Department of Defense
Legacy Resource Management Program

Vietnam War: Medical Research, Treatment, and Training on U.S. Military Installations Vietnam Historic Context Subtheme

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EXECUTIVE SUMMARY

Buildings, structures, and sites related to the buildup of and sustained fighting during the Vietnam War are turning 50 years old. Recently, an overarching historic context was developed that provides a broad, historic overview that highlights the Vietnam War-influenced construction that created facilities on many military installations between 1962 and 1975 (Hartman et al. 2014).

The overarching historic context provides common ground for understanding the need for construction on military installations in support of the conflict in Vietnam. It also identifies several thematic areas related to stateside construction in support of the war effort under which significance can be defined. This report is tiered from the overarching historic context; addresses medical support for the Vietnam War; identifies specific installations and resource types associated with medical research, training, and treatment during the Vietnam War; and provides a context to evaluate the historical significance of these resources.

The National Historic Preservation Act of 1966, as amended, requires federal agencies to inventory and evaluate their cultural resources, usually as they near 50 years of age. This report provides context and typology for Vietnam War (1962–1975) medical-related resources on Department of Defense (DoD) installations in the United States. This report can be used to develop detailed research that will lead to identification and evaluation of Vietnam War facilities that supported medical research, medical training, and treatment of casualties at DoD military installations in the United States. This report's historic context provides military cultural resources professionals with a common understanding for determining the historical significance of Vietnam War medical-related facilities, greatly increasing efficiency and cost-savings for this necessary effort.

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1.0 INTRODUCTION

The Department of Defense (DoD) Legacy Resource Management Program (Legacy Program) was created in 1990 to assist the military branches in their cultural and natural resource protection and enhancement efforts in support of the agency's mission of military preparedness. The DoD Legacy Program is guided by the principles of stewardship or protection of irreplaceable resources, leadership of the DoD as the leader in resource protection, and partnership with outside DoD entities to access the knowledge and skill sets of others.

Each year, the DoD Legacy Program develops a specific list of areas of interest, which is usually derived from ongoing or anticipated natural and cultural resource management challenges within the DoD. These specific areas of emphasis; however, reflect the DoD Legacy Program's broad areas of interest. To be funded, a project must have regional or DoD-wide significance and involve more than one Military Service and be necessary to meet legal requirements or to support military operations. This project's report can be used by all the DoD Services and for military installations throughout the country.

1.1 OVERARCHING VIETNAM WAR CONTEXT

The DoD and its individual Services must comply with the National Historic Preservation Act of 1966, as amended (NHPA), by identifying and managing historic properties that are part of their assets. In an effort to help with this requirement, the U.S. Army Construction Engineering Research Laboratories (USACERL) directed a study of DoD Vietnam War resources, many of which are about to turn 50 years old. The resulting report, which was approved in December 2014, is an overview study of construction on DoD military installations in the United States from 1962 through 1975.

The report was developed as an overview document from which more detailed historic contexts and other documents can be developed. This programmatic approach will ultimately lead to the efficient and cost-effective identification and evaluation of Vietnam War facilities at DoD military installations in the United States. The overview report identifies several significant thematic areas (subthemes) related to construction in support of the war. These include ground training, air training, special operation forces and warfare, schools, housing, medical facilities, and logistics facilities.

This project contributes to the broad Vietnam War context by providing a historic context for identifying and evaluating medical-related historic properties at DoD installations. This context addresses medical research, training, and treatment of casualties.

This historic context is intended to be a companion to other contexts that address Vietnam War history in the military in a holistic sense. The subcontext for ground combat training, helicopter training and use, special schools, logistics, and special operations have already been developed. This is the final subcontext to be prepared. As the reports become approved for release, the Vietnam War subcontexts will be posted to https://www.denix.osd.mil/legacy/home/.

This report is intended to provide a basis from which to evaluate DoD resources developed to provide medical support for the Vietnam War. When evaluating medical-related resources, the information contained in this document should be augmented with specific installation historic contexts to make an accurate and justified argument regarding historic significance.

1.2 PURPOSE AND METHODOLOGY

The purpose of this effort was to research and develop a Vietnam War medical support historic context. The report also provides context and typology of Vietnam War (1962–1975) medical support-related resources on DoD installations in the United States. This report is not a detailed history of military engagements and important battles. Military action is only addressed in somewhat general terms to fortify the overall context and how increased deployment of troops affected DoD installations in the United States.

Research was pivotal to the development of this historic context. Researchers accessed primary and secondary sources with medical-related properties at several locations. The National Archives and Records Administration (NARA) Archives I (Military Reference Branch) was visited, and information was gathered from the Services. Numerous online sources of information were also researched.

The development of the Vietnam War historic context was supported and facilitated through the assistance of several individuals. A number of individuals provided additional support to the project by assisting with data requests, site visits, and providing reports and resources related to Vietnam War medical research, treatment, and training in the DoD. They also provided general guidance and installation-specific information.

- Mark Gallihue, Cultural Resources Manager, Aberdeen Proving Ground (APG), Maryland (MD)
- Ellen R. Hartman, Engineer Research and Development Center (ERDC)/U.S. Army Construction Engineering Research Laboratories (USACERL)
- Susan I. Enscore, ERDC/CERL
- Adam D. Smith, ERDC/CERL
- Scott Keyes, Naval Facilities Engineering Command Headquarters Cultural Resources
- André B. Sobocinski, Historian, Bureau of Medicine and Surgery (BUMED)
- Susan Cowart, Fort Rucker, Alabama
- Lisa Black, Natural & Cultural Resource Manager, Sheppard Air Force Base (AFB), Texas (TX)
- Bryan D. Booker, 82d Training Wing/History Office, Sheppard AFB, TX
- Jackie Davis, Director, Fort Sam Houston Museum
- Carlos Alvarado, Archivist, U.S. Army Medical Department (AMEDD) Center of History & Heritage, JBSA Fort Sam Houston, TX
- Jessica Cumbee, Research Information Scientist, U.S. Army Aeromedical Research Laboratory (USAARL) Fort Rucker, Alabama

To date, one installation, APG, allowed for a site visited.

1.3 REPORT ORGANIZATION

This report is presented in five chapters. Chapter 1 provides the introduction and methodology used to prepare this report. Chapter 2 provides a summary of the Vietnam War and medical issues and advancements of the Vietnam War. Chapter 3 provides a context for medical support during the Vietnam War at U.S. installations. Chapter 4 describes the types of resources associated with medical research, training, and treatment during the war on U.S. installations and an overview of evaluating resources under the NHPA with descriptions of evaluation criteria and integrity. Chapter 5 contains selected references.

Appendix A includes a list of acronyms. Appendix B includes a list of the primary medical units; however, it should not be considered exhaustive. Some units were active during the period of the Vietnam War, but did not serve in the Vietnam War, while other units may have served in supporting roles or were trained and did not deploy. Appendix C includes brief resumes of the report contributors. Appendix D, E, and F include brief write-ups on U.S. medical-support facilities with guidance on applying this subcontext.

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2.0 SHORT HISTORY OF THE VIETNAM WAR AND MEDICAL ADVANCEMENTS

> *"'There are two groups of people in warfare – those organized to inflict and those organized to repair wounds – and there is little doubt but that in all wars, and in this one in particular, the former have been better prepared for their jobs'* (Milit. Surg., *38:601, 1916*). *So observed Harvey Cushing, the founder of modern neurosurgery, a year before America's entry into World War I. Cushing's judgment is just, and yet throughout history 'those organized to repair wounds' have risen to the exigencies of the war at hand. In point of fact, warfare has spurred physicians, surgeons, and researchers to major, sometimes spectacular, advances, and their scientific and clinical victories are bequeathed to civilian populations that inherit the peace. Out of human destructiveness emerge potent new strategies of protection, remediation, and self-preservation. Call it an irony of war."*[1]

Perhaps war's greatest contribution to medicine is the chance to run public health experiments on a grand scale under exigent circumstances. As with other conflicts, the Vietnam war brought advances in medical care, some of which remain standard practice in civilian medical care today. Medical needs during the Vietnam War provided for medical practice advancements in the areas of trauma care, blood supply, repair of blood vessels to save limbs, treatment of burns, and a better understanding the effects of a range of weapons. Some treatments and techniques for the care of burns and other wounds were available for the first time in the Vietnam-theater of operations.[2] The combination of rapid evacuation of the casualty, availability of whole blood, well-established forward hospitals, advanced surgical techniques, and improved medical management resulted in excellent care for the wounded in Vietnam.[3]

2.1 SHORT HISTORY OF THE VIETNAM WAR

[Portions of this summary are adapted from Ellen R. Hartman, Susan I. Enscore, and Adam D. Smith, "Vietnam on the Homefront*:* How DoD Installations Adapted, 1962–1975," Department of Defense Legacy Resource Management Program, Report ERDC/CERL TR-14-7, December 2014.]

The Vietnam War was a conflict that played a significant role in American foreign policy during much of the Cold War. However, the foundations of unrest in Vietnam (a French possession since the 1800s) were laid during World War II and were driven by a legacy of European colonialism and the exigencies of Cold War politics.

Indochina (Vietnam, Laos, Cambodia) was not a major stage during World War II, but the region fell to the German-sympathizing Vichy French government during the war. A local resistance movement known as the Viet Minh quickly rose in defiance of the Vichy. The group, led by a Vietnamese nationalist named Ho Chi Minh, gained the support of China, the Soviet Union, and the United States. The Viet Minh defied the French in Indochina until the Vichy government in France fell to the Allies in 1944. Japan filled the void left by the French and briefly occupied Vietnam between 1944 and August 1945.

The defeat of Japan and the end of World War II resulted in a power vacuum in Vietnam. Ho Chi Minh subsequently declared Vietnamese independence and established the Democratic Republic of Vietnam. He asked the United States to recognize the newly independent country. American leaders, however, were

[1] Paul E. Stepansky, An Irony of War, February 11, 2012, accessed: https://adoseofhistory.com/category/military-psychiatry/medicine-in-vietnam/
[2] Medical Advances from the Vietnam War, *accessed:* https://vva.org/programs/veterans-health-care/medical-advances-from-the-vietnam-war/
[3] Major General Spurgeon Neel, Medical Support of the U.S. Army in Vietnam 1965-1970, Department of The Army, Washington, D.C., 1991, page 49

uncomfortable with Ho Chi Minh's nationalism and his political ideology, which was largely influenced by communism. Even though the Soviet Union was an American ally during the war, the specter of communism, real or imagined, came to dominate Cold War foreign policy in the late 1940s.

Meanwhile, leaders from the United States, Britain, and the Soviet Union met in Potsdam, Germany to shape the post-war world. The Potsdam Conference did not serve Ho Chi Minh's interests. Instead of acknowledging a Vietnam free of colonial control, the world leaders decided that Indochina still belonged to France, a country that was not strong enough to regain control of the region on its own. Instead, China and Britain removed the Japanese from southern and northern Vietnam, respectively.

A French colonial government took control of Vietnam by 1946, but prior to their arrival, the Viet Minh held elections in which they won several seats in northern and central Vietnam. In an effort to consolidate their rule, the French drove the Viet Minh out of the urbanized areas of Vietnam. This action triggered the First Indochina War, a guerilla campaign against French occupation. The war pivoted on a north/south axis, with the Viet Minh, who had a solid foothold in the north, maintaining control of the central and northern portions of the country and the French holding on to power in the southern part of the country.

The Cold War stakes of the First Indochina War became considerably more significant when the newly established Communist government in China recognized the Viet Minh as the legitimate government of Vietnam. American policymakers looked gravely upon these developments. They believed that U.S. foreign policy and aid should strive to prevent and contain the spread of Communism, a policy termed "containment." As a result, the United States began assisting the French in their fight against the Viet Minh. Pragmatically, President Eisenhower chose to send military supplies but not combat troops. The First Indochina War continued for another four years until the French suffered a final defeat at the battle of Dien Bien Phu, which ended colonial rule in Vietnam.

The 1954 Geneva Accords codified France's withdrawal from Indochina but did not mark the end of Western influence in Vietnam's governance. The treaty was negotiated among the United States, the Soviet Union, China, France, and Britain. There were no Vietnamese representatives. The accords created three countries in Indochina: Vietnam, Cambodia, and Laos. Vietnam was temporarily divided along the 17th parallel. The Viet Minh were placed in control of the north while an Anti-Communist government under Prime Minister Ngo Dinh Diem was installed in the south until nationwide elections could be held, as stipulated.[4]

Subsequently, the Viet Minh held elections in the north and won by significant margins. The situation in the south was markedly different; Prime Minister Diem cancelled elections in 1955 because he was afraid the Viet Minh would win convincingly. The United States agreed.[5] To make matters worse, Diem became increasingly authoritarian. He proclaimed himself president of the Republic of Vietnam in October 1955. While he had little influence in the north, Diem's regime was oppressive and anti-democratic in the south. Nonetheless, the United States Military Assistance Advisory Group (MAAG) began training South Vietnamese soldiers in 1955. Training played a major role in MAAG's presence in Vietnam. Most training occurred in Vietnam. However, by 1961, 1,000 South Vietnamese soldiers received training in the United States each year.[6]

By 1956, a Communist-influenced insurgency escalated in the countryside and these rebels, known as the Viet Cong, complicated U.S. policy in the region. In addition to containment, U.S. policymakers also

[4] "Final Declaration of the Geneva Conference on Restoring Peace in Indochina, July 12, 1954," in *The Department of State Bulletin*, Vol. XXXI, No. 788 (August 2, 1954): 164.
[5] Walter LaFeber, *America, Russia, and the Cold War, 1945–2002* (New York, NY: McGraw Hill, 2002): 170.
[6] Ronald H. Spector. *Advice and Support: The Early Years of the United States Army in Vietnam 1941–1960* (Washington, DC: United States Army Center for Military History, 1983): 239.

espoused the Domino Theory which argued that if the West did not take a stand, Communism would spread from country to country like toppling dominoes. South Vietnam was ground zero in this scenario. If South Vietnam fell to Communism then Laos would be next, then Cambodia, followed by Thailand, Malaysia, Indonesia, Burma, and so forth. The United States, while not comfortable with Diem's anti-democratic rule, considered him an ally in their fight against Communism.

By 1958, a full-scale civil war was raging in South Vietnam. The opposition to Diem received encouragement and support from North Vietnam, which, by 1959, was providing supplies and troop support to the Viet Cong. Meanwhile, the U.S. support of South Vietnam continued. There were 900 advisors in Indochina at the end of the 1950s and the U.S. financial and material commitments to Vietnam at this time ran into the billions of dollars.

John Fitzgerald Kennedy became President of the United States in 1961. While he did not want to commit the United States to a full-scale war in Vietnam, President Kennedy was steadfast in his opposition to Communism. As a result, the American advisory and support role grew dramatically under his administration. President Kennedy initially increased support for Diem's regime and sent additional troops to Vietnam, including U.S. Army and Marine Corps units. The U.S. Air Force (USAF) role also increased, with the first permanent units arriving in the fall of 1961. The U.S. Navy provided critical troop transport and increased their presence in the Gulf of Tonkin.

There were over 11,000 U.S. troops in Vietnam by the end of 1962.[7] While ostensibly there to train troops and protect villages, the soldiers found themselves involved in border surveillance, control measures, and guerilla incursions. They also supported Central Intelligence Agency (CIA) operations in the region.

The U.S. involvement in Vietnam increased perceptibly in the first two years of President Kennedy's administration, but did not ameliorate the crisis as events grew increasingly out of control in South Vietnam. The intractability and oppression of President Diem's administration had become untenable by 1963. He rebuffed U.S. demands that elections be held. Worse, he lost any support he previously had in South Vietnam. This was graphically displayed to the world on 11 June 1963, when Thich Quang Duc, a Buddhist monk, set himself on fire at a busy Saigon intersection. The self-immolation, which attracted the attention of the world, was a direct protest to Diem's anti-democratic policies and the war that was raging in the countryside.

By the fall of 1963, President Kennedy realized that as long as Diem was in power, South Vietnam could not put down the insurgency. Kennedy and other top U.S. officials discussed ousting Diem through diplomatic approaches or if resorting to a coup was necessary. Plans were discussed to have the CIA overthrow the South Vietnamese government. However, an actual coup occurred on 1 November 1963, when the ARVN launched a siege on the palace in Saigon. Diem and his brother were later arrested and assassinated by the ARVN.[8]

The fall of Diem resulted in considerable instability. From November 1963 to June 1965, the South Vietnamese government was a revolving door. Five administrations came and went until Lt. Gen. Nguyen Van Thieu and Air Vice Marshal Nguyen Cao Ky came to power. Thieu remained president until the fall of Saigon in 1975. The years of instability; however, undermined South Vietnam's ability to counteract the Communist insurgency. The Viet Cong attracted substantial support and assistance from the Viet Minh in South Vietnam who saw the instability as an opportunity to overthrow the South Vietnamese government.

[7] Joel D. Meyerson, *Images of a Lengthy War: The United States Army in Vietnam,* (Washington, DC: United States Army Center for Military History, 1986): 69.
[8] John Prados, editor. The Diem Coup After 50 Years, John F. Kennedy And South Vietnam, National Security Archive Electronic Briefing Book No. 444, Posted – November 1, 2013, https://nsarchive.gwu.edu/search/node/president%20John%20F%20Kennedy

Upon President Kennedy's assassination on 22 November 1963, Lyndon Baines Johnson was immediately sworn in as president of the United States. Initially, President Johnson was not interested in expanding the U.S. involvement in Vietnam. In fact, the crisis in Southeast Asia took a backseat to his domestic agenda, which included civil rights legislation and an ambitious package of domestic policies and laws known as the "Great Society."

At the same time, President Johnson did not want U.S. policy and actions in Vietnam to fail. After all, the United States had spent nearly a decade supporting the South Vietnamese government in the fight against the Viet Cong and, by proxy, the Viet Minh. More importantly, he did not want the 14,000 Americans who were in the region to lose their stand against the spread of Communism.

President Johnson increased the number of advisors and other military personnel in Vietnam to 16,000 by early summer 1964, but domestic matters occupied most of his energy until August when the war in Southeast Asia forcefully became the priority.

On 2 August 1964, three North Vietnamese patrol boats fired on the U.S. destroyer *Maddox* in the Gulf of Tonkin. The U.S. Navy retaliated and fended off the attack. The details of the confrontation are debated; at the time, the United States claimed the U.S. Navy vessel was on routine patrols in international waters, but other sources have since suggested that the USS *Maddox* was supporting South Vietnamese troops who were raiding North Vietnamese ports.[9] Regardless of the details, the event, which came to be known as the "Gulf of Tonkin Incident," marked a significant shift in the Vietnam War.

source: https://www.history.com/topics/vietnam-war/gulf-of-tonkin-resolution-1

FIGURE 2-1. U.S. DESTROYER *MADDOX* IN THE GULF OF TONKIN

President Johnson ordered air strikes on North Vietnamese bases and critical infrastructure. The retaliation strikes ordered by Johnson destroyed or damaged 25 patrol boats and 90 percent of the oil storage facilities. This strategy eventually became a cornerstone of the air war in Vietnam.

