramstein Air Base to Landstuhl Army Regional Medical Center. Once patients are treated and stabilized at Landstuhl, a small proportion of them are returned to duty at their deployed location. Most patients, however, are medically evacuated to CONUS after treatment at Landstuhl.

Those patients who require CONUS evacuation are transported to the Ramstein CASF. Patients are then sent to receiving hospitals within CONUS for further treatment and disposition. In most cases, patients from Landstuhl are first transported to the Andrews Air Force Base ASF and then to Walter Reed Army Medical Center. However, patients are also sent to a variety of military hospitals around CONUS, depending on the medical needs of the patient and the availability of medical care resources.

Between March 2003 and March 2007 approximately 62,000 patients were seen at the Ramstein CASF as part of OIF and OEF. About 40,000 of these patients arrived at Landstuhl from OIF/OIF, and about 22,000 of them were transported to CONUS. Differences in the inbound and outbound patient numbers reflect that slightly less than half of the patients who arrived were transported back to theater or to other locations through nonmedical transportation methods. Overall, battle-injured patients have accounted for about 21% of the total number of patients transported.

The Andrews Air Force Base Aeromedical Staging Flight

The ASF at Andrews Air Force Base plays a critical role in the aeromedical evacuation process of patients during both war and peace. Andrews' ASF is the first stop into the United States for all patients from the European theater, OIF, and OEF. The Andrews ASF is operated by 31 permanent party members and 33 augmentees. In addition, the ASF has one marine and three soldiers permanently assigned to the unit to assist with the transition of marines and soldiers. The Air Force Family Liaison Officer program is also used to meet patient needs. To perform their mission, the ASF is equipped with six "ambuses" (medium-size buses equipped to carry litters), three ambulances, one box truck, one step van, and two patient-loading systems. On average, each month the ASF assists about 800

inbound and outbound patients.

In Germany, the Joint Patient Movement Requirement Center coordinates with the GPMRC to establish CONUS destinations for patients who are grouped into mission loads based upon the bed availability at Landstuhl and patient care movement requirements. Aeromedical evacuation missions are launched three times per week from Germany, with other missions added as needed depending upon Landstuhl's capacity or patient acuity.

The mission operations component of the Andrews ASF receives information regarding the mission and its patient load. The PMR information obtained via TRAC2ES' Web-based electronic record describes clinical information, equipment, staffing, and other operational information on every patient. This information is available to Walter Reed, Bethesda, and the Andrews ASF at the same time through TRAC2ES. The TRAC2ES system is also used in the area of responsibility and is the key communication link to the Theater Patient Movement Requirements Center in Qatar.

A typical mission load is 25 to 30 patients with a variety of diagnoses, medical conditions, and levels of acuity. These may include critical care, amputations, head injuries, psychiatric conditions, cardiac complications, diabetes, and eye injuries. An example of a mission package is as follows: "Mission K-6 includes 12 litters, 17 ambulatory, 4 medical/nonmedical personnel arriving at 1600 hours at Andrews AFB [Air Force Base] on Julian date 214." The mission load is further broken down to reveal which patients will be transported to Walter Reed or Bethesda, and which will need to remain overnight at Andrews prior to transport to another medical facility.

During the 24-hour period prior to a plane's arrival at Andrews, much preparatory work is accomplished. Rooms are readied, meals are ordered, clinical information is reviewed, the flight line crews are alerted, and leaders are notified of mission and other pertinent clinical and administrative information.

Three hours before the plane's arrival, the ASF flight line nurse arrives to review the latest information received from Germany on the patients' conditions after the plane departed. A typical report might contain information such as the number of patients added or cancelled and reason for cancellation; number of critical care air transport (CCAT) cases; if blood was transfused en route; the need for an ambulance on arrival; patients with conditions requiring special room accommodations or care; family member traveling with a patient; amputee needs for wound wash or operating room visit for dressing change; and if a psychiatric patient is to be admitted at Walter Reed. In summary, to be properly prepared for the arrival of a mission, all staff members involved in each aspect of Andrews ASF review the latest available information regarding vital clinical and administrative information before the aeromedical evacuation mission arrives.

Prior to the plane's landing, transport vehicles from Walter Reed Army Medical Center and the National Naval Medcial Center (Bethesda, Md) are positioned to move designated patients to their respective facilities based upon TRAC2ES information and any updates and changes from GPMRC. Sometimes patient destinations are changed while the plane is in the air due to changes in patient condition, medical capability changes, and other administrative reasons. All of this is done in the best interest of patient care.

Two hours before the plane's arrival, all flight line personnel report to duty. This usually includes about 10 personnel from the ASF, Walter Reed, and Bethesda; the Army and Marine liaisons; and volunteers. During the first hour, refresher training is conducted on the litter carry, and mission planning is performed to identify vehicles, drivers, spotters, and other necessary personnel. During the second hour, a mission brief is given on the latest clinical picture and an ASF flight surgeon is present to clarify any clinical questions.