The most important outcome of the Gulf of Tonkin Incident; however, was the 7 August passage of the Gulf of Tonkin Resolution by the U.S. Congress. The resolution gave the president broad authority to

[9] LaFeber, America, Russia, and the Cold War 1945–2002, 252–253.

prosecute the war in Vietnam by allowing him to take "all necessary measures" to defend U.S. and allied forces and to "prevent further aggression."[10]

President Johnson did not immediately use his new war-making powers in any comprehensive or aggressive way. He was, after all, running for reelection as the peace candidate in opposition to Barry Goldwater. President Johnson was re-elected in November 1964, and the war in Vietnam took precedence. The President and his advisors began to initiate a forceful military response. President Johnson removed all restrictions on U.S. military involvement, allowing U.S. personnel to directly engage in combat without the guise of training or advising the South Vietnamese.

In February 1965, President Johnson approved a sustained aerial bombing of North Vietnam. The campaign was known as OPERATION ROLLING THUNDER. The U.S. Air Force, Navy, and Marine Corps aircraft dropped hundreds of tons of bombs on North Vietnam nearly every day from early March 1965 to early November 1968. President Johnson hoped the bombings would bring North Vietnam to the negotiating table.

President Johnson began committing combat troops to Vietnam in the spring of 1965 when he deployed U.S. Marine Corps and Army combat troops to Da Nang and Saigon, respectively. The U.S. Navy vessels transported the troops, who were tasked with the defense of airbases. The deployments brought the U.S. presence in Vietnam to over 50,000. The United States' first major ground offensive occurred in August 1965 when the U.S. Marine Corps, in cooperation with the South Vietnamese Army, launched an airmobile and amphibious assault on Viet Cong forces near Chu Lai.

Johnson continued increasing troop strength in Vietnam throughout the summer and fall of 1965. The U.S. military presence had increased to 175,000 by the end of 1965. This included major Army divisions and units such as the 1st Cavalry Division, 1st Brigade, 101st Airborne Division, and 1st Infantry Division. The U.S. Marine Corps Expeditionary Force accounted for nearly 20,000 troops in Vietnam by the end of 1965. Large deployments continued through the peak years of the war (1965–1968).

It became clear to military leadership that the Vietnam War required more aggressive enlistment than the existing annual average of just over 55,000. The war necessitated an annual enlistment of nearly one million. Initially, military planners attempted to meet the shortfall through recruitment. Recruitment was successful for all branches except the U.S. Army, which was not able to fill the personnel gap and resorted to the draft in 1966. Draft calls continued until 1973.

The U.S. military was now committed to defeating the enemy in direct action. There were no longer any illusions about the United States merely providing training, logistical, and material support to the South Vietnamese. The U.S. ground forces participated in more than 550 battalion-size or larger operations during 1966. The U.S. military aircraft flew almost 300,000 sorties in 1966. Ground forces also participated in more than 160 joint operations with allies. As the war in Vietnam intensified in 1966, U.S. Marine units were conducting several hundred small unit actions during each 24-hour period. These operations, which were designed to find and isolate the Viet Cong, were successful. Within a year, the U.S. Marine Corps was able to gain control of almost 1,200 square miles of Vietnamese territory. Active campaigns continued through 1967. There were nearly 490,000 U.S. troops in Vietnam at the end of the year over 260,000 of whom were Marines and 28,000 of whom were Navy seamen.

Early 1968 brought two major battles. First, the Khe Sanh Combat Base, a garrison of 6,000 U.S. Marines and South Vietnamese Rangers, which came under attack from North Vietnamese forces in late 1967, was completely isolated by the beginning of 1968. President Johnson and General William Westmoreland were

[10] "Gulf of Tonkin Resolution," Public Law 88-408, 88th Congress, August 7, 1964.

determined to hold the base at all costs. This precipitated one of the longest and bloodiest battles of the war. The base remained under siege for 77 days until mid-April 1968. Khe Sanh eventually fell to the North Vietnamese in July 1968.

The other major engagement, known as the Tet Offensive, was a surprise attack on South Vietnamese targets by North Vietnamese troops. The operation, which occurred on 30 January 1968, was a simultaneous assault on more than 100 South Vietnamese cities and military installations. The United States, South Vietnamese, and other allied troops eventually repelled the attacks, but the offensive was a public relations disaster. President Johnson and other leaders had been telling the American public that the end of the war was in sight and that the North Vietnamese were on the defensive. The Tet Offensive appeared to belie this contention. Support for the war, which was already unpopular, eroded further.

The military reaction to the Tet Offensive was to deploy more soldiers to Vietnam. General Earle Wheeler traveled to Vietnam after the Offensive to assess conditions in the country. He was convinced that there were not enough troops in Vietnam to effectively fight the war. Therefore, the general requested deployment of 206,000 additional U.S. troops. There were already nearly 500,000 soldiers in Vietnam and the American public was not supportive of increasing that number by nearly 50 percent. President Johnson denied General Wheeler's request. Instead, he authorized a comparatively small increase of about 13,000 troops. The president also began scaling back OPERATION ROLLING THUNDER.

Khe Sanh and the Tet Offensive captured the public's attention and convinced many that Vietnam was a never-ending quagmire. Although, military leaders were planning for the U.S. exit from Vietnam, a defined withdrawal plan was elusive. Their most pressing concern was the preservation of an independent South Vietnam. They knew that the only way this could occur was if they provided modern equipment and professional training to the South Vietnamese military.

Meanwhile, President Johnson decided not to run for reelection in 1968. His successor, President Richard Milhous Nixon, announced a new plan called "Vietnamization" in the spring of 1969. Essentially, the plan consisted of an interconnected rapid withdrawal from Vietnam and strengthening of South Vietnamese defense capabilities. The latter would be achieved through training and the provision of military equipment. Some U.S. units literally left Vietnam without their vehicles and aircraft; they were donated to the South Vietnamese military.

The military was at peak troop strength of 543,482 when President Nixon implemented Vietnamization. Drawdowns were rapid and troop levels were down to 250,000 by 1970. Stand-downs continued over the next couple of years, reducing U.S. forces to only 24,000 U.S. soldiers in Vietnam at the end of 1972.

Vietnamization coincided with increased hostilities in Vietnam and a widening of the war. Citing their support for North Vietnamese troops, President Nixon approved secret bombings of Cambodia and Laos in 1970. The United States also took part in a ground incursion in Cambodia in the summer of 1970 and supported a South Vietnamese incursion in Laos in February 1971. President Nixon ordered the mining of North Vietnam's Haiphong Harbor in 1972 to prevent the arrival of supplies from the Soviets and Chinese. The United States and North Vietnam agreed to a ceasefire in January 1973. The U.S. minesweepers cleared Haiphong Harbor of mines in February 1973 and the last U.S. combat troops left Vietnamese soil in March. The U.S. military remained in the region but reverted to its training and advisory role.[11] The United States exit from Vietnam resulted in greater instability. President Nixon warned the North Vietnamese that the U.S. military would return if the Viet Minh broke the ceasefire. However, in June 1973, the Senate passed the Case-Church amendment prohibiting further intervention in Vietnam.

[11] Meyerson, Images of a Lengthy War, 183.

President Nixon was soon consumed by his own downfall as the Watergate scandal broke. President Nixon resigned in August 1974. His replacement, Gerald Ford, was greeted with continued crisis in Cambodia and Vietnam. Cambodia's long-running civil war was at a critical point in early 1975. The U.S.-supported Khmer Republic was on the verge of collapse as the Communist Khmer Rouge solidified control over most of the country. The Khmer Republic only held Phnom Penh and its fall was imminent. The U.S. military, therefore, conducted a helicopter-based evacuation of U.S. citizens and refugees from Phnom Penh on 12 April 1975.

Meanwhile, the North Vietnamese and Viet Cong had launched an offensive in early 1975. Just as they had done in Cambodia, the United States implemented an existing evacuation plan on 29 and 30 April 1975. Much larger than the Cambodian evacuation, the Vietnamese operation provided transport for over 1,300 Americans and nearly 6,000 Vietnamese (and other foreign) evacuees from the country. The evacuation provided a graphic end to the Vietnam War as U.S. helicopters lifted civilians off the roof of the U.S. embassy in Vietnam. Saigon fell to North Vietnamese forces on 30 April 1975, effectively marking the end of the Vietnam War.

Source: https://namvietnews.wordpress.com/a-look-back-at-the-vietnam-war-on-the-35th-anniversary-of-the-fall-of-saigon/35th-anniversary-of-the-fall-of-saigon-c/

FIGURE 2-2. THE FALL OF SAIGON

One final clash occurred in May 1975 when the Khmer Rouge Navy seized a U.S. container ship (the SS *Mayaguez*). The U.S. Navy, Marine Corps, and Air Force units launched a rescue operation. They met heavy resistance from the Khmer Rouge. The U.S. Marine Corps suffered significant casualties during the operation, which ultimately resulted in the release of the SS *Mayaguez* and crew.

The Vietnam War and related military actions finally ended in the summer of 1975—over two decades since the United States began providing support to the French colonial government in their fight against a nationalist indigenous uprising. The war was a turning point for Americans and the U.S. military. It was a

conflict that occurred on a complicated stage that pushed technological change and forced the military's Special Operations forces to continually innovate. It was also an increasingly unpopular war that reshaped the manner in which U.S. civilians viewed warfare. Many became increasingly distrustful of their government and military leadership.

The war was also a quintessential Cold War conflict in which U.S. policymakers viewed anything branded as Communist, whether real or imagined, as a fundamental threat. Some threats were grave, others were illusory. There is no doubt that Communism shaped the war in Vietnam. It is also true that Vietnam was finally unified as a single country in the spring of 1975 under a generally popular Communist regime. The country was also finally free of the divisions established by foreign governments. Vietnam, which had been colonized by Europeans since the 19th century, was finally independent, albeit not on the terms the United States would have liked.

2.2 U.S. MILITARY MEDICAL HISTORY BEFORE THE VIETNAM WAR

Medical support for an American Army began on 27 July 1775 when the Congress established a medical service for the Army of General George Washington during the siege of Boston. The organization followed the model of the British Army. On 14 April 1818, Congress reorganized the staff departments of the Army and established the present medical department. Medical officers gained military rank in 1847. A hospital corps, providing formal instruction for enlisted men as physicians' assistants, was formed in 1887 and the present civilian programs for paramedical physician extenders have their philosophical base in this system. The Army established the Nurse Corps in 1901, the Dental Corps in 1911, the Veterinary Corps in 1916, and the Sanitary Corps in 1917; the latter became the Medical Service Corps in 1947 when the Women's Medical Specialist Corps enrolled dietitians and physical and occupational therapists.[12]

The major military contributions of the surgical disciplines have been in mass casualty management, the evacuation of wounded, and in the treatment of battle wounds. Although the removal of the sick and wounded from the battlefield has always been a part of military operations, the development of an organized system did not come until 1862. The next major advances in this area included the use of airplanes for evacuating hospitalized patients in World War II and the use of helicopters as forward tactical air ambulances in the Korean War.

Army studies of wound ballistics, beginning in 1892, established the scientific rationale for wide debridement of wounds, and led to reduction in gangrene and wound infection, as well as to the development of individual body armor. Charles Drew, Douglas B. Kendrick, and others developed systems for mass blood collection, distribution, and transfusion during World War II and introduced the civilian medical community to the concepts of massive blood transfusions for shock and trauma. An Army burn research and treatment center, founded in 1947, was the first in the United States, and the use of Sulfamylon to prevent skin infection contributed greatly to the burn research program.[13]

Communicable and infectious diseases have always been the major causes of morbidity among troops, and military medicine has made its greatest contributions in this area. In World War I, the application of infectious disease research to military sanitation produced a milestone in the history of war: lower mortality from disease than from battle wounds. Frederick F. Russell developed an American typhoid vaccine in 1909 at the Army Medical School. In 1911 the Army immunized all of its soldiers—a first for an entire Army—causing typhoid to disappear as a major cause of morbidity and mortality. Carl Rogers Darnall's introduction of anhydrous chlorine to purify drinking water in 1910 became the basis for present systems of municipal water purification. William C. Gorgas used the new findings on mosquito transmission to

[12] https://www.encyclopedia.com/medicine/divisions-diagnostics-and-procedures/medicine/military-medicine
[13] https://www.encyclopedia.com/medicine/divisions-diagnostics-and-procedures/medicine/military-medicine

control yellow fever and malaria, permitting the building of the Panama Canal. In 1933, the Army Medical Research Board in Panama conducted the first American studies on the efficacy of atabrine as a prophylactic drug against malaria; it became the standard drug of World War II until the chloroquine-primaquine combination tablet replaced it following definitive studies in Korea in 1960. In 1963, the Army's medical department began to support the only large international research program for the development of new antimalarial drugs.[14]

2.3 MEDICAL ADVANCES DURING AND BECAUSE OF THE VIETNAM WAR

2.3.1 WEAPONS AND WOUNDS

In addition to the well-known technical advances that have occurred during the major wars of the past 150 years, each one also has produced significant advances in medicine. Some of these advances were completely innovative as a direct result of circumstances that occur primarily during wartime—e.g., multiple severe wounds—and some advances expanded and standardized discoveries that had not yet become common in civilian medical practice.[15]

High-velocity, lightweight rounds from M16/AK47-type weapons used in the Vietnam War have greater kinetic energy and cause larger temporary and permanent cavities and more severe tissue damage than do low-velocity projectiles. They are also easily deflected by foliage, which causes the rounds to tumble and spin resulting in even larger entrance wounds. Therefore, blood vessels not in the direct path of the missile can be affected. Additionally, these bullets usually disintegrate and are rarely found whole even in the absence of an exit wound. Rapid-fire weapons result in a significant increase in percentages of multiple wounds. Multiple wounding complicated resuscitation and treatment.[16]

During the Vietnam war, small arms fire caused approximately two-thirds of the wounds of the head and neck, and three-fourths of trunk wounds; fragments accounted for the remainder. Fragments and small arms contributed fairly equally to wounds of the extremities.[17]

The distribution of fatal wounds by location differed from that of total wounds since some areas were much more likely to involve mortal injuries than others. The 14 percent of the wounds located in the head and neck region accounted for 39 percent of the fatalities. This was followed by 19.3 percent fatal wounds in the thorax; 17.9 percent, abdomen; 16.1 percent, multiple sites; 6.8 percent, lower extremities; and 0.9 percent, upper extremities. Twenty to thirty percent of the penetrating head wounds brought in from the field in Vietnam were classified as "expectant" cases, and little could have been done for them; however, a relatively low mortality rate for the others was accomplished through early evacuation, extensive use of blood, and the presence of fully trained neurosurgeons in the combat zone.

The data on relative lethality of wounds and the distribution by causative agent also showed the advantage of wearing properly designed body armor. Helmets proved very effective against fragments, although little could be done for a direct hit by a small-arms round. Troops in static positions or in air or ground vehicles usually wore both helmets and flak vests, but soldiers on the move found the body armor too heavy and too hot.[18]

[14] https://www.encyclopedia.com/medicine/divisions-diagnostics-and-procedures/medicine/military-medicine
[15] Dr. Raymond Tobey, Advances in Medicine During Wars, February 23, 2018, accessed: https://www.fpri.org/article/2018/02/advances-in-medicine-during-wars/
[16] Neel, page 53
[17] Neel, page 54
[18] Neel, page 55

The claymore mine received its first field trials by both sides in Vietnam. The intensity of peppering and the velocity of the fragments often resulted in deep penetration in a number of sites on the body. The extensive use of mines and booby traps in Vietnam created a serious medical problem as the proximity of the blast caused severe local destruction and caused tremendous amounts of dirt, debris, and secondary missiles to enter the wound. Massive contamination challenged surgeons to choose between radical excision of potentially salvageable tissue and a more conservative approach that might leave a source of infection.[19]

Source: https://www.militaryfactory.com/imageviewer/sa/pic-detail.asp?smallarms_id=35&sCurrentPic=pic9

FIGURE 2-3. M18 CLAYMORE MINE

Burns associated with enemy fire, while fewer in number, accounted for almost 70 percent of the fatalities in Vietnam because of their severity and associated wounds. A factor in the high mortality was that most combat burns occurred in an enclosed space, such as an armored personnel carrier or a bunker, and were complicated by inhalation injuries. The most unfortunate aspect of the burn injuries incurred in Vietnam was that more than half were accidental and, therefore, preventable.[20]

2.3.2 ADVANCE IN SURGICAL TREATMENT

Improved casualty management contributed to the quality of care. Surgery became a part of the continuing process of resuscitation and a weapon in the struggle against shock. A team approach where multiple surgeons with a variety of specialties operated together proved highly effective. A "team" for head injuries, for example, included a neurosurgeon, ophthalmologist, oral surgeon, otolaryngologist, and plastic surgeon. If the casualty had multiple injuries, more than one surgical team operated simultaneously.[21]

Surgical techniques practiced in Vietnam were comparable to those performed in the United States. Although, trauma surgery was more advanced as surgeons in Vietnam rediscovered that wounds (except cranial, facial, and some hand injuries) responded better to a delayed closure that permitted necessary drainage.[22]

By the spring of 1968, there were 10 neurosurgeons at five Army hospitals in Vietnam. Sophisticated operations were handled as a matter of routine.[23] Vascular surgery, rarely performed in Korea, was commonplace in Vietnam, and surgeons became so adept that not only thoracic, but also general and orthopedic surgeons, routinely performed vascular repairs.[24] Two to three percent of the hospitalized

[19] Neel, page 53
[20] Neel, page 56
[21] Neel, page 50
[22] Neel, page 50
[23] Neel, page 57
[24] Neel, page 50

wounded in Vietnam had significant vascular injuries, and the amputation rate for those with major arterial injury was about 13 percent. This rate was approximately the same as that for Korea, and markedly less than the 49 percent rate for World War II.[25] Further improvements in vascular reconstruction reduced the amputation rate in Vietnam to just 8 percent by the end of the war.[26] In a few instances, limb salvage was possible by constructing an extra anatomic bypass, tunneling a graft through a new route around the wound, until the wound healed and a permanent vascular graft could be inserted.[27]

Most surgery in Vietnam hospitals was done under a general anesthetic, usually thiopental induction and maintenance with halothane, nitrous oxide, and oxygen. Most anesthesiologists favored halothane with its rapid action, ease of administration, nonflammability, and applicability to all cases. It also did not cause nausea and did not mask critical drops in blood volume. Local anesthetics were used only for very minor wounds and a few delayed primary closures. Employment of spinal anesthesia was very limited and development of safe, simplified methods of portable inhaled anesthesia was emphasized. New concepts for assisting the breathing of the critically injured were also developed to meet Vietnam requirements. Prolonged mechanical support was necessary in some cases to minimize oxygen deficiency, and while respirators were typically used, the possibility of bacterial infection existed because proper sterilization was not always feasible under combat conditions. As a result, new respiratory assistance devices that eliminated or reduced that threat were tested in Vietnam.[28]

2.3.3 OTHER MEDICAL ADVANCES

Blood

Important advancements in medical practice during the Vietnam War included ways to extend the life of blood, plasma, and frozen blood products. Other medical advancements included the use of non-type specific blood as the universal blood type donor, O negative, was introduced on a wide scale in Vietnam. Since then, it has become the standard practice in blood transfusion for traumatic injuries.[29] Additionally, the use of a new type of Styrofoam container permitted storage of blood for 48 to 72 hours in field. This allowed for the movement of blood into forward areas in anticipation of casualties.[30]

The requirement for whole blood climbed slowly but steadily from fewer than 100 units per month in 1965 to 8,000 units by February 1966. By 1968, that number skyrocketed to more than 30,000 units per month. The whole blood requirement peaked at 38,000 units in February 1969 and fell rapidly to less than 15,000 units by mid-1970.[31]

Time is crucial in the collection, delivery, and distribution of whole blood for large numbers of traumatic casualties. From 1965 forward, a need for rapid distribution was the catalyst for U.S. Army Pacific and U.S. Army Republic of Vietnam (USARV) to develop a whole blood distribution program to support U.S. forces. Blood is perishable, and its useful life is short, as contaminated blood could be lethal. From donor to patient, liquified whole blood had a shelf life of 21 days.[32]

The 8th Field Hospital administered all whole blood transfusions until the spring of 1965. Every 10 days, 10 units of universal donor low titer group O blood were shipped to the hospital from Japan to meet the small demand for transfusions. Seldom did the demand for blood exceed the supply, and even during the

[25] Neel, page 52
[26] About *MEDICAL ADVANCES IN VIETNAM, accessed* http://www.vvmf.org/education-military-medical-advances
[27] Neel, page 58
[28] Neel, page 56
[29] About *MEDICAL ADVANCES IN VIETNAM, accessed* http://www.vvmf.org/education-military-medical-advances
[30] Neel, page 49
[31] Neel, page 114
[32] Neel, page 114

surprise attacks by the Vietcong at Qui Nhon and Pleiku in February 1965, the 406th Mobile Medical Laboratory bled local donors to supply the needed 123 units of whole blood. After the 3rd Field Hospital was established in Saigon in May 1965, it became the central blood depot in Vietnam and the 406th Mobile Medical Laboratory, a satellite of the 406th Medical Laboratory in Japan, was charged with distributing whole blood to all U.S. forces in Vietnam.[33]

The USARV Central Blood Bank operated under the 9th Medical Laboratory Detachment and was supported by personnel from the 3rd and 51st Field Hospitals, and by five sub-depots in the blood distribution system: the 406th, 528th, and 946th Mobile Medical Laboratories at Nha Trang, Qui Nhon, and Long Binh, respectively; the NSA Hospital, Da Nang; and the 96th Evacuation Hospital, Vung Tau. As troop strength grew and combat casualties increased, the task of distributing whole blood, plasma, and related products in South Vietnam developed into the largest blood distribution system ever undertaken by a single organization.[34]

The Military Blood Program Agency incorporated the donor collection and processing capabilities of the three military departments. Blood was collected by 42 donor centers designated by the Surgeons General of the U.S. Army, Navy, and Air Force and was shipped by air to the tri-service Armed Services Whole Blood Processing Laboratory at McGuire AFB. All group O blood was put through a blood titer process, and after a thorough inspection and verification of groups, Rh types, and other essentials, blood was flown via Elmendorf AFB, Alaska, to Yokota AFB in Japan. At each point, shipments were re-iced and then flown to the 406th Medical Laboratory in Japan. From Japan, whole blood was flown to the 9th Medical Laboratory, Saigon, and distributed from there to sub-depots in South Vietnam.[35] The first shipment of whole blood, 2,036 units, arrived in Japan from the United States in July 1966. From July 1966 to 1967, two shipments of 1,500 to 2,500 units of whole blood were received from the continental United States each week.[36]

After the Tet Offensive in 1968, military officials feared that another such offensive would interrupt the supply of blood from the USARV Central Blood Bank in Saigon, or that the airfield at Tan Son Nhut might be seized. Plans were initiated to construct a new central blood bank at Cam Ranh Bay on the grounds of the 6th Convalescent Center. The new laboratory was completed in June 1969 and the USARV Central Blood Bank moved there in July 1969.[37]

In April 1968, fresh frozen plasma was introduced in Vietnam as a means for controlling coagulopathy following surgery and massive transfusions. The availability of fresh frozen plasma resulted in a decrease in the quantity of fresh whole blood drawn in Vietnam. Fresh plasma was obtained at the 406th Medical Laboratory in Japan by the process of plasmapheresis from a limited group of donors of the AB group—the ideal donors for fresh plasma.[38]

Blood was already between four and seven days old when it arrived in Vietnam. Therefore, the amount of whole blood that became outdated because it was not used within 21 days was significant, averaging 29 percent. Occasionally, during lulls in the fighting, outdated blood reached up to 50 percent per month.[39]

Efforts were constantly made to extend the shelf life of blood. One of the most promising was the addition of small amounts of the amino acid adenine, which increased the shelf life of whole blood to 40 days. Adenine-added blood was tried on a limited basis in Vietnam during 1969. The blood was transfused to

[33] Neel, page 116
[34] Neel, page 116
[35] Neel, page 117
[36] Neel, page 119
[37] Neel, page 121
[38] Neel, page 124
[39] Neel, page 124

patients admitted to the hospitals at Long Binh, and no adverse effects were found in numbers of clinical tests.[40]

The normal blood volume in a young adult is approximately 8 to 10 pints and in catastrophic injuries, it is not uncommon to transfuse 10, 20, or more pints of blood and have the patient survive. Obtaining and storing these massive amounts of fresh blood in war time conditions was impossible. Therefore, the military became a leader in developing frozen blood products that can be used for up to a year if properly frozen.[41] However, the freezing compartment of an ordinary refrigerator was not cold enough to keep fresh frozen plasma for more than a week or two. Factor V, the most critical of all clotting factors, deteriorates slowly at temperatures above -20°C. A small freezer, used by construction engineers to cool steel rivets, was determined to be ideal for storing fresh frozen plasma. Steel rivets contract when cooled and expand to give a snug fit as they warm up. After diligent searching, enough of these freezers were found for all hospitals in Vietnam. By July 1969, a newly designed 4-cubic foot freezer, similar to the construction engineer's freezer, was issued in Vietnam.[42]

The Styrofoam blood box was introduced in late 1965 and was, without question, one of the most important technical advancements to come out of the blood distribution program. Major William S. Collins II, director of the blood bank at the 406th Medical Laboratory, suggested modifying the standard disposable blood box by replacing the cardboard divide insert with a Styrofoam insert that he had devised. The new insert, when placed in a cardboard shipping container, permitted shipment of blood at the required temperature regardless of outside temperatures.[43]

The shipping container was easier to handle and was less susceptible to damage or destruction than other shipping containers. The Collins box, as it became known, occupied only three cubic feet and weighed only 40 pounds when filled with 18 units of whole blood and wet ice. This replaced the conventional shipping container, the Hollinger box, which occupied eight cubic feet and weighed 115 pounds when filled with 24 units of blood and wet ice. In addition to weighing less, the Collins box offered other equally important advantages: compared to the $100 Hollinger box it cost only $1.40; it was expendable and did not have to be returned through the system to Japan; and it maintained an adequate ice level for 48 hours, twice as long as the Hollinger box. The castoff Collins Styrofoam blood boxes were reused by American servicemen and Vietnamese civilians for use as private iceboxes in hot and dusty Vietnam. Major Collins received $935 for his suggestion, and his innovation resulted in a first-year savings of $56,000 and a new flexibility in military blood banking. [44]

In early 1965, it was decided that only universal donor low titer group O blood would be shipped to Vietnam, and that the use of group and type-specific blood would be confined to the offshore hospitals in Japan and in the Philippines. The great advantage of universal donor blood is that it is impossible to give a patient the wrong group of blood. The amount of universal donor group O low titer whole blood that could be given to a casualty before he would have a reaction to his hereditary specific type and group was a significant concern. Frequently, transfusions of whole blood were initiated long before the casualty reached a facility with the capacity for cross-matching blood, and in these cases, type O low titer blood was used. Any patient who had received four or more units of type O low titer was continued on this type, while those who had received less than four were matched at the hospital.

[40] Neel, page 125
[41] Dr. Raymond Tobey, Advances in Medicine During Wars, February 23, 2018, accessed: https://www.fpri.org/article/2018/02/advances-in-medicine-during-wars/
[42] Neel, page 125
[43] Neel, page 125
[44] Neel, page 125

Stress

Armies have struggled for centuries to help troops cope with the stress of battle. From the late 17th to the late 19th century, "nostalgia" was the official diagnostic term for the homesickness and despair that practically paralyzed some soldiers. In Vietnam, men broke down, became contentious, or grew increasingly depressed. Units sometimes spent weeks fighting in and enduring an inhospitable environment. These surroundings took the form of heat, humidity, insects, snakes, leeches, booby traps, and an invisible but deadly enemy. For the men defending isolated hilltops and outposts, enemy shelling deprived men of sleep, leaving them exhausted, disoriented, and unable to function.[45]

Most of the psychiatric patients who arrived at the Navy medical companies or hospital ships were Marines who demonstrated extreme stress related to combat. Those who could not immediately be sent back to their units after some rest were retained in small 10- to 12-bed units. The antipsychotic drug of choice was Thorazine, which had a sedative effect on most patients. If patients were very stressed, psychotic, disorganized, or extremely fatigued and not able to function, psychiatrists administered enough Thorazine to make them sleep for two or three days. At timely intervals, corpsmen would wake the patients, help them to the latrine, give them food and fluids, and then allow them to go back to sleep. After a day or two of this regimen, most patients improved drastically and were able to return to their units.[46]

Until 1968, the neuropsychiatric disease rate in Vietnam remained roughly stable and parallel with that for the rest of the Army. In that year, however, Army-wide rates began to increase, and rates in Vietnam increased more precipitously than in any other location where substantial numbers of American troops were serving. Rising rates showed increases in all areas of psychiatric illness: psychosis, psychoneurosis, and character and behavior disorders, for example. Rates for admission to hospital and quarters for neuropsychiatric cases in Vietnam more than doubled between 1965 (11.7 per 1,000 per year) and 1970 (25.1 per 1,000 per year). In terms of estimated man-days lost, neuropsychiatric conditions were the second leading disease problem in the theater in 1970; the 175,510 figure for that year is more than twice as high as the estimate for 1967 (70,000), reflecting a steady increase over the 1967-70 period.[47]

A very important advance, for civilians as well as military personnel, was the post-war recognition of Post-Traumatic Stress Disorder (PTSD) as a disorder.[48] This was carefully described for the first time as a recognized diagnosis by a Veterans Affairs psychiatrist treating many Vietnam veterans. In the Civil War, it was called "Lost Heart;" in WWI, it was "Shell Shock;" in WWII, it was "Battle Fatigue." These individuals were often regarded as cowards and ordered to court-martial.[49]

Burns

Advances in burn care occurred during the Vietnam War. The use of antiseptic- and antibiotic-impregnated dressings helped reduce dangerous infections. Also, excessive loss of body fluids is a major problem caused by widespread loss of the protective skin cover; therefore, better fluid management of these patients added to survival and recovery.[50]

[45] Jan K. Herman, "Navy Medicine in Vietnam, Passage to Freedom to the Fall of Saigon," Naval History & Heritage Command. Department of the Navy, Washington, DC., 2010, page 16
[46] Herman, page 17
[47] Neel, page 45
[48] Christopher Connell, War's Medical Legacy, accessed: http://sm.stanford.edu/archive/stanmed/2007summer/main.html
[49] Dr. Raymond Tobey, Advances in Medicine During Wars , February 23, 2018, accessed: https://www.fpri.org/article/2018/02/advances-in-medicine-during-wars
[50] Dr. Raymond Tobey, Advances in Medicine During Wars , February 23, 2018, accessed: https://www.fpri.org/article/2018/02/advances-in-medicine-during-wars/

Burn cases were stabilized in-country and then evacuated to the 106th General Hospital in Japan, where a special burn unit had been established. Of the burns treated by the l06th, 27 percent returned to duty, 66 percent were evacuated to the burn unit at Brooke Army Medical Center, Fort Sam Houston, TX, and 7 percent died. Sulfamylon ointment was employed to prevent infection. If evacuation to Japan was delayed more than 48 hours, treatment was initiated in Vietnam.[51]

Disease

One of the most striking achievements of military medicine in Vietnam was the rapid and effective establishment of a preventive medicine program that dampened the impact of disease on combat operations. In World War II, preventive medicine programs in the Far East did not begin to make inroads on disease incidence until 1945. In Korea the delay was less, but still considerable. In Vietnam, however, effective disease control programs were introduced in 1965, and these programs were successfully maintained throughout troop buildup.[52]

Malaria was endemic and all troops took Chloroquine-Primaquine prophylaxis.[53] In Vietnam, the average annual rate of admission to hospital for malaria (26.7 per 1,000 per year) was about one-third of that for the Southwest Pacific-theater (70.3 per 1,000 per year) and one-quarter of that for the China-Burma-India-theater (101 per 1,000 per year) in World War II. However, malaria rates during the Vietnam War were higher than those of the Korean War (11.2 per 11000 per year). This was principally because *P. falciparum* malaria was encountered infrequently during 1950-53, and because primaquine, having just been introduced into general use during that time, had not yet induced the development of a drug-resistant strain of the parasite.[54] Malaria had a crippling effect on American strength at the outset of the Vietnam effort. In December 1965, the overall Army rate in Vietnam reached a peak of 98.4 per 1,000 per year; during that period, rates for certain units operating in the la Drang valley were as high as 600 per 1,000 per year, and at least two maneuver battalions were rendered ineffective by malaria.[55]

Much of the success in the fight against malaria was the result of the ongoing preventive medicine program and of findings from studies conducted at the Walter Reed Army Institute of Research (WRAIR) and in South Vietnam. Advances were also made in the treatment of the disease after it had been acquired. New advances in malaria chemotherapy showed that single doses of a combination of the long-acting sulfonamides, sulphormethoxine and pyrimethamine, were successful in the treatment of *P. falciparum* malaria when given alone or with quinine. Another study showed that these drugs, when used with quinine, reduced relapse rates to 2 percent whereas they had been as high as 41 percent on chloroquine therapy alone.[56] In addition to lowering the relapse rate, they also returned the soldier to duty more quickly.[57]

Another positive outcome from Vietnam-era malaria studies came about when team members instituting clinical research studies on extracellular fluid, blood function, and renal function noted that the delay involved in evacuating patients for hemodialysis treatment to Japan and the Philippines was causing an increase in morbidity and mortality from malaria. This led to the establishment of the first renal unit in Vietnam at the 3rd Field Hospital.[58] Additionally, on the recommendation of WRAIR malaria researchers, a central hospital for malaria patients known as the 6th Convalescent Center was established at Cam Ranh Bay. The center was used for treating patients, studying the disease, and evaluating new therapeutic agents.

[51] Neel, page 57
[52] Neel, page 32
[53] Herman, page 7
[54] Neel, page 38
[55] Neel, page 38
[56] USAMRMC, page 45
[57] Neel, page 39
[58] USAMRMC, page 45

Formal linkage with the Navy preventive medicine unit in Da Nang allowed the exchange of information and research data.[59]

All personnel received immune globulin for infectious hepatitis prior to or upon reporting in Vietnam.[60] As with malaria, the average annual infectious hepatitis rate in Vietnam (6.9 per 1,000 per year) was lower than comparable rates for World War II (Southwest Pacific = 27.1 per 1,000 per year; China Burma India = 9.8 per 1,000 per year). Vietnam rates for infectious hepatitis were also lower than those for Korea (7.9 per 1,000 per year). The hepatitis rate in Vietnam reached a peak in August 1968. Largely caused by failures in mess and field sanitation and by consumption of non-potable water and ice available through the local economy, this disease was most commonly acquired by soldiers in their fourth through ninth month in Vietnam.[61]

Although cholera did not have a material effect on U.S. troops, an intensive recurrence in the Vietnamese population within a 2-month period overwhelmed existing clinics and hospitals. American medical teams taught the Vietnamese the mass treatment system for replacement of fluids and electrolytes, virtually eliminating further deaths from cholera.[62]

A disease that did pose a potential threat to U.S. troops was the plague. A joint study by the Ministry of Health, the Pasteur Institute and the WRAIR team led to the construction of a plague research laboratory that tracked 4,500 cases of plague in 1965. Studies of rodent reservoirs and flea vectors revealed new endemic foci as well as a realization that rat fleas were resistant to the pesticide DDT (dichloro-diphenyl-trichloroethane). As a result, rat and flea survey programs and insecticide evaluation programs were expanded, and a program was initiated for the production and evaluation of a living plague vaccine.[63]

The incidence of diarrheal disease severe enough to require hospitalization or assignment to quarters showed a steady downward trend between 1965 and 1970. In 1965, the average theater-wide annual rate for this type of disease was 69 per 1,000 per year; in 1969, it was 35 per 1,000 per year. Incidence of diarrheal disease peaked in May or June, corresponding with the monsoon season. The illness most severely affected wet, unacclimated troops under combat conditions. Disease often stemmed from feces-laden soil being washed into inadequately protected water supplies in the field. Any one of a host of viral, bacterial, or parasitic agents caused diarrhea in Vietnam. The average hospital stay for a patient with a diarrheal problem was five days. In the China-Burma-India-theater during World war II, it was reported that "... except for an occasional winter month, monthly rates for diarrhea and dysenteries were never under 100 per 1,000 per year until the fall of 1945."[64]

Skin disease is a leading cause of morbidity in any tropical military campaign. The tactical situation, particularly in the Mekong Delta region, required continuous and prolonged exposure to a wet environment, predisposing infantrymen to bacterial and fungal invasions of the skin.[65] Skin disease incident rates severe enough to require hospitalization or admission to quarters in Vietnam was around 30 per 1,000 per year until 1968, when a new preventative program resulted in a dramatic drop to around 20 per 1,000 per year. At the height or the rainy season, the rates of disabling skin disease among infantrymen were extremely high, reaching 50 percent in some rifle companies. Surgeons at the infantry battalion level were often

[59] USAMRMC, page 45
[60] Herman, page 7
[61] Neel, page 40
[62] USAMRMC, page 46
[63] USAMRMC, page 46
[64] Neel, page 41
[65] USAMRMC, page 49

overwhelmed by the number of soldiers displaying skin lesions of uncertain etiology which were slow to heal despite vigorous topical and systemic antibiotic therapy.[66]

Skin disease occurred from prolonged exposure to contaminated water; damage to the skin by trauma and friction generated by wearing boots and socks; presence of the etiological organisms in the watery environments; and increased temperature of the tropical environment. Susceptibility to dermatological diseases increased with time in combat, peaking at the 10th month. Immersion foot was treated through the use of a drying-out period, and the others through the therapeutic use of griseofulvin-V, broad scope antibiotics, and a variety of topical treatments.[67]

Source: National Archives, accessed https://www.bing.com/images/search?view= =image+of+us+soldier+in+country+vietnam

FIGURE 2-4. SOLDIER IN COUNTRY, VIETNAM

The USAMRDC sent a special field epidemiological research team from WRAIR to the Mekong Delta in 1968.[68] From November 1968 through February 1969, the field dermatology research team, led by Captain Alfred M. Allen, studied dermatological conditions in soldiers and civilians in the 9th Division area and published several articles addressing skin diseases in Vietnam. Those articles formed the basis for the understanding of skin diseases in the area. Based on this research and similar work by the other Services, Operation Safe Step, a medical research program designed to control and minimize foot problems in troops, ensued. It was a three-pronged effort to test foot gear, protective skin ointments, and skin disease in volunteers exposed to paddy water for varying lengths of time.[69]

A unit located at the Letterman Army Institute of Research, Presidio of San Francisco, led by Colonel William Akers, provided the ointments while the U.S. Army Natick Research Laboratory provided the footgear. Captain Allen's field dermatology team worked in consultation with Colonel Akers and the division surgeons in charge of the program. In less than six months, Captain Allen's team had identified

[66] Neel, page 132
[67] Neel, page 43
[68] Neel, page 132
[69] USAMRMC, page 49

the populations most likely to develop disabling skin diseases, isolated the pathogens, measured the effects of exposure, and initiated effective new methods of prevention and treatment.[70]

As a result of these studies, Major General Ewell, 9th Infantry Division, altered division tactical procedures by limiting operations in paddies to 48 hours (unless pinned by the enemy) followed by a 24-hour drying period. Time lost to skin diseases dropped from over 3,000 days per month to 1,000 days per month, a significant preservation of combat power.[71]

The chief causes of cutaneous disability in American combat forces were inflammatory ringworm and tropical immersion foot. Elastase-producing fungi were found to be the major cause of inflammatory ringworm. A preliminary study showed that daily administration of griseofulvin was an effective prophylactic against fungus diseases of the skin, and its use reduced incapacitating dermatophytosis in certain special military units from 36 percent to 6 percent, a major contribution of preventive medicine during this period. Nondisabling skin diseases included prickly heat, acne vulgaris, and tinea versicolor.[72]

2.3.4 MEDICAL RESEARCH LABORATORIES

The operating conditions that the climate and geography of Vietnam presented were new challenges that the U.S. military needed to overcome. Extreme heat and humidity negatively impacted soldier performance and endemic tropical diseases accounted for a significant portion of days lost while in-theater. The environmental conditions combined with the endemic (as well as epidemic) tropical diseases also made preserving and maintaining medical supplies and equipment difficult. Logistical problems were compounded by the overtaxed medical supply system and by the terrain of waterways and jungles that restricted supply distribution and patient evacuation.[73]

In July 1962, a group from WRAIR was sent to Southeast Asia to evaluate the existing resources for medical research and to develop plans for coordination and expansion. They surveyed the laboratories then operating in East and Southeast Asia: the Air Force's Fifth Epidemiological Flight at Yamata, Japan with one air-transportable trailer-type bacteriology laboratory, the 406th Medical General Laboratory at Camp Zama, Japan; the U.S. Naval Medical Research Unit (NAMRU) No. 2 in Taipei, Taiwan, the U.S. Army Medical Research Unit in Kuala Lumpur, Malaysia, and the U.S. Army Medical Component of the Southeast Asia Treaty Organization (SEATO) Medical Research Laboratory in Thailand.[74] A medical laboratory system was established in Vietnam based on a concept of the laboratory as a component of medical service with a specific function of generating medical technical information for the purpose of patient care, disease, prevention, advice to the command, and forensic activity.[75]

The study group recommended expansion of the existing medical research program to include establishment of a medical research unit in Saigon of a WRAIR, similar to those in Bangkok and Kuala Lumpur, because a theater laboratory would not be able to deal with all the subjects to be covered in the expanded program. In November 1963, a research team was sent to Saigon.[76] Initially, the team studied infectious disease, combat surgery, and military psychiatry, and evaluated new medical materiel. Their first effort was a blood survey among U.S. military advisers in the Delta region for evidence of viral hepatitis, leptospirosis, and dengue-related viruses.[77] During its third year, from 1965 to 1966, the medical research team expanded its

[70] USAMRMC, page 49
[71] USAMRMC, page 49
[72] USAMRMC, page 49
[73] Ellen R. Hartman, Susan I. Enscore, and Adam D. Smith, "Vietnam on the Homefront: How DoD Installations Adapted, 1962–1975," Department of Defense Legacy Resource Management Program, Report ERDC/CERL TR-14-7, December 2014, page 92
[74] Neel, page 127
[75] Neel, page 136
[76] Neel, page 127
[77] Neel, page 128

research studies into malaria, plague, gastrointestinal disease, fevers of undetermined origin, combat psychiatry, environmental stress, and other causes of morbidity and mortality in U.S. soldiers.[78]

The first medical laboratory unit in Vietnam, a mobile detachment of the 406th Medical General Laboratory, began operations as laboratory augmentation of the 8th Field Hospital in Nha Trang in 1962. In late 1965, the 528th and 946th Mobile Laboratories of the 9th Medical Laboratory arrived in Vietnam and were placed under operational control of the 406th Mobile Laboratory. These units were to support the 85th and 93rd Evacuation Hospitals. Within six months, the headquarters and base section of the 9th Medical Laboratory arrived and assumed control over these units. In August 1967, the 406th Mobile Laboratory was placed under operational control of the 9th Medical Laboratory.[79]

In February 1966, the 3rd Field Hospital in Saigon instituted clinical research studies in patients with malaria, including studies of body water, extracellular fluid, blood volume, and renal function. Because the only facilities for performing hemodialysis were in Japan and the Philippines, delays in evacuation and treatment of patients with acute renal failure often resulted in increased morbidity and mortality. The first in-country renal unit was established in Vietnam at the 3rd Field Hospital.[80]

In January 1968, the 74th Medical Laboratory was activated and organized to replace the 406th Medical Laboratory (Mobile) and was placed under operational control of the 9th Medical Laboratory. By September 1968, the 946th and 528th Medical Laboratories (Mobile) were inactivated and their personnel assigned to the 9th Medical Laboratory. These two mobile laboratories, or mobile sections of the 9th Medical Laboratory, continued operations in Long Binh and Qui Nhon.[81]

The Surgical Research Team sent from WRAIR, tested several experimental items developed to aid wound healing in Vietnam. An antibiotic preparation, packaged as an aerosol, was distributed to aide men in various tactical units. Immediate use on an open wound acted to slow bacterial growth and resulted in decreased morbidity. Tissue adhesives that had low toxicity, degraded relatively rapidly, and spread well proved valuable in surgery on the lung, kidney, and liver. The Surgical Research Team utilized them with excellent results as early as 1968.[82]

The war in Vietnam exposed deficiencies in the knowledge of certain important tropical diseases. The Field Epidemiologic Survey Team (FEST) was organized in May 1966 at the USA John F. Kennedy Center for Special Warfare at Fort Bragg, North Carolina (NC). It was recognized that a research group operating in the remote areas where U.S. military forces were being committed could study the epidemiology of tropical diseases in the environment where most of them were transmitted. The FEST was trained to specified scientific areas of interest, such as the entomological aspects of tropical sprue, febrile illness, schistosomiasis, filariasis, dengue, and malaria. After the training period, FEST was formally constituted as an element of WRAIR, deployed to Vietnam on 26 September 1966, and became part of the medical research team in Saigon for administration and logistics, but was attached to Headquarters, 5th Special Forces Group. The studies of this team which continued through 1968, diminishing as the war became conventionalized.[83]

Other research included the development and testing of new respiratory assistance devices and the development and use of plastic polymers as tissue adhesives in controlling bleeding and repairing internal organs. Spray guns containing the adhesive were provided to the surgical research team for use in treating

[78] Neel, page 129
[79] Neel, page 136
[80] Neel, page 131
[81] Neel, page 136
[82] Neel, page 57
[83] Neel, page 131

casualties in Vietnam. New methods for fixing jaw fractures were studied as was a new technique using a silicone plastic placed directly into oral wounds to restore temporary oral integrity until reconstructive surgery could be performed. Other innovations were the use of electrical anesthesia, laser irradiation, synthetic blood vessels, plasma expanders new additives in the preservation of whole blood, Sulfamylon ointment for control of infection in burns, and various methods for suppression of an immune response of the body to homografts and transplants.[84]

A major collaborative study done by the team with the 93rd Evacuation Hospital and the SEATO laboratory in Bangkok resulted in determining the specific causes of fever of unknown origin in 60 percent of patients studied. Of the cases diagnosed, 50 percent were due to dengue with Chikungunya, scrub typhus, and malaria accounting for most of the remainder. These laboratory results, carefully correlated with clinical findings, enabled clinicians to diagnose these diseases, in the absence of classical findings, early in the course of hospitalization.[85]

Studies of heat stress incurred by crews of the Mohawk (OV- l) aircraft led to changes in clothing and to ventilation of the cockpit, measures which materially improved crew comfort and efficiency.[86]

2.3.5 MEDICAL FACILITIES IN VIETNAM AND THE PACIFIC THEATER

During the Vietnam War, the majority (69 percent) of hospital admissions in Vietnam between 1965 and 1969 were due to disease. Although hospital stays for combat injuries were longer, on average, these battle injuries accounted for only one in six in-country hospital admissions between 1965 and 1969.[87] In Vietnam, as in Korea and in the Asiatic- and Pacific-theaters in World War II, the cumulative effect of disease was the greatest drain on the strength of the American combat and support effort.[88] Although disease accounted for the single greatest cause of indisposition during this war, disease rates for Vietnam were lower than for previous conflicts.

Army Hospitals

When the Army's Charlie Medical Company arrived in Da Nang, the living conditions were poor and obtaining materials to improve the facilities was a constant problem. The personnel pitched the tents over wooden frames and plywood decks. A helicopter pad for receiving casualties lay in the center of the compound. The medical staff occupied screened, wooden-framed structures with corrugated metal roofs called "hooches." Operating rooms consisted of two plywood boxes side-by-side inside a canvas tent and the tents were surrounded by sandbags. Between the two operating rooms, a larger tent enclosed a plywood box. This bigger tent served as a recovery room and an intensive care unit (ICU).[89]

The Army used a Medical Unit Self-Contained Transportable (MUST) system, similar to the Korean War Mobile Army Surgical Hospital (MASH) unit. These MUST units consisted of three basic elements, each of which could be airlifted and dispatched by truck or helicopter. The expandable surgical element was a self-contained, rigid panel shelter with accordion sides. The air-inflatable ward element was a double-walled fabric shelter that provided a free-space area for ward facilities.[90] The utility element or power package contained a multi-fuel gas turbine engine that supplied electric power for air-conditioning, refrigeration, air heating and circulation, water heating and pumping, air pressure for the inflatable

[84] Neel, page 135
[85] Neel, page 130
[86] Neel, page 130
[87] Hartman, et al, page 95
[88] Neel, page 32
[89] Herman, page 15
[90] Neel, page 66

elements, and compressed air or suction. Other expandable elements were used for central materiel supply, laboratory, X-ray, pharmacy, dental, and kitchen facilities.[91]

The performance of the 45th Surgical Hospital led to the accelerated deployment of MUST equipment for three additional surgical hospitals (the 3rd, 18th, and 22nd) in 1967. In 1968, the 95th Evacuation Hospital was temporarily supplemented with some MUST equipment until the construction of a fixed facility was completed. The 2nd Surgical Hospital arrived in Vietnam in 1965 and had a long history of distinguished service before becoming the last unit to be equipped with MUST in January 1969. The Marine Corps was also using MUST equipment.[92]

The nature of counterinsurgency operations in Vietnam necessitated modification of medical facilities in a combat area. There was no "front" in the tradition of World War II; instead, the Army had base camps throughout the countryside. The base camp was relatively secure unless it was under attack, so semi-permanent, air-conditioned, fully equipped hospitals were constructed at a number of these camps. In contrast to World War II and the Korean War, the hospital did not follow the advancing army in direct support of tactical operations. All Army hospitals in Vietnam, including the MUST units, were fixed installations with area support missions.[93]

Source: https://en.wikipedia.org/wiki/Medical_Unit,_Self-contained,_Transportable

FIGURE 2-5. A U.S. ARMY HOSPITAL IN VIETNAM, EQUIPPED WITH MUST (MEDICAL UNIT, SELF-CONTAINED, TRANSPORTABLE) EQUIPMENT

The bed occupancy rate in Vietnam was approximately 60 percent and was about 50 percent in offshore facilities.[94] The average length of stay per case for patients in Vietnam (63 days through July 1967) was considerably less than those of World War II (80 days) and the Korean War (75 days).[95] This reduction reflected the advances in wound management and patient care. Of the 194,716 wounded in Vietnam between January 1965 and December 1970, 61,269 (or 31 percent) were treated and returned to duty immediately. Of those admitted to treatment facilities, the distribution upon leaving was as follows:

[91] Neel, page 65
[92] Neel, page 67
[93] Neel, page 59
[94] Neel, page 52
[95] Neel, page 52

- 42.1 percent returned to duty in Republic of Vietnam
- 7.6 percent returned to duty in the Pacific Command
- 33.4 percent returned to duty in the United States
- 2.7 percent still hospitalized as of 31 December 1970
- 14.2 percent other dispositions (died, transferred to VA hospital, discharged, etc.).[96]

Until April 1965, the 8th Field Hospital at Nha Trang with a 100-bed capacity was the only U.S. Army hospital in Vietnam. Because of the limited number of Army hospital beds in Vietnam to support the buildup of U.S. combat forces in 1965, a variable 15- to 30-day evacuation policy was established. By mid-1966, the number of beds had increased sufficiently to permit a change to a 30-day policy. Patients who could be treated and returned to duty within 30 days were retained in Vietnam and patients requiring hospitalization for a longer period were evacuated out-of-country as soon as their medical condition permitted. By December 1968, there were 5,283 Army hospital beds in Vietnam at facilities located throughout the four Corps Tactical Zones (CTZ).[97]

Navy Hospitals

The Navy operated two hospitals in Vietnam, one in Saigon and another in Da Nang. The U.S. Naval Station Hospital in Saigon was established as a response to the military buildup and to address the need for a military hospital and medical services in the capital. This hospital treated U.S. and allied military personnel (Australia, New Zealand, Philippines, and South Korea) and South Vietnamese civilians. It was the first full-scale hospital established in Vietnam by the U.S. military; it had a 100-bed inpatient capacity, and it was used to handle combat casualties from the Mekong Delta.

The Station Hospital Saigon was ready by October 1963. The hospital treated wounded Navy and Marines from Saigon and III and IV CTZs in the southernmost part of the country were they no longer were treated at the 8th Army Field Hospital. It remained responsible only for the large area encompassed by II CTZ in the central part of South Vietnam.

At Station Hospital Saigon, the senior physician was assisted by nine medical officers, including two general surgeons, an internist, a psychiatrist, four or five general practitioners, seven Navy nurses, and eight Thai nurses. The staff also had two Medical Service Corps officers, 76 trained hospital corpsmen, and 40 Vietnamese employees who served as clerical assistants, drivers, and janitors. Navy medical personnel stabilized and treated most casualties and performed minor surgery. The more serious cases were medevacked to other military treatment facilities in Japan or in the continental United States. The hospital had a 30-day holding policy, and two air evacuation flights per week were used to transfer patients to the hospital at Clark AFB in the Philippines[98]

As the war escalated throughout South Vietnam, Station Hospital Saigon proved inadequate to handle the influx of casualties. In October 1965, the Navy created Naval Support Activity (NSA), Da Nang to support the Navy and Marines operating in the northern provinces of South Vietnam (I CTZ). The new station hospital became the largest land-based medical facility in Vietnam. The advanced emergency hospital center eventually provided specialties not found in the medical battalion hospitals, such as neurosurgery, dermatology, urology, plastic surgery, ophthalmology, and ear, nose, and throat treatment.[99]

Three months after construction began in July 1965, Viet Cong attacked the site destroying much of the compound. Despite the setback, the hospital opened in mid-January 1966 with 120 beds. By the end of

[96] Neel, page 52
[97] Neel, page 61
[98] Herman, page 7
[99] Herman, page 21

1966, 6,680 patients had been treated. Two years later, during the peak of American involvement in the war, the bed capacity increased to 700 with 24,273 admissions. The facility also added a dental department, preventive medicine unit, blood bank, frozen blood bank, and a detachment of NAMRU No. 2, then headquartered in Taipei, Taiwan.