At the flight line landing zone, the ground crew coordinator interacts with the medical crew director and loadmasters to arrange the vehicles in the best manner to expedite the offload and transport of patients from the plane to the waiting motor vehicles. Priority is given to the CCAT patients. Usually, the Walter Reed and Bethesda buses are loaded prior to the Andrews bus, because they have a 40- to 50-minute travel time to their respective hospitals. During this transition period, a flight surgeon or other physician completes an assessment of every patient onboard. The flight surgeon can evaluate, stabilize, and arrange transportation for the patient to the emergency room at Andrews if needed.

Once the patients arrive at their designated medical facilities, additional personnel process them based on their ward destinations. After treatment at Walter Reed or Bethesda, many patients are transferred to other hospitals depending on the specific needs of the patient. Patients are often transferred to hospitals or clinics near their home military station or near their hometown once they have become medically stable. The time frame for these transfers varies widely. The aeromedical evacuation process varies somewhat for special patient categories such as burn patients. Brooke Army Medical Center at Fort Sam Houston in San Antonio, Texas, is the Department of Defense Burn Center. Burn patients are transferred to Brooke as soon as they are stable enough for aeromedical evacuation. Some

patients are flown directly to the burn unit from the area of responsibility or from Landstuhl.

Patients remaining at Andrews Air Force Base are housed in the ASF, which has 32 beds and an expansion capability to 45. The next morning, missions are launched to transport patients to their various CONUS destinations. Ultimate destinations are determined by clinical needs and facilities' capabilities.

AEROMEDICAL EVACUATION OF PATIENTS IN SUPPORT OF OPERATION ENDURING FREEDOM AND OPERATION IRAQI FREEDOM

As of January 2009, there had been over 65,000 hostile and nonhostile US military casualities in Iraq, including over 4,000 fatalities and almost 30,000 wounded in action.[25] About 70% of the wounded were treated in theater and returned to duty without the need for evacuation for additional medical care. However, about 45,000 US military personnel required aeromedical evacuation out of Iraq, including about 9,000 wounded, 9,000 with nonhostile injuries, and 26,000 with other medical conditions.

Significantly fewer aeromedical evacuations have been required for patients deployed to Afghanistan in support of OEF.[26] As of January 2009, over 9,000 US military personnel were evacuated, including about 1,400 wounded, 2,000 with nonhostile injuries, and 5,500 with other medical conditions requiring care outside the area of responsibility. There were over 600 US fatalities in OEF during this same time period.

Recent publications have underscored the potential mental health impact of the military operations in Iraq and Afghanistan on personnel.[27–29] Since 2003, all personnel returning from deployment complete a Post-Deployment Health Assessment.[30] A review of 303,905 of these health assessments showed that over 19% of soldiers and marines who returned from OIF met risk criteria for a mental health concern. However, only 18.4% of these "at risk" soldiers were referred for mental health treatment. In addition, posttraumatic stress disorder symptoms are associated with lower general health ratings, more primary care visits, and missed workdays among military personnel during the year following deployment.[31]

Several recent journal articles have evaluated the aeromedical evacuation of psychiatric patients from OIF/OEF.[32–35] Turner and colleagues[35] evaluated 116 British military personnel who were evacuated between January 2003 and October 2003 to the United Kingdom for admission at a military inpatient psychiatric facility. The majority of the psychiatric patients (69%) were noncombatants, and 21% were Reserve personnel. A large percentage (37%) had a previous mental health history.

Harman and colleagues[32] completed a descriptive analysis of 11,183 US military patients who were aeromedically evacuated from Iraq between January 2003 and December 2003. Of those patients evacuated, the most common patient categories were orthopaedic surgery (21.5%) and general surgery (13.3%). Psychiatric patients were the third most common patient category, comprising 6.9% of all evacuees.

Two articles reviewed US military patients evacuated from both OIF and OEF. Stetz and associates[34] evaluated 5,671 OEF/OIF patients evacuated from March 2003 to September 2003. Out of all patients aeromedically evacuated, 386 (6.8%) were psychiatric patients. Seventy-three patients (19%) were diagnosed with psychotic disorders, 242 (63%) were nonpsychotic disorders, and 60 (15%) had either DSM-IV (*Diagnostic and Statistical Manual*, 4th revision) V-codes or a deferred diagnosis. About l3% of patients had suicidal ideations or self-injurious behaviors.

Rundell[33] conducted the most comprehensive review of psychiatric patients evacuated from OIF/OEF. He included data from 1,264 US military psychiatric patients who were evacuated to Landstuhl Army Medical Center in Germany between November 4, 2001 and July 30, 2004. The psychiatric patients were about 10% of the total population of 12,480 patients evacuated to Landstuhl. A retrospective review of the psychiatric clinical records was conducted to characterize the demographic composition, clinical diagnoses, and clinical dispositions given to the patients. A psychiatrist or clinical psychologist evaluated all patients according to a single, standardized clinical process.

The results indicated that women were twice as likely to be psychiatric patients compared to the percentage of female medical patients (19% vs 10%). Psychiatric patients were more likely to be younger, enlisted, Reserve or National Guard members, and African-American or Hispanic. The majority of psychiatric patients were Army personnel (86%), which most likely reflects the higher proportion of deployed Army personnel during that time. About half of the psychiatric patients (49%) were evacuated during the first 3 months of their deployment. Another third of the patients (33%) were evacuated during the second 3 months of deployment.