At NSA Hospital, Da Nang, patients whose hospitalization was expected to be 30 days or less remained until they recovered and then returned to their units. The hospital treated the more seriously injured but transferred them to naval hospitals in the Philippines, Japan, or Guam if their hospitalization was expected to be 120 days or less. The patients were transferred to medical facilities in the United States if their condition required hospitalization beyond 120 days. Patients were provided care at NSA Hospital, Da Nang until they were able to withstand air travel. Air Force casualty units provided the airlift to Clark AFB Hospital in the Philippines and also to Japan, Guam, and the United States. Clark AFB Hospital offered short-term medical care for patients on their way to other treatment facilities.[100]

The hospital buildings included several Quonset huts connected by cement walkways, some covered by wooden roofs. The casualty receiving area, consisting of one Quonset hut and an open area with a cement floor and tin roof, was adjacent to a small landing strip. The pre-op building and x-ray hut abutted the receiving area. Adjacent to pre-op and x-ray buildings were the Quonset huts that contained two operating rooms (OR), the Central Supply half hut, and the upper hut that also contained two operating rooms. The two OR Quonset huts and Central Supply were in the shape of an "H."[101]

Nearly two years after NSA Hospital, Da Nang opened, the staff numbered between 25 and 30, 15 of whom performed administrative duties. The hospital continued to expand, offering additional specialties, such as oral and plastic surgery. During lulls in battle, the staff also took Vietnamese civilian patients, operating on cleft lips and palates and performing other elective surgeries. The hospital was turned over to the Army in 1970.[102]

As the American presence in Vietnam grew, so did the number of casualties. Navy planners soon recognized that hospital ships could augment the medical companies and the NSA Hospital, Da Nang. [103] Because of Vietnam's narrow geography, which was accessible to helicopters, and its long coastline suited to hospital ships, medevacked patients could be aboard and on the operating table within half an hour.[104]

The Navy operated two hospital ships, *U.S.S. Repose* and *U.S.S. Sanctuary*, staffed by Navy doctors, corpsmen, and female members of the Nurse Corps. The ships arrived and were stationed off the central coast of South Vietnam in 1966 and 1967, respectively, and provided medical support for American and Allied Forces.[105]

On 8 March 1967, *U.S.S. Sanctuary* departed San Francisco for the Far East. On 2 April, she joined the 7th Fleet at Subic Bay. On 10 April 1967, *U.S.S. Sanctuary* arrived at Da Nang, South Vietnam and took aboard her first casualties. By the end of the month, the ship had admitted a total of 717 patients, with 319 combat casualties, 72 noncombat injuries, and 326 with disease. The staff also treated 682 outpatients. Only two patients died. After a year in Vietnam, the *U.S.S. Sanctuary* had admitted 5,354 patients and treated another 9,187 on an outpatient basis. After more than 10,000 helicopter landings, 4,600 major surgical operations, admitting 13,500 patients, and treating about 35,000 servicemen, the *U.S.S. Sanctuary* departed Vietnam from Da Nang harbor in April 1971.[106]

[100] Herman, page 21
[101] Herman, page 22
[102] Herman, page 23
[103] Herman, page 29
[104] Herman, page 30
[105] Hartman, et al, page 118
[106] Hartman, et al, page 118

When she was recommissioned on 16 October 1965, *U.S.S. Repose* was a fully equipped, modern floating hospital with a medical staff of 54 officers, 29 nurses, and 543 enlisted personnel. The *U.S.S. Repose* arrived off Chu Lai on 16 February and began taking on patients. The ship supported military operations and took patients from such places as Da Nang, Dong Ha, Khe Sanh, Chu Lai, Phu Bai, and Quang Tri until leaving in in March 1970. During her three-year deployment, the medical personnel on *U.S.S. Repose* treated more than 9,000 battle casualties and admitted approximately 24,000 patients for inpatient care. The vessel had less than a 1 percent death rate.[107]

Source: http://photos.wikimapia.org/p/00/01/58/10/83_big.jpg

FIGURE 2-6. *U.S.S. SANCTUARY* IN VIETNAM 1970

There were three completely equipped operating rooms (ORs), two anesthesiologists, a nurse anesthetist, three nurses, and from 9 to 12 operating room technicians. At times of massive casualty admissions, all three ORs could run simultaneously, often with multispecialty procedures underway on the same patient. The operating rooms were located at the center of the ship to minimize rolling and rocking, though, surgeons just reporting aboard had to learn to overcome any tendency toward sea sickness, to operate uphill and downhill with the ship underway, and to wait for the OR light to swing back into the field of sight. The anesthesiologist had to learn to pin his anesthesia machine with one foot while hooking the table with his other foot to avoid sliding away from the patient. The ICU had 18 beds and each nursing shift ordinarily consists of two nurses and four corpsmen. The ICU was equipped with wall suction, piped-in oxygen, and four beds with electrocardiogram monitoring capability.[108]

2.3.6 ADVANCES IN MEDEVAC

One of the most significant innovations in medical care that resulted from the Vietnam War was the widespread use of air ambulances, also called medevacs, for helicopter evacuation of casualties of the war. The first helicopter medivac was performed in the beginning of 1944 by an U.S. Army Air Forces lieutenant piloting an early Sikorsky YR-4 in Burma. More than 10 years before U.S. involvement in Vietnam, helicopters showed their potential and utility during the Korean War, transporting casualties from the battlefield to aid stations, field hospitals, and hospital ships. This evacuation system could move a casualty from the battlefield to definitive care within 60 minutes—the "magic hour" that often-meant life or death.[109]

[107] Hartman, et al, page 118
[108] Cowart, Jr. CAPT, Elgin C., *Proudly We Hail,* U.S. Navy. Bureau of Medicine and Surgery, U.S. Navy Medicine Vol. 57 No. 4, April 1971
[109] Herman, page 41

Although helicopter aeromedical evacuation became common during the Korean War, land-based ambulances still transported 80 percent of the wounded.

Within Vietnam, the waterways, jungles, and lack of infrastructure obstructed the tactical frontline evacuation of casualties, even without the interference of combat operations.[110] In Vietnam, helicopters touched down forward of aid stations on the battlefield itself and evacuated the wounded to air-conditioned, fixed hospital facilities. [111] Army rotary wing aeromedical evacuation became a routine part of the Army Medical Department's evacuation system in Vietnam, which was universally referred to as "dustoff," a radio call sign adopted in 1963.

Compared to helicopters used during the Korean War, helicopters flown during Vietnam were larger. The improvement over Korean War-era helicopter transport was that the wounded were carried inside the helicopter, not outside of it. This change also allowed for a medic to tend to the wounded on route to the medical facility.[112] The ability to carry the casualties inside the helicopter meant casualties on route to the field hospital could receive definitive medical treatment from helicopter medics. This was paramount in reducing the mortality rate of casualties during Vietnam, along with the initiation of specialty hospitals for the treatment of certain types of injuries. Dustoff helicopters brought modern medical capabilities closer to the tactical front lines than ever before, and they provided great flexibility in the treatment of casualties. Dustoff helicopters, working with the communication network on board, made it possible to evaluate the status of casualties while in flight and possessed the ability to be directed to the nearest hospital best suited to the needs of the casualty.[113]

Civilian responders in the United States began to employ this system of pre-hospital care by para-medical professionals, now known to the public as Emergency Medical System (EMS). In the United States, civilian responders also began using helicopters to transport highway crash victims.[114] Today's trauma centers, which rely on medevac helicopters to deliver grievously injured patients well within that magic hour, owe their existence to procedures developed during the Vietnam War.[115]

Aeromedical evacuation became routine in Vietnam as the Army Dustoff helicopters transported over 64,000 casualties in 1966. By 1967, this number rose to 94,000 injured soldiers.[116] Army air ambulances completed more than 104,112 aeromedical evacuation missions while flying approximately 78,652 combat hours in 1969.[117] At the peak of combat operations in 1968, aeromedical support was provided by 116 air ambulances and these helicopters could transport six to nine patients at a time. Medical evacuation flights averaged only about 35 minutes each. The more seriously wounded usually reached a hospital within 1 to 2 hours after they were injured. Of the wounded who reached medical facilities, about 97.5 percent survived.[118] From 1962 through 1973, Army medical evacuation helicopters transported almost one million patients, both military and civilian, in a total of 496,573 missions. A study showed the percentages of wounded evacuated to the United States as 60 percent Army, 35 percent Navy and Marine Corps, and approximately 5 percent Air Force. This is a direct result of the different missions performed by the Services in Vietnam.[119]

[110] Howard, page 39
[111] Major William G. Howard, History of Aeromedical Evacuation in The Korean War and Vietnam War, Fort Leavenworth, Kansas, 2003, page 39
[112] Howard, page 42
[113] Howard, page 42
[114] About *MEDICAL ADVANCES IN VIETNAM, accessed* http://www.vvmf.org/education-military-medical-advances
[115] Herman, page 43
[116] Howard, page 42
[117] Neel, page 75
[118] Neel, page 70
[119] Howard, page 49

To protect helicopter pilots, heavy armor plates protected the pilot's seat, cockpit doors, and cabin floor as a precaution. Even though the Geneva Convention stated that helicopter ambulances should have large red crosses painted on the sides, nose, and bottom, in Vietnam, crews in certain units only painted a small red cross on the nose; because they believed that the Viet Cong would use the large red crosses on the sides as targets.[120]

source: https://cherrieswriter.com/2016/02/23/dead-men-flying-heroic-as-hell-the-dustoff-pilots-of-the-vietnam-war-image-heavy/

FIGURE 2-7. DUSTOFF HELICOPTER

In addition to the helicopter ambulance, a medical radio network created the basis of the effective medical regulating system that evolved in Vietnam. During the first phase of U.S. troop commitment to Vietnam in early 1965, there was only one hospital in support of each CTZ and, therefore, no alternative for the destination of a casualty. As the number of hospitals and the number of casualties increased, the need for a regulating system became imperative.[121]

Telephone communications were poor and radio communications were not much better during this period. When heavy fighting produced a large number of casualties and medical regulating was most urgently needed, operational radio traffic was also heaviest. Since short-range radios were used, requests for evacuation had to be routed from divisional medical battalions to backup hospitals by way of the Dustoff radio network or through the supporting field Army medical group. This cumbersome method caused delays and sometimes resulted in garbled transmissions. On an experimental basis, the 55th Medical Group at Qui Noon borrowed single-sideband, long-range radios from the 498th Medical Company (Air Ambulance). Originally placed in the air ambulance company for long-range transmissions to its aircraft on evacuation missions, these radios had been little used because of the relatively short distance of most flights and the extensive maintenance they required.[122]

[120] Howard, page 51
[121] Neel, page 73
[122] Neel, page 73

The widespread use of these long-range radios reduced the response time to an injured solider—it took an average of just nine minutes from request to the launch of a medevac. Improved radio communication also meant that the status and needs of the injured solider could be relayed to the hospital while on route.[123] The use of the radio network permitted redirecting the patient to the nearest hospital best-suited to his needs. If a hospital developed a surgical backlog, the combination of helicopter and radio facilitated regulating patients according to available operating facilities, rather than available beds. This combination was the core of the Army medical management system in Vietnam.[124]

As the war went on, it was apparent that finding means of rescuing wounded soldiers specifically from the dense jungle environment was imperative. This jungle extraction led to the use of hoists. Captain Donald Retzleff, 1st Platoon, 498th Medical Company, Nha Trang, performed the first hoist rescue mission 17 May 1966, 12 miles north of Song Ba. The first time the hoist was utilized, the medic rode the cable down and, once on the ground, he showed the ground troops how to place the wounded soldier in the vest. Before that day was over, the hoist had lifted 17 wounded soldiers to safety.[125]

The hoist consisted of a winch and cable on a boom that was moved out from the aircraft. The cable could be lowered at the rate of 150 feet per minute and retracted at the rate of 120 feet per minute. At the end of the cable was a ring and hook to which a vest, rigid litter, or jungle penetrator could be attached. A rigid litter was added for patients who were too seriously wounded to be put in the vest.

source: https://www.cc.gatech.edu/~tpilsch/AirOps/sar-penetrator.html

FIGURE 2-8. JUNGLE PREDATOR

Neither the vest nor the litter worked well in dense jungle areas and to solve this problem, the "Jungle Penetrator" was developed. The penetrator was a torpedolike, three-foot projectile attached to and lowered from the helicopter. Once on the ground, seats were pulled down from the bottom half of the projectile and

[123] About *MEDICAL ADVANCES IN VIETNAM, accessed* http://www.vvmf.org/education-military-medical-advances
[124] Neel, page 70
[125] Howard, page 50

the wounded was strapped on. The first jungle penetrators arrived in Vietnam in June 1966 and were placed in use after extensive training in October 1966.[126] The jungle penetrator was preferred over the litter by the crews for hoist rescues because it was less likely to become entangled in the trees.[127] As the jungle penetrator became more popular, the use of the vest was eventually discontinued.

All Dustoff and medevac units operating in Vietnam were using the hoist by the end of 1966. The hoist permitted the rescue of 1,735 casualties in 1963 and 2,516 casualties in 1969, who otherwise could not have been retrieved.[128]

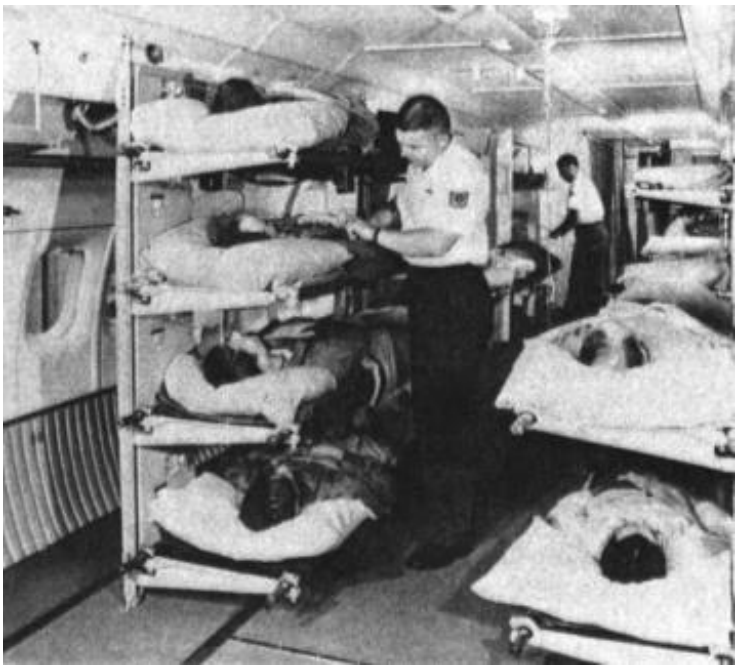
2.3.7 OUT-OF-THEATER AND OUT-OF-COUNTRY EVACUATION

The patient evacuation policy for Vietnam was established as a 15-day minimum or a 30-day optimum.[129] Under this policy, it was possible to return nearly 40 percent of those injured through hostile action and 70 percent of other surgical patients to duty in Vietnam. Out-of-country evacuation was performed by aircraft to Clark AFB in the Philippines; from there, evacuees were routed either to the continental United States, to Tripler General Hospital in Hawaii, to the U.S. Army Hospital, Ryu Kyu Islands, or to Japan. In the summer of 1966, direct evacuation by jet aircraft of patients from Vietnam to the continental United States via one stop in Japan began and patients were flown either to Andrews AFB, Washington, D.C. or to Travis AFB, California (CA).[130] The distance of Vietnam from the U.S. resulted in U.S. casualties being flown over 7,800 miles to reach Travis AFB and almost 9,000 miles to reach Andrews AFB near Washington, DC. The nearest offshore U.S. hospital was located almost 1,000 miles away at Clark AFB in the Philippines, but the nearest complete hospital was 2,700 miles away in Japan. Patients received in the continental United States were mostly accommodated in general hospitals nearest their homes, but some were regulated to Class I hospitals when these hospitals had beds available and the professional capability of treating their injuries.[131]

The U.S. Air Force provided all out-of-country aeromedical evacuation.[132] The 9th Aeromedical Evacuation Squadron, for example, increased its flight schedule from two weekly departures from Tan Son Nhut to daily flights with additional sites for departure at Da Nang and Qui Nhon. The number of evacuations out-of-country increased from 10,164 in 1965 to 35,916 in 1969.[133]

The U.S. Air Force used the Military Airlift Command's (MAC) fixed-wing aircraft capability to carry the seriously wounded from in-theater medical facilities to hospitals in Japan and the U.S. Aeromedical evacuation was improved in 1966 when MAC began using C-141s.[134] The C-141 Starlifter jets, which were used to transport troops to Vietnam, were quickly reconfigured to evacuate patients to Japan. The C-141 could carry 80 litter, 121 ambulatory, or a combination of 36 litter and 54 ambulatory patients. After a 6-hour flight to Japan where those patients to be retained disembarked; patients bound for the continental United States boarded and the aircraft continued to the state-side AFBs.[135]

[126] Howard, page 50
[127] Neel, page 75
[128] Neel, page 75
[129] Neel, page 70
[130] Neel, page 77
[131] Neel, page 70
[132] Neel, page 77
[133] Neel, page 77
[134] Hartman, et al, page 156
[135] Neel, page 77



source: Alcott, Edward B.; Williford, SMS Robert B. (1986). Aerospace Medical Division: Twenty-five Years of Excellence 1961–1986.

FIGURE 2-9. OUT-OF-COUNTRY MEDICAL EVACUATION

2.3.8 MEDICAL UNITS AND TRAINING DURING THE VIETNAM WAR

The first U.S. combat troops arrived in Vietnam in March 1965 to defend the Da Nang airfield. These were the Marines of the 3rd Marine Division. Soon, Marines were also deployed to Chu Lai, about 50 miles south of Da Nang, to protect that airstrip, as well. They were also sent to Phu Bai, about 40 miles north near the city of Hue, to defend another airfield in that area.[136] It was not long before the Marines shifted from defense to offense, actively patrolling the countryside and searching for the enemy. With a force of 3,500 troops on the ground and escalation of the war seeming to be a foregone conclusion, medical assistance became a high priority. The 3rd Medical Battalion provided that support. The 3rd Medical Battalion had a company for each of the infantry regiments and one company at the division headquarters.[137]

Navy and Marine Corps

In July 1953, when the U.S. and North Korean military officials signed an armistice at Panmunjom, demobilization of the armed forces began almost immediately. This military decrease was strongly felt by the Navy Medical Department as the authorized ratio of medical officers to active duty troop strength was cut in half. Between 1953 and 1954, the Navy lost more than 1,000 physicians, a 25 percent reduction.

After Headquarters Support Activity Saigon was established in 1962, Medical Service requirements increased with the buildup of U.S. Forces; a handful of Navy Medical Department people increased to more than 6,000 medical personnel committed to the direct support of Vietnam action. Included were more than 400 medical officers, approximately 140 dentists, over 100 Medical Service Corps officers, 95 nurses, 5,000 hospital corpsmen, and 300 dental technicians servicing aboard two hospital ships, the Station Hospital, Da

[136] Herman, page 15
[137] Herman, page 15

Nang, III Marine Expeditionary Force, the 1st and 3rd Marine Divisions, and other major operational units both ashore and afloat.[138]
The U.S. Navy medical services were provided by the Navy Medical Department. Within the Navy Medical Department were the Hospital Corps and six specialist Corps: Supply and Administrations, Medical Allied Sciences, Optometry, Pharmacy, Podiatry, and the Medical Specialist Section. These specialist corps were combined as the Navy Medical Service Corps and became part of the larger Medical Department. The U.S. Navy provided critical facilities for treating casualties. The wounded were primarily transported by helicopter from the battlefield to a hospital, often within minutes of the injury. Once at a hospital, the patient had a 97.4 percent chance of survival.[139]

The sailors deployed into combat areas were enlisted Hospital Corpsmen who accompanied Marine combat forces. Corpsmen provided offshore medical support while stationed aboard various ships including the hospital ships, amphibious ships, and the riverine force ships.[140] Naval Hospital Corpsmen were heavily utilized by USMC units, treating over 70,000 Navy and USMC combat casualties. Initially, 50 corpsmen arrived with the first combat Marines in 1965. Eventually, 2,700 corpsmen served with the 1st and 3rd Marine Division, 1st Marine Air Wing, and other combat support units. Corpsmen also supported Navy Sea, Air, and Land (SEAL) teams and Marine reconnaissance units.[141]

There was a great deal of cross-service medical support in Vietnam as servicemen from all branches were cared for by Navy personnel. The riverine warfare activities in Vietnam are an example of the cross-service cooperation. The 9th Medical Battalion of the 2nd Brigade was part of the Army's 9th Infantry, which, in combination with two 50-boat Navy river assault squadrons, formed the Mobile Riverine Force. A completely water-based unit, the Mobile Riverine Force was supported medically by the 9th Medical Battalion, and they established the only Army medical facility in Vietnam based on a Navy ship.[142]

Ashore, Navy Corpsmen were assigned to Station Hospital Saigon beginning in 1963 and later sent to the Naval Support Activity Hospital, Da Nang. Corpsmen provided medical support to the Marines as members of air wings, reconnaissance teams, artillery fire bases, and with the 1st and 3rd Medical battalions of the 1st and 3rd Marine divisions.[143]

Throughout U.S. involvement in Vietnam, approximately 5,000 hospital corpsmen and 300 dental technicians served in-theater.[144] Almost without exception, each corpsman arrived in Vietnam as a replacement, and not as a part of a military unit. The assignment to a unit might take place right at the airport in Da Nang within a day or two.[145] Corpsmen then encountered the worst that the environment could offer—malaria, foot immersion, snakebite, leeches, heat exhaustion, heat stroke, and jungle rot.[146] Corpsmen often found that their biggest problem was trying to force their men to practice rudimentary sanitation.[147]

Army

Since there was no secure road network in the combat area of Vietnam, surface evacuation of the wounded was almost impossible. Use of the five separate companies and five detachments of ground ambulances

[138] McClendon, Commander F.O. Jr., Medical Service Corps, US Navy. Doctors and Dentists, Nurses and Corpsmen in Vietnam, The Vietnam Center and Archive at Texas Tech University. date unk,
[139] Hartman, et al, page 118
[140] Hartman, et al, page 119
[141] Hartman, et al, page 120
[142] Hartman, et al, page 119
[143] Herman, page 35
[144] Herman, page 35
[145] Herman, page 35
[146] Herman, page 38
[147] Herman, page 38

sent to Vietnam was limited largely to such functions at base camps as transportation between the landing strip and the hospital or the routine transfer of patients between neighboring hospitals when roads were secure. Air evacuation of the injured became routine.[148]

Between April 1965 when the 3rd Field Hospital arrived in Saigon and December of that year, two surgical hospitals, two evacuation hospitals, and several numbered field hospital units, which were initially collocated with the 8th Field Hospital in Nha Trang and the 3rd Field hospital in Saigon, were deployed to Vietnam. By the end of 1965, the total number of hospital beds in-country had increased to 1,627. Augmented by specialty teams, platoons of companies often preceded or supplanted hospitals, providing limited care within an area until more adequately staffed and equipped units arrived. Field-Army-level clearing units were also used to augment hospitals and provide additional bed space. Dispensaries sometimes supplemented the resources of major hospitals and at other times provided outpatient service in remote areas.[149]

The deployment of additional hospitals to Vietnam continued throughout 1966 and 1967. During 1966 and 1967, four surgical hospitals, six evacuation hospitals, and another hospital unit of a field hospital arrived in-country. The 6th Convalescent Center was established at Cam Ranh Bay. The buildup of medical units was completed in 1968 with the arrival of one surgical hospital, three evacuation hospitals, and additional field hospital units, as well as 11 Reserve and National Guard medical units. The 312th Evacuation Hospital, the largest Reserve medical unit sent to Vietnam, arrived in September 1968, and occupied a facility the 2nd Surgical Hospital had operated at Chu Lai. By December 1968, there were 5,283 Army hospital beds in Vietnam at facilities located throughout the four corps tactical zones.[150]

Nursing

The Army Nurse Corps was part of the deployed forces in Vietnam even before the war escalated. In April of 1956, three Army Nurse Corps officers became the first U.S. servicewomen to serve in Vietnam. Majors Jane Becker, Francis Smith, and her sister, Helen Smith, were placed on a temporary duty assignment with the U.S. Military Assistance Advisory Group's Medical Training Team in Saigon, Vietnam. Their principal responsibilities were to educate South Vietnamese nurses in modern nursing care practices. One of the tools developed and translated into Vietnamese was a nursing procedure manual.

In 1962, as America's commitment expanded in the Republic of Vietnam, Army Nurse Corps officers helped establish the 8th Field Hospital in Nha Trang, South Vietnam.[151] By December of 1968, Army Nurse Corps officers were assigned to seven surgical, five field, eleven evacuation, and one convalescent hospital within the four Corps Tactical Zones of South Vietnam. These hospitals provided regional medical support to U.S. forces as far north as the 18th Surgical Hospital, Camp Evans near Quand Tri (only 21 miles from the Demilitarized Zone [DMZ]), and south to the 29th Evacuation Hospital, Can Tho, South Vietnam, in the Mekong Delta region. Reserve and National Guard medical units were also deployed.[152]

In 1963, the first Navy Nurse Corps officers arrived in South Vietnam to help establish the U.S. Naval Station Hospital, Saigon. Within a few years, additional Navy Nurse Corps officers served on board two hospital ships, the *U.S.S. Repose* and *U.S.S. Sanctuary*, off the coast of South Vietnam. These floating hospitals arrived in 1966 and 1967, respectively. Their primary mission was offshore medical support for American and Allied Forces in the I Corps Tactical Zone from Da Nang to the DMZ at the 17th parallel. In

[148] Neel, page 59
[149] Neel, page 61
[150] Neel, page 61
[151] Military Nurses in the Vietnam War, www.vietnam war50th.com
[152] Military Nurses in the Vietnam War, www.vietnam war50th.com

1966, Navy Nurse Corps officers helped establish the Navy Support Activity (Naval Station Hospital) in Da Nang, which was to become one of the busiest combat casualty treatment facilities in- theater. [153]

In February of 1965, as fighting intensified and U.S. combat forces were committed to Vietnam, the Air Force Nurse Corps augmented the 9th Air Evacuation Squadron, Clark Air Base, Philippines with male nurses to help evacuate wounded American servicemen from Vietnam. In February of 1966, the first contingent of female Air Force Nurse Corps officers arrived for duty at the newly established 12th U.S. Air Force Hospital and the casualty staging unit in Cam Ranh Bay. Other Air Force nurses soon followed, serving in aeromedical evacuation squadrons, such as the 903rd, and dispensaries throughout the Pacific Theater. The Air Force assigned nurses to two types of air evacuation missions during the war: "intratheater" or in-country flights transporting the sick and wounded to military hospitals within South Vietnam; and "intertheater" flights from Vietnam to U.S. military hospitals in Japan, the Philippines, and the United States. During the Tet Offensive in February of 1968 the Air Force evacuated more than 10,000 patients. [154]

Medevac Units

Helicopter evacuation techniques and requirements varied by geographic area, type of combat operation, and type of equipment available, and changed from year to year as experience modified and refined procedures. Since the air ambulance was unarmed, gunship support was requested if the ground reported contact with the enemy in the vicinity of the pickup site, or if the rescue was a hoist operation. In "hot" areas, the crew of the evacuation aircraft consisted of a pilot, copilot, crew chief, medical aidman, and a man armed with an automatic rifle. In quieter areas, the rifleman was left behind in favor of increased patient capacity. On hoist operations in mountainous and jungle terrain, before the more powerful "H" model aircraft was introduced, the crew consisted only of a pilot, copilot, and hoist operator. On these missions, full load was also generally reduced in favor of greater lift capability.[155]

The buildup of air ambulance units paralleled the commitment of U.S. combat forces to Vietnam. The first helicopter ambulance unit sent to Vietnam was the 57th Medical Detachment (Helicopter Ambulance), later nicknamed "The Originals." This would not only be the first Medical Detachment (Helicopter Ambulance), but also the first aviation unit to deploy the UH-1 helicopter in Vietnam. The detachment was authorized for five UH-1A helicopters. The personnel organization consisted of two sections: (1) pilot or commissioned officer section of seven that included the commander, maintenance officer, and operations officer; and (2) enlisted soldier section of twenty-one that included mechanics, medics, flight operations, and supply. Army Dustoff helicopters utilized a crew of four: aircraft commander (pilot), copilot, medic, and crew chief (who handled the helicopter's preventive maintenance) armed with an automatic rifle. Unless flying into dangerous areas, the crew chief was usually left behind to allow additional space for additional casualties, unlike the crew of one during the Korean War. The crew flew the UH-1 Huey from the early "A" model to the "I" model in use at the end of the war. These helicopters had an official capacity for six litter casualties, but were reported to transport eight to 13 at once. Pilots and copilots were graduates of a special course for Dustoff pilots. Although some warrant officers lacked this specialized training, close teamwork resulted from the beginning.

The unit's mission was to support the 8th Field Hospital, which it was actually attached to command and control, rations, quarters, and administrative matters at Nha Trang. This was the standard doctrinal employment of the detachment that actually changed little from the Korean War. Initially, two helicopters were stationed at Qui Nhon and three at Nha Trang.[156] In response to increased fighting around Saigon and

[153] Military Nurses in the Vietnam War, www.vietnam war50th.com
[154] Military Nurses in the Vietnam War, www.vietnam war50th.com
[155] Neel, page 75
[156] Howard, page 44

in the Delta, helicopters were shifted from place to place. In August 1964, the Surgeon General's office named four more air ambulance units for assignment to Southeast Asia that included the 82nd Medical Detachment (Helicopter Ambulance) at Fort Sam Houston, TX, being given a 1 October 1964 move date. The three other units were put on notice without firm departure dates. It is important to note at this time that all four of these units identified have the same Table of Organization and Equipment (TO&E) as the 57th initially. The 82nd Medical Detachment (Helicopter Ambulance) became operational in November 1964 in IV Corps Zone (the Delta). Three of the 57th pilots were transferred to the 82nd, and three of the 82nd pilots were transferred to the 57th. This was to aid in training the crews for the critical Dustoff mission.[157]

The buildup of units continued at an accelerated pace in 1965. The 283rd Medical Detachment (Air Ambulance) arrived in August 1965, followed by the 498th Medical Company (Air Ambulance) in September. The 254th Medical Detachment (Air Ambulance) arrived in Vietnam before the end of the year but did not become operational until February 1966. The four detachments supported III and IV CTZs. The 498th Medical Company supported II CTZ.[158] After Headquarters, 44th Medical Brigade, arrived in Vietnam in 1966, the brigade's medical regulating officer (MRO) became responsible for all in-country regulating of patients. Medical groups controlled the movement of patients from tactical areas to hospitals within their own group areas. Further movement of patients from one group area to another was coordinated by medical group MRO's with the brigade MRO.[159] Also in 1965, another new form of air ambulance unit was established, the air ambulance platoon. These units, unlike the air ambulance units of the 44th Brigade, depended upon the combat assault divisions for command and control and supply issues.[160]

The air ambulance platoon usually consisted of 12 UH-1 helicopters, 14 officers, and 44 enlisted; after testing this new system, the initial air ambulance platoon was deployed to Vietnam in August 1965, as part of the 15th Medical Battalion, 1st Cavalry Division (Air Mobile). The unit consisted of a medical evacuation section with eight helicopters and a crash rescue section with four helicopters, which the platoon's pilots, unlike the helicopter detachments of the 44th Medical Brigade, used "medevac" as their call sign. This was in part to keep the old tradition from the Korean War, so that they could be immediately recognized as part of the 1st Cavalry Division. To protect the platoon's aeromedical evacuation helicopters, they began requesting gunships on call, but the platoon's medevac pilots thought traveling with the slower gunships wasted time. The next unit established in Vietnam was the 436th Medical Company (Air Ambulance) (Provisional). It was established from the old 57th and 82nd Detachments, along with the 254th and 283rd Detachments. The 43rd Medical Group took command of the provisional company, and the new group's mission was to supervise all Dustoff missions in III and IV Corps Zones. It operated 22 helicopters and was expected to improve the coordination of the air ambulance detachments, but these improvements did not occur. Each detachment retained its own separate identity and regarded the company as just another headquarters in the chain of command, and in September 1966, the provisional company was renamed the 436th Medical Detachment (Company Headquarters) (Air Ambulance) and attached to the 68th Medical Group.

The 283rd Medical Detachment (Air Ambulance) arrived in Vietnam in August 1965, followed by the 254th Medical Detachment (Air Ambulance) before the end of the year, but the 254th was not operational until February 1966 because of a backlog at the port that delayed the arrival of the unit's equipment. The four detachments 57th, 82nd, 283rd, and 254th were authorized six helicopters each and supported III and IV Corps Zones (this was an increase to the TO&E of one helicopter and crew). However, the 498th Medical Company (Air Ambulance) was authorized 25 helicopters and supported II Corps Zone.[161]

[157] Howard, page 45
[158] Neel, page 71
[159] Neel, page 73
[160] Howard, page 46
[161] Howard, page 46

In March 1966, the 44th Medical Brigade, which was activated in January, assumed operational command and control of most Army medical units in Vietnam. During the next two years, the brigade coordinated the activities of the 68th Medical Group (III and IV Corps Zones), the 43rd Medical Group (South II Corps Zone), the 55th Medical Group (North II Corps Zone), and the 67th Medical Group (I Corps Zone).[162]

During 1967, the 45th Medical Company (Air Ambulance) and four additional air ambulance detachments arrived in Vietnam. The units were shifted from location to location to provide the most effective area coverage in response to tactical operations. In 1968, four additional detachments were sent to Vietnam, completing the buildup of aeromedical evacuation units. One unit, the 50th Medical Detachment, which was assigned to the 101st Airborne Division in mid-1968, became the nucleus of the division's air ambulance platoon. By 1969, there were 116 Field Army helicopter ambulances in Vietnam. These were assigned to two companies and 11 separate detachments. [163]

The U.S. Army and U.S. Air Force evacuation systems complemented each other, each carefully continuing the movement of wounded or sick until they reached a final destination medical facility.[164] The USAF MAC evacuated the seriously wounded from theater by strategic fixed wing aircraft back to Japan and to the United States.[165] Based on experience gained in World War II and the Korean War, the U.S. Air Force initially used returning assault or cargo aircraft for casualty evacuation. The system worked well during the early stages of the Vietnam War, because the number of sick and wounded was relatively low. As troop strength increased and combat operations became more intense, the system grew progressively less satisfactory. The requirements for evacuation often coincided with the most urgent needs for resupply, although not always at the same location.[166]

The old system was abandoned in favor of a new system in which aircraft were regularly used specifically for evacuation purposes. The 903rd Aeromedical Evacuation Squadron scheduled the first regular in-country evacuation flights in 1967. By late 1969, the number of regular scheduled flights had increased to 188. The assault aircraft initially used for aeromedical evacuation were supplemented, in early 1968, by C-118 cargo aircraft specifically modified for evacuation missions. The average number of patients moved increased from 5,813 per month between July 1967 and January 1968, to 9,098 from March to June 1968. During the Tet Offensive in February 1968, more than 10,000 patients were evacuated by the Air Force.[167]

[162] Howard, page 46
[163] Neel, page 71
[164] Neel, page 71
[165] Howard, page 39
[166] Neel, page 71
[167] Neel, page 72

3.0 ON THE HOME FRONT

The Vietnam War led to the advancement of medical research and treatment of diseases and wounds. As presented in the previous chapter, much of the treatment and research was conducted in or near the Asiatic theater. There were many medical facilities on U.S. military installations and in the private sector that existed at the time of the war providing non-war specific or general medical services, treatments, and research. This chapter identifies hospitals, research facilities, and medical unit training facilities for the Army, Air Force, and Navy that directly supported the U.S. military effort in Vietnam. These facilities were identified through research at NARA and online, data requests, and referencing previously collected materials and reports (from previous projects). This chapter includes description of facilities if that information was provided or available online. Not all requests for data and information received responses, and several of these facilities are no longer under DoD management.

3.1 MEDICAL CARE FACILITIES

3.1.1 ARMY HOSPITALS

Brooke Army Medical Center, Fort Sam, Houston, Texas

At present, Brooke Army Medical Center (BAMC) at Fort Sam Houston, TX is the largest and most robust military healthcare organization in the DoD. The origins of BAMC date to 1879 when a Post Hospital opened onsite with temporary structures. The first permanent structure was built in 1886, and in 1908, an 84-bed Station Hospital was constructed. In July 1936, the cornerstone was laid for the construction of a replacement Station Hospital. By November 1938, the new 418-bed hospital was operational, having cost three million dollars. The new hospital was the first in a series of moves, which changed Fort Sam Houston from an Infantry to a Medical Post.

Source: https://www.bamc.health.mil/history.asp

FIGURE 3-1. BROOKE ARMY 418-BED HOSPITAL

In 1941, BAMC prepared for an overwhelming flow of casualties from World War II battlefields by converting a 220-person enlisted barracks into additional patient wards. This facility provided care to wounded soldiers and would later become BAMC Headquarters. In 1945, BAMC converted a field artillery barracks into a convalescent unit to accommodate the flow of casualties from the war. In 1946, Fort Sam

Houston was chosen as the new site for the U.S. Army Medical Field Service School. The decision to centralize the Army's medical research and training at one location resulted in the re-naming of Brooke General Hospital to Brooke Army Medical Center.[168]

During the Vietnam War, burn cases were stabilized in-country and then evacuated to the 106th General Hospital in Japan where a special burn unit had been established. Cases unable to return to combat after treatment at the 106th were evacuated to BAMC. The twice-monthly evacuation flights from the 106th carried 30 to 40 patients each and stopped at Travis AFB for refueling on the way to Fort Sam Houston. The two busiest years for the Brooke Army Medical Center Burn Unit were 1968 and 1969, with 389 and 309 admitted burn patients, respectively.[169]

One returning injured medic describes his stay:

> *Finally, I get out of there and get back to Texas. But they were overcrowded at Fort Sam, so they put us in a building called Beach Pavilion, and it was so such a misnomer, I mean there were no beaches around and it damn sure wasn't a pavilion. It was a building that was built in the 1870s when Custer was there at Fort Sam. They didn't have a room or a place to put me, so they put me and a lot of other people, we were out in the hall* (Bullock Museum, 2020).

In 1975, BAMC was added to the National Register of Historic Places (NRHP or National Register) as a contributing property of the Fort Sam Houston Historic District, and in 2001 it was added individually to the NRHP. The period of significance for the building is documented from 1925 through 1949, and it is significant under the themes of military, health and medicine, and architecture (Mission/Spanish Revival).[170]

In 1987, the official groundbreaking took place for the construction of a new hospital replacing BAMC's 59 separate buildings.[171] The opening of the new facility resulted in the removal of medical operations from the original Brooke Army Medical Center Building. As part of its mission, BAMC supports the Army Burn Center, the Fort Sam Houston Dental Activity, and the Area Dental Laboratory, all three also located at Fort Sam Houston.

Eisenhower Army Medical Center, Fort Gordon, Georgia

The Dwight D. Eisenhower Army Medical Center in Georgia began as Camp Gordon Station Hospital in 1941, caring for World War II casualties and dependents. It was closed in 1946 but reopened as Fort Gordon during the Cold War.[172] The hospital was meant to be a 1,500 bed, temporary cantonment hospital. It was comprised of 138 separate wood-frame, single-story buildings connected by ramps and dispersed over 85 acres.[173]

In 1966, it was determined that a specialized treatment hospital was needed in the southeastern U.S. Necessitated by an increase in training activities at Fort Gordon and because the hospital at Fort Gordon was one of 31 Service hospitals designated by DoD as homecoming centers for returning soldiers, the hospital added 650 specialty beds. To help rehabilitate existing structures in order to accommodate the increased patient flow, a one-million-dollar contract was authorized in 1967 for maintenance and renovations. Despite renovations and commendations for quality of care, poor conditions and the

[168] https://www.bamc.health.mil/history.asp
[169] Hartman et al, page 95
[170] https://npgallery.nps.gov/AssetDetail/NRIS/01001281
[171] https://www.bamc.health.mil/history.asp
[172] https://www.goarmy.com/amedd/health-care/facilities/dwight-d-eisenhower-army-medical-center.html
[173] Congressional Record, Proceedings and Debates of the 90th Congress Second Session, page 10659

inadequacies of the hospital's features was noted in during a 1968 petition of Congress to fund construction of a new facility.[174] In addition to treating returning soldiers injured in combat, the hospital also received the first patient from a group of returning former Prisoners of War (POWs) in February 1973.[175]

A new hospital was funded and opened in 1976, replacing the World War II-era structures. The new hospital was dedicated in honor of former General of the Army and President Dwight D. Eisenhower, who made his farewell address to the Army at Fort Gordon in 1961.[176]

Letterman Army Medical Center, Presidio, San Francisco, California

The U.S. Army was stationed at the Presidio at San Francisco from 1946 until 1994 when the post was excess and was transferred to the National Park Service. The U.S. Army General Hospital was completed in 1902 at the Presidio and was renamed Letterman General Hospital in 1911. Letterman Army Medical Center (LAMC) was a ten-story, 550-bed facility that opened in 1969. Throughout the 1970s, LAMC was instrumental in training the Army's medical specialists and serving soldiers wounded in Vietnam.

The Letterman Army Institute of Research (LAIR) opened in 1971 and specialized in the development of artificial blood, laser physics, and treatment of trauma. Letterman Army Medical Center was another of the homecoming centers, and it welcomed home nine former POWs in 1973. Following the transfer of the Presidio of San Francisco to the National Park Service in 1994, both the hospital and its adjoining facilities, including LAMC and LAIR, were deactivated in 1995.[177]

source: Paul Raymond, Sixth Army Photo Facility

FIGURE 3-2. LETTERMAN ARMY MEDICAL CENTER, 16 MARCH 1967

[174] Congressional Record, Proceedings and Debates of the 90th Congress Second Session, page 10659
[175] Hartman et al, page 95
[176] https://www.goarmy.com/amedd/health-care/facilities/dwight-d-eisenhower-army-medical-center.html
[177] NPS, Letterman Army Hospital Records, 1866-1998, page 12

Tripler Army Medical Center, Fort Shafter, Oahu, Hawaii

Tripler Army Medical Center began as Tripler Hospital within Fort Shafter on the island of Oahu, Hawaii in 1907. A larger facility was built on the site following the attack on Pearl Harbor and the buildup of World War II. Construction of the new building was completed in 1948. Patients evacuated to the United States were either transported to Tripler General Hospital, to Travis AFB in CA, or to Andrews AFB near Washington, D.C.[178]

Source: https://www.tamc.amedd.army.mil/residency/mchk-dm/default.htm

FIGURE 3-3. TRIPLER ARMY MEDICAL CENTER

Fitzsimons Army Medical Center, Denver, Colorado

Established east of Denver, Colorado in 1918, Fitzsimons General Hospital began as an Army hospital specializing in treating soldiers infected with tuberculosis during World War I. After struggling with small budgets and the threat of closure, the facility expanded with the addition of a new main building in 1941 and an influx of patients during World War II. Later renamed Fitzsimons Army Hospital and eventually Fitzsimons Army Medical Center, the hospital continued to serve soldiers and veterans after the war, most famously caring for President Dwight D. Eisenhower after he had a heart attack in Denver in 1955.[179]

ln the early 1960s, Fitzsimons began receiving small numbers of casualties from Vietnam. The number of combat-injured patients increased markedly in 1965 and a steadily growing number of Vietnam veterans began arriving from Southeast Asia.[180] ln February 1968, Fitzsimons was instructed by the Surgeon General to open seven stand-by wards that had been inactive since the Korean War. Nearly 800 combat casualties from the Tet Offensive were admitted, almost overnight, doubling the number of combat-wounded patients. ln the early 1970s as U.S. involvement in Southeast Asia diminished and the patient load at Fitzsimons reduced. Patients coming from Vietnam, with primarily orthopedic and neurological injuries, made up a continually smaller percentage of the hospital population.[181] ln October 1971, Fitzsimons received for medical treatment the first POW released by the Viet Cong in more than two years. [182]

In the 1970s, after the end of the Vietnam War, Fitzsimons had fewer active-duty casualties under its care. It began to focus on treating more military retirees and their dependents. It also continued to support nearby

[178] No additional information was available from Tripler Army Medical Center or the U.S. Army Museum in Hawaii
[179] https://coloradoencyclopedia.org/article/fitzsimons-general-hospital
[180] Department of Army, Fitzsimons General Hospital 1971
[181] Department of Army, Fitzsimons General Hospital 1971
[182] Department of Army, Fitzsimons General Hospital 1971

Lowry Air Force Base, as well as other Army and Air Force bases in the region, and to serve as an important Army medical training center. By the end of the Cold War in 1991, Fitzsimons was an aging facility not directly associated with any active military installations. After Fitzsimons was deactivated in 1996, the site became home to the University of Colorado Anschutz Medical Campus and Medical Research Park called the Fitzsimons Innovation Campus.[183]

3.1.2 NAVY HOSPITALS

Naval Hospital Portsmouth, Virginia

The Naval Medical Center Portsmouth is the Navy's oldest continually operating hospital, serving since 1830. The Medical Center was originally known as Fort Nelson in 1776. The end of World War I caused drawdown, but the hospital developed the first internship programs for Graduate Medical Education in 1937. After World War II, the hospital did not have to scale down. Naval Hospital Portsmouth began construction on a new high-rise facility in 1957, with construction complete in 1960. At the end of the Vietnam War, 12 recovering POWs were temporarily housed at the facility. The hospital continued to expand during the 1990s and still cares for hundreds of patients every day.[184]

National Naval Medical Center, Bethesda, Maryland

President Franklin D. Roosevelt selected the site of the National Naval Medical Center in Bethesda, MD, and ground was broken in 1939. The President's vision was to establish a Navy Medical Center that housed medical care, Navy medical training, Navy research, and a medical library in one location.

The original Medical Center was designed to hold 1,200 beds, the Naval Medical School, the Naval Dental School, and the Naval Medical Research Institute. In 1945, temporary buildings were added to accommodate 2,464 wounded American sailors and marines from World War II. With the start of the Korean War, the Medical Center's capacity grew to 1,167 beds in 1951. In August of 1960, a 5.6 million-dollar expansion project was initiated and consisted of two five-story wings attached to the main building's east side, providing space for 258 beds and replacing the World War II temporary ward buildings. In 1968, during the Vietnam War, the bed capacity peaked at 1,122.

The Center expanded again in 1973 when the Naval Regional Health Care System was established, which placed all naval health care facilities within the Naval District Washington under authority of the Commander of the Medical Center; the same year, the hospital was consolidated into one command to form the National Naval Medical Center. In 1975 an extensive renovation began, which included the construction of two buildings: Building 9, a three-story outpatient structure, and Building 10, a seven-story, 500-bed inpatient facility, with a combined area of more than 880,000 square feet, which made National Naval Medical Center one of the largest medical facilities in the country.

The Base Realignment and Closure Act of 2005 closed both National Naval Medical Center and Walter Reed Army Medical Center and realigned them as the Walter Reed National Military Medical Center, Bethesda on 15 September 2011.[185]

Naval Regional Medical Center, Long Beach, California

[183] https://coloradoencyclopedia.org/article/fitzsimons-general-hospital
[184] https://www.portsmouthnavalmedicalcenterhousing.com/history
[185] https://www.wrnmmc.capmed.mil/About%20Us/SitePages/History.aspx

In April 1964, construction began on a Naval Hospital that would serve members of the military community living near Los Angeles. Located on a 65-acre tract, Naval Hospital, Long Beach was officially commissioned in February 1967. Initially, the hospital was a five-floor structure with a 350-bed capacity. During the Vietnam conflict, the hospital and its support facilities, Naval Station dispensary and the Hospital Ship *U.S.S. Repose*, served as a primary debarkation point for personnel returning to the continental United States via air medical evacuation. In July 1972, Naval Hospital, Long Beach was re-designated as Naval Regional Medical Center, Long Beach and functioned as such until 26 April 1983 when it was again re-designated as a Naval Hospital. Hospital operations ceased in March 1994 and the DoD disposed of the entire property.[186]

In addition to Naval Hospital, Long Beach, there were other regional hospitals constructed or renovated during the buildup of the Vietnam War, including Great Lakes and Oakland Naval Hospitals, but, as with Naval Hospital, Long Beach, they have since been demolished.

Navy Hospital Ships

For the Korean War, the *U.S.S. Repose* was brought out of mothball status to be modernized and re-equipped with the latest medical equipment available. The *U.S.S. Repose* had a 520-foot-long hull and displaced 11,400 tons. With single screw, 9,000-shaft horsepower, geared-turbine drives, the ship had a top speed of 18 knots. The vessel had eight decks, three below the water line. All machinery spaces were located aft, leaving the entire forward portion of the vessels available for hospital spaces. This arrangement allowed the hospital to be one unit, not built around the uptake spaces and machinery trunks as in conventional ships. All treatment rooms and wards could be accessed by wide, continuous corridors.[187]

To minimize movement from pitch and roll, the surgical suite, clinics, and treatment rooms were located amidships. The surgical suite accommodated two major operating rooms, a fracture operating room, an anesthesia room, a surgical supply room, a clinical laboratory, and a dispensary. The dental clinic had its own fully equipped laboratory and X-ray and darkroom facilities. The radiology department contained a record and appointment office, examination room, and X-ray machines. Other hospital facilities included a physiotherapy department, a dermatology clinic, and additional laboratories.[188]

At the San Francisco Naval Shipyard at Hunter's Point, the *U.S.S. Repose* began an extensive overhaul in June 1965. Her Korean War-era helicopter landing deck was strengthened to support the newer, larger helicopters, but it was not until 1969 that the helo deck was enlarged to handle the largest helicopters that were operational in Vietnam.[189]

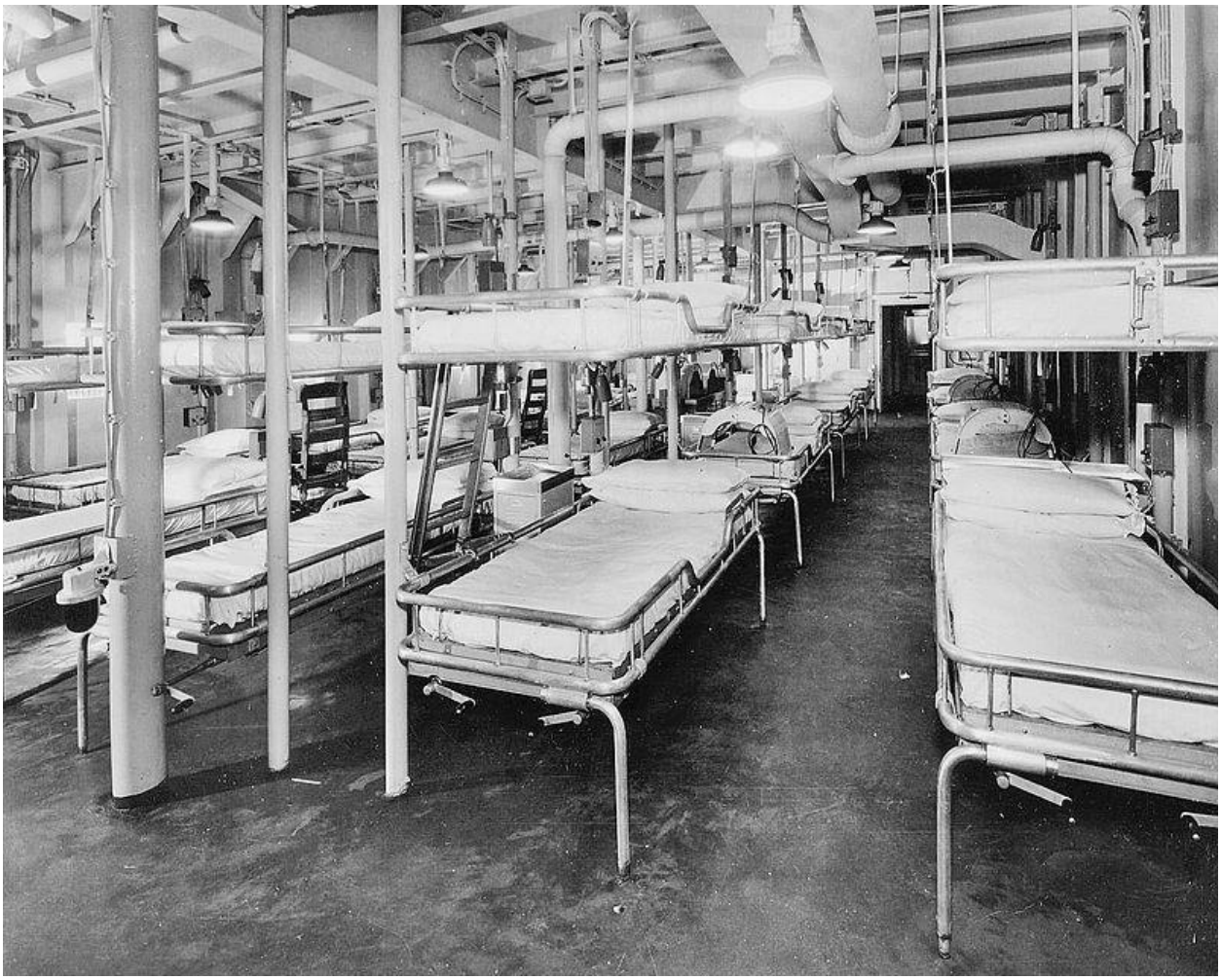
The overhaul also reconfigured parts of the ship to improve efficiency in handling incoming patients. The focal point for admissions was located in triage, which in turn was located in the most accessible area of patient care nearest the helo deck. An inclining ramp connected these two strategic areas—entrance to the triage area and the helo deck—which enabled rapid access to and from these two locations. Triage was equipped for rapid evaluation and resuscitation of acutely ill and wounded patients.

Besides adding the latest in medical equipment, the upgrade also included a portable heart-lung machine and an echoencephalograph. Both ships were fully air conditioned. "We had all the facilities you would find in a hospital today," oral surgeon Bill Terry recollected in 2005. "In addition, we had something very

[186] http://www.militarymuseum.org/NRMCLongBeach.html
[187] Herman, page 29
[188] Herman, page 29
[189] Herman, page 30

new. We had a frozen blood bank onboard. I think it was the first time a frozen blood bank had been put aboard a ship, and it turned out to be a great lifesaver for many of our patients."[190]

The *U.S.S. Sanctuary*, also a Haven-class vessel, had a similar layout and accommodation. The three decks above the waterline contained the wards, and all were provided with portholes. Each ward had access to the weather decks, allowing freedom of movement for the patients. All wards, with the exception of the intensive care unit, had bunk-style, two-tiered beds, with three-tiered beds on the so-called self-care units. Although both ships had the expanded capacity for 750 beds, the staff learned that 560 patients could be managed comfortably.



Source: https://en.wikipedia.org/wiki/USS_Repose_(AH-16)#/media/File:Hospital_ship_USS_Repose_(AH-16)_in_1945.jpg

FIGURE 3-4. *U.S.S. REPOSE* HOSPITAL WARD

Because of their large displacements, *U.S.S. Repose* and *U.S.S. Sanctuary* meant relatively smooth sailing for patients and stable platforms for surgeons to operate. With their fuel tanks full, these vessels could travel at a top speed of 18 knots and cruise 12,000 miles. The paint scheme was also new. Each gleaming white hull sported three red crosses spaced forward, amidships, and aft. Absent was the fore and aft green hull stripe from World War II and Korean War years. Four red crosses were painted on the single funnels of

[190] Herman, page 30

U.S.S. Repose and *U.S.S. Sanctuary*. The white hulls and red crosses were not cosmetic changes but necessary under the terms of the Geneva Convention, which regulated the status of hospital ships as noncombatants. These international agreements, of which the United States was a signatory, also meant that both the *U.S.S. Repose* and *U.S.S. Sanctuary* would operate totally illuminated at all times and carry no armament, even when sailing in hostile waters. Unlike the *U.S.S. Repose*, which was updated for the Korean War, the *U.S.S.* Sanctuary had been idle since the end of World War II. Her refit was, therefore, far more radical.

On 1 March 1966, the *U.S.S. Sanctuary* was reacquired by the Navy, towed to Louisiana, and modernized at the Avondale Shipyards. Modernization included the addition of a heliport, three x-ray units, a blood bank, an artificial kidney machine, ultrasonic diagnostic equipment, a recompression chamber and other modern equipment, medical, culinary, laundry, etc., to supplement her 20 wards and four operating rooms. Three hundred and sixteen medical personnel were assigned to staff the Naval Hospital. Her mission had shifted in emphasis from that of an "ambulance" ship carrying wounded and sick to hospitals in rear areas, to that of a fully equipped hospital carrying medical facilities close to the combat area.[191]

Placed in reserve as of 31 August 1971, the *U.S.S. Sanctuary* was decommissioned on 15 December. The next 11 months were spent at Hunters Point Naval Shipyard where she was converted for use as a dependents' hospital and as a commissary/Navy exchange retail store. Ex-*Sanctuary* was towed out of Baltimore on 17 August 2011. The eventual owner, Potomac Navigation sold her to be scrapped by ESCO Marine in Brownsville, TX.

3.1.3 AIR FORCE HOSPITALS

The Air Force Medical Service established hospitals at each Air Force base during the 1950s. Many of these hospitals were expanded to accommodate the increase in patients as a result of the Vietnam War. Major hospitals were constructed or developed at Elmendorf, Travis, Andrews, and Lackland AFBs. The facility at Lackland AFB became the Air Force's largest. Constructed in 1957, the original 500-bed facility had its capacity doubled in 1961. The 100-bed hospital at Travis AFB was opened in 1949, and it expanded during the Korean War with a new wing and 200 more beds. The Vietnam War brought more hospital expansion to the newly christened David Grant USAF Hospital at Travis, with another addition built during 1966–1967. This $700,000 project included a new dental clinic and about 100 more beds for the casualty staging unit adjacent to the main hospital building.[192]

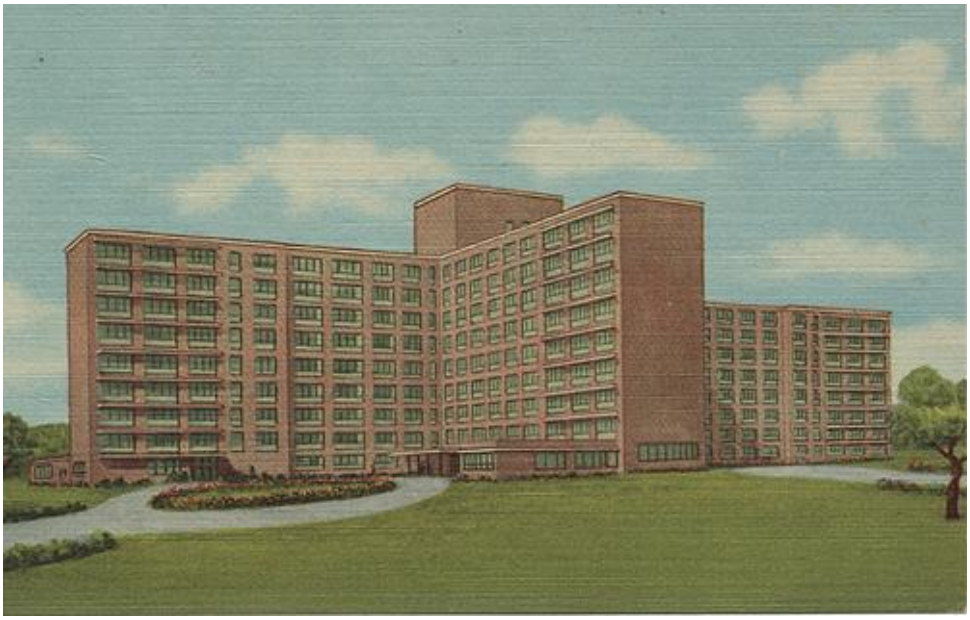
Sheppard Air Force Base, Texas

In the early 1960s, a new $5 Million medical center was constructed at Sheppard AFB. It is currently still serving as the base hospital. However, the hospital will be replaced with a new treatment facility scheduled to be completed in 2020.[193] See Appendix F for descriptions of the Sheppard AFB medical facilities.

Lackland Air Force Base, Texas

In 1957, the Lackland AFB Hospital became the Air Force's largest medical facility, with 500 beds. Three years later another 500 beds were added. In March 1963 it was renamed after Major General Wilford Hall, USAF, MC. Wilford Hall was completely replaced with newer structures.

[191] https://en.wikipedia.org/wiki/USS_Sanctuary_%28AH-17%29
[192] Hartman, et al, page 160
[193] Communication with Bryan Booker, 82nd Training Wing/History Office, Sheppard AFB. 2019



Source: A Smith USARMY CEERD-CERL, image from post card, date unk

FIGURE 3-5. LACKLAND AFB HOSPITAL

David Grant USAF Hospital, Travis AFB, California

The medical center first opened to patients on 1 July 1943 as the 4167th Station Hospital at Fairfield-Suisun Army Airfield. Hospital buildings were of cantonment-type construction, housing seven wards with a total capacity of 125 beds. In 1945, Congress approved the construction of a 670-bed Aerial Debarkation Hospital and the reconstruction of the 150-bed Station Hospital, and the project began in June. The designs for the Aerial Debarkation Hospital called for seven wards, six with 100 beds. The seventh, for 70 beds, would be for mental health patients. The wards would accommodate eight patients in each room. A two-story Base Hospital would consist of four wards with a capacity of 150 beds.[194]

After Victory over Japan Day, the primary mission of Fairfield-Suisun became the processing of returned troops for redeployment and transfer to separation centers. The mission of the Army Air Force (AAF) Station Hospital was to provide medical care for the station complement and transient personnel, and to perform routine examinations prior to the transfer to separation centers. With the cessation of hostilities with Japan, the construction of the holding station and hospital ceased. The floor of the tunnel and 80 percent of the footings had been poured. One long wall and several wing walls of concrete had been poured to first floor level and the area had been rough graded.

The mission needs of Fairfield-Suisun Army Airfield had to be reevaluated as the west coast base from which the Air Transportation Command would conduct its foreign commitment. When this was completed in favor of maintaining the base, additional funds were allocated on 25 March 1946 to complete construction of projects at the base, among which was the hospital.[195]

Excavation work for the 150-bed Station Hospital was started on 17 March 1947 after many revisions of plans. To allow the temporary hospital to continue its functions and, at the same time to clear the site for the new Air Freight Terminal and apron, a few of the existing hospital buildings were salvaged.

On 1 June 1948, the base went to the newly created Air Force and was redesignated Fairfield Suisun AFB, and eventually renamed Travis AFB. As a result of the Korean War, all patients evacuated by air from

[194] https://en.wikipedia.org/wiki/David_Grant_USAF_Medical_Center
[195] https://en.wikipedia.org/wiki/David_Grant_USAF_Medical_Center

Pacific bases debarked at Travis AFB. Facilities had to be expanded to meet new needs. In August 1950, the hospital airmen's barracks were converted into a hospital annex, with 118 additional beds. On 30 June 1954, the first planeload from war in Indochina, consisting of 16 litters and 31 ambulatory French patients, arrived at the Travis hospital.

Additional construction at USAF Hospital at Travis AFB was completed in 1961, which included conversion of the former nurses' quarters to a casualty staging facility. Temporary conversion of a transient airmen's dormitory in 1965 enabled the hospital to reach a 650-bed capacity. With the growing conflict in Southeast Asia after the Gulf of Tonkin incident in 1965, USAF Hospital at Travis AFB became the central receiving medical facility for aeromedical evacuation of soldiers, sailors, marines, and airmen wounded during the Vietnam War.[196]

Source: https://www.military.com/daily-news/2018/05/15/travis-air-force-base-psychiatrist-accused-rape.html

FIGURE 3-6. DAVID GRANT MEDICAL CENTER

On 1 July 1966, the USAF Hospital at Travis AFB was designated David Grant USAF Medical Center in honor of the late Major General (Dr.) David Norvell Walker Grant, USAAF, MC (1891–1964), the first Surgeon General of the Army Air Corps and U.S. Army Air Forces.

Postgraduate educational programs were implemented at David Grant Medical Center in 1966 for five residency programs. The Air Force and Medical Service Accreditation Committee for Graduate Medical Education gave provisional approval to start the General Surgery, Pediatrics, Obstetrical/Gynecological, Internal Medicine, and Radiology residency programs with a start date of 1 July 1967. Other programs offered at David Grant Medical Center included Physician Assistant in Orthopedics, Pharmacy Practice, Nurse Anesthesia, and Administrative Residency. General Dentistry and Oral and Maxillofacial Surgery postgraduate education programs were added in 1969.

In addition to training active duty officers, David Grant Medical Center partners with the local community and reserve forces. David Grant Medical Center has active affiliations with University of California Davis School of Medicine, University of California San Francisco, University of the Pacific, Solano Community College, and a number of the other local training institutions.[197]

[196] https://en.wikipedia.org/wiki/David_Grant_USAF_Medical_Center
[197] https://en.wikipedia.org/wiki/David_Grant_USAF_Medical_Center

Throughout the war, many patients were either treated or transited through Travis AFB. During the Vietnam War, Travis AFB assumed responsibility as the West Coast terminus for MAC aeromedical transports. The spring of 1968 recorded increasing arrivals of wounded (sometimes over 5,000 per month) at Travis AFB with the David Grant Medical Center receiving an average of 4,070 patients a month throughout 1968. At the height of this effort, over 9,000 patients (all injured during the February 1969 Tet Offensive) were airlifted aboard MAC evacuation flights. Even though most patients only stayed a few days before being sent on to Army hospitals or Veterans Administration hospitals closer to their homes, the medical center was at full capacity from 1966 through 1969.[198]

Air Force Mortuaries

Caring for the remains of the fatalities of war has been a component task of the Army Quartermaster Corps since the Civil War and was conducted by the Mortuary Affairs personnel of the Quartermaster Corps. The Air Force established the first mortuary facilities in South Vietnam; however, because most of the fatalities were Army personnel, operational control of the facilities was transferred to the Army on 1 July 1966. The Air Force remained involved, however, as they provided the airlift effort to bring the remains back to U.S. soil. Travis AFB became the principal receiving station for war fatalities flown back for U.S. burial from the Vietnam War. According to records kept by the Travis Mortuary Affairs Office, 10,523 fallen servicemen passed through Travis AFB in 1968 alone. Travis AFB served as the sole receiving station for Army war dead on the West Coast, accounting for 73 percent of the arrivals at the base. As of 1 July 1970, the Travis Mortuary Affairs Office was consolidated with those of other military services at the nearby Oakland Army Base, where all caskets arriving at Travis AFB were then transferred. Processing facilities were also available at Dover AFB for East Coast airlift arrivals. Personnel at these mortuaries provided preparation of the remains for forwarding to their families. The wholesale return of remains during conflict was primarily instituted during the Vietnam War due to cargo jet capability, with the entire process taking 7 to 10 days from battlefield to receipt by families. This return process eliminated the need to establish in-theater temporary cemeteries, as was done in previous wars.[199]

3.2 RESEARCH FACILITIES

3.2.1 ARMY MEDICAL RESEARCH FACILITIES

As the Vietnam War progressed, the activities of the Army's medical research hospitals and laboratories increased dramatically to meet the demands brought about by combat in Southeast Asia. The U.S. Army Medical Research and Development Command (USAMRDC) was the main agency in charge of Army medical research during the Vietnam era. Consequently, its budget more than quadrupled between 1958 and 1968, from 12 million to 53 million dollars. The main focus of research was solving medical problems encountered in Southeast Asia. As a result, soldier performance in the field was enhanced through the reduction of losses from wounds, infectious diseases, and environmental stress. As the volume and scope of medical research activities increased, the size and responsibilities of USAMRDC grew correspondingly in the decade since it was activated. During 1968, the Command provided management, personnel, and research facilities for 31 multi-area projects. These efforts were about equally divided between internal and external programs.[200]

New methods of preserving whole blood, techniques in combat surgery, development of the new, transportable field hospital MUST, a new field laboratory (Field Medical Laboratory), design of body

[198] Hartman et al, page 159
[199] Hartman et al, page 161
[200] USAMRMC, page 24-25

armor, epidemiologic investigations of wounding, small unit water purification, and behavioral studies are examples of research categories that expanded in direct response to needs in Southeast Asia. [201]

A majority of the research studies conducted on a contract basis were devoted to the control and treatment of diseases endemic to Southeast Asia. The external program of USAMRDC consisted of contracts and grants with universities and other research institutions, as well as fund transfers to other government research institutes. More than 1,000 contracts, grants, and fund transfers were awarded during 1968.[202]

By 1968, internal research was also conducted in 14 research institutes, 15 military hospitals, and the Armed Forces Institute of Pathology. The largest of the research institutes under USAMRDC was the WRAIR, where nearly half of the Command's internal research efforts were conducted. The professional staff at WRAIR, 300 doctoral-level scientists at the time, was engaged in a wide range of research activities in all aspects of military medicine, especially infectious diseases. The WRAIR also served as an educational and advisory center.[203]

The WRAIR supported large tropical medicine research teams at the SEATO Medical Research laboratory, Bangkok, Thailand, and in Saigon, South Vietnam.[204] As discussed in Chapter 2, most of the disease-related research performed by the U.S. Army was conducted outside the United States in Asia and the Pacific where these diseases were endemic.

Walter Reed Army Institute of Research, Forest Glen, MD

WRAIR was founded by Surgeon General George M. Sternberg as the Army Medical School in 1883 in Forest Glen, MD. The institute underwent a series of name changes including the Army Medical Department Professional Service Schools in 1923, the Army Medical Department Research and Graduate School in 1947, the Army Medical Service Graduate School in 1950, and finally to WRAIR in 1955. In 1958, WRAIR, then located in Building 40 on the campus of the Walter Reed Army Medical Center, became a major subordinate activity of the newly formed USAMRDC.[205]

WRAIR is the largest, most diverse, and oldest research program in USAMRMC. It is also the largest military laboratory in the DoD and the direct descendant of the oldest school of public health and preventive medicine in the United States.[206]

U.S. Army Research Institute of Environmental Medicine, Natick, Massachusetts

The U.S. Armored Medical Research Laboratory was located at Fort Knox, Kentucky and included research on heat acclimation, physical fitness, nutrition, burns, foot disabilities, and prolonging the shelf life of whole blood. In 1961, the laboratory became part of the U.S. Army Research Institute of Environmental Medicine (USARIEM), in Natick, Massachusetts.[207]

Medical problems associated with geography, new environments, and extremes of climate received particular attention during the Vietnam War. The effects of hot and cold climates and high terrestrial altitude on Soldier performance had been under investigation by USAMRDC scientists for several years. The USARIEM spearheaded the USAMRDC effort in this area. The new laboratory at USARIEM was a modern building, with research facilities in environmental and altitude chambers, provided the finest single

[201] Department of The Army, Nov 1969
[202] USAMRMC, page 25
[203] Department of The Army, Nov 1969
[204] USAMRMC, page 25
[205] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter
[206] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter
[207] Hartman et al, page 94

laboratory in the country for the study of environmental medicine.[208] One of USARIEM's support laboratories is at Pikes Peak, Colorado. This location was the site of studies on the performance of infantrymen at high altitude—14,000 feet.[209]

The influence that heat rash has on heat exhaustion was investigated in a collaborative study between USARIEM and the LAIR, Presidio of San Francisco. These studies demonstrated that heat rash can predispose a person to heat exhaustion and that this predisposition can persist for as long as three weeks after the skin appears to be clinically healed. The effect has been shown to be due to the slower recovery of sweat glands following heat rash with a subsequent decrease in sweat production and evaporative cooling.[210]

In addition, unfamiliar hazards resulted from the development of new military systems. These hazards included the biological effects of ionizing, microwave, and coherent light radiation, and the effects related to the myriad new toxic chemicals, fuels, insecticides, and related compounds that became common during this era for military use. Changing concepts and tools of warfare, such as the introduction of improved nuclear and conventional weapons, new tactical concepts of increased mobility and dispersion of units, increasing reliance on mobile strategic reserves involving sudden troop movements to areas of climatic extremes, comprised novel and increasingly complex target areas for the research directed toward improving the performance of the soldier in the field.[211]

Recognizing the importance of environmental and operational contingencies for the health, performance, and effectiveness of troops in training or combat, USARIEM was activated in 1961 as a research laboratory under the USAMRDC and as a composite of elements associated with a number of outstanding federal and academic laboratories, including the Harvard Fatigue Laboratory in Cambridge, Massachusetts; the Armored Medical Research Laboratory at Fort Knox, Kentucky; the Climatic Research Laboratory in Lawrence, Massachusetts; and the Quartermaster's Environmental Protection Research Division and Earth Sciences Division in Natick, Massachusetts. The USARIEM's research focus in the early 1960s included effects of heat- and cold-induced stress and temperature regulation and effects of altitude exposure. In 1967, the Arctic Medical Research Laboratory at Fort Wainwright, Fairbanks, Alaska, was opened specializing in research on frostbite, hypothermia, and other injuries associated with cold weather military operations; the laboratory subsequently closed in 1978.[212]

The USARIEM moved to a permanent space of 76,000 square feet in 1968. This facility contains two altitude chambers (added in 1969), five biophysical evaluation chambers, a biomechanics laboratory, 13 environmental chambers, and a water immersion laboratory. In 1978, USARIEM reorganized under missions—altitude research, exercise physiology, heat research, health and performance, military ergonomics, and experimental pathology (including cold research). The USARIEM is currently organized into four research divisions: Biophysics and Biomedical Modeling, Military Nutrition, Military Performance, and Thermal and Mountain Medicine. The John T. Maher Altitude Research Facility at Pikes Peak is also part of the USARIEM laboratory as is the USARIEM/Womack Medical Research Facility in Fort Bragg, NC.[213]

Letterman Army Institute of Research, San Francisco, California

In 1966, the Surgeon General had established the Western Medical Research Laboratory in five buildings at Letterman General Hospital.[214] Research was conducted in tropical medicine, nutrition, surgery and blood

[208] USAMRMC, page 37
[209] USAMRMC, page 39
[210] USAMRMC, page 39
[211] Department of The Army, Nov 1969
[212] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter
[213] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter
[214] Hartman et al, page 94

replacement, pathology, and psychiatry. Letterman Army Institute of Research (LAIR) in San Francisco, CA was incorporated into the USAMRDC in August 1968. It represented a combination of four Army research activities: The Army Medical Research and Nutrition Laboratory, Denver, Colorado; the blood research component of the U.S. Army Medical Research Unit, Fort Knox; the Joint Laser Safety Team, Frankford Arsenal, Pennsylvania; and the Dermatology Unit of the U.S. Army Medical Research Unit, Presidio of San Francisco