The most frequent psychiatric diagnostic categories were adjustment disorders (34%), mood disorders (22%), personality disorders (16%), and anxiety disorders (15%). Of the patients diagnosed with anxiety

disorders, 36% were diagnosed with acute stress disorder and 29% with posttraumatic stress disorder. About 6% were diagnosed with a psychotic disorder, 4% with bipolar disorder, and 5% with a substance abuse disorder.

After psychiatric hospitalization at Landstuhl, most patients (81%) were sent back to their home stations for outpatient mental health treatment, and 14% were transferred to other inpatient psychiatric settings. Only about 5% of these patients were returned to duty in a deployed location after successful treatment at Landstuhl. The long-term disposition of the psychiatric patients evacuated from OEF/OIF is not known. However, previous research has shown that about two thirds of active duty military members who are hospitalized for a mental health condition are discharged from active duty within 2 years of the initial hospitalization.[30,36]

BEHAVIORAL HEALTH CONSULTATION FOR MEDICAL PATIENTS

The primary mission of mental health staff members involved in the aeromedical evacuation process is the screening and preparation for evacuation of psychiatric patients. However, psychiatric patients are usually less than 10% of all patients evacuated, and it is known that a much larger percentage of patients have had some type of combat or other trauma exposure.[34]

Military personnel who sustain combat-related physical injuries are at increased risk for developing combat-related stress disorders. A recent study[37] evaluated the relationship between combat-related physical injuries and posttraumatic stress disorder in 60 combat-injured soldiers. A matched group of 40 soldiers who took part in the same combat situations but were not injured was used as a comparison group. The study found that 16.7% of the combat-injured soldiers met diagnostic criteria for posttraumatic stress disorder as compared to 2.5% in the noninjured comparison group. Another recent study found that a large percentage of combat-injured personnel have a delayed onset of combat stress symptoms.[38] Almost 80% of combat-injured patients who initially screened negative for posttraumatic stress disorder or depression at the 1-month point after the injury were later found to screen positive at the 7-month point. These results suggest that brief contact of combat-injured personnel by mental health staff during the aeromedical evacuation process may be warranted. This may be important even if combat stress symptoms are not present at the time of the aeromedical evacuation.

Many locations across the aeromedical evacuation continuum have implemented programs using a behavioral health consultation model to provide for brief contact and screening of all medical patients by mental health staff members. Various versions of behavioral health consultation programs are currently being used at the Air Force theater hospital and CASF at Balad,[39] at Landstuhl, and at Walter Reed Army Medical Center.[40]

Brief contact with at-risk medical patients has allowed mental health providers to expand their role and be actively involved with all patients being evacuated for medical or nonpsychiatric reasons. This approach has been used successfully in primary care settings where many patients have significant behavioral health risk factors or are at risk for comorbid psychiatric conditions.[41–45] A similar model was used with approximately 700 military personnel who were deployed to work at the Armed Forces Mortuary at Dover Air Force Base, Delaware, to process the human remains from the 189 individuals killed in the terrorist attacks at the Pentagon.[46]

The behavioral health consultation model involves brief individual consultation with all medical patients. The goals are to assess for trauma or combat stress exposure, normalize combat stress symptoms, initiate positive contact with mental health staff, and describe symptoms that might emerge in the future that would indicate that follow-up with a mental health provider might be helpful.[39] It is helpful to provide patients with a description of the normal course of trauma-related symptoms and how some symptoms can have a delayed onset.

SUMMARY

The US military aeromedical evacuation system is one of the primary contributors to the significantly improved survival rate in patients injured in support of OIF/OEF. Its ability to transport a patient from point of injury to specialized hospital trauma care is currently unsurpassed. The professionals who maintain this system continue to make strides to improve safety, comfort, and speed. Military mental health professionals play an important role in the aeromedical evacuation of medical and mental health patients from a war zone. Mental health professionals are actively involved in all aspects of the aeromedical evacuation system, including screening of psychiatric patients, making recommendations of psychiatric patient category,

preparing patients and attendants for the aeromedical evacuation flight, and providing organizational consultation to aeromedical evacuation medical staff. Nonpsychiatric medical personnel often have little or no experience in working with severe psychiatric cases. The placement of mental health professionals as part of the aeromedical evacuation system is a significant relief to medical staff.

The Department of Defense patient movement and aeromedical evacuation system involves a complex interaction between patients, healthcare providers, patient movement administrators, aircraft, and computer tracking systems. In this chapter, an overview of the entire aeromedical evacuation process was provided with as much accuracy as possible. However, as with many complex systems, changes in the aeromedical evacuation process occur on a regular basis depending on local conditions, operational requirements, and changing priorities. Therefore, it is likely that some of the specific details contained in this chapter may have changed since the time that the chapter was written. Nevertheless, it is hoped that this chapter will serve as a general guide for the military aeromedical evacuation system and a helpful tool for military personnel involved in the aeromedical evacuation of patients in both deployed and nondeployed locations.

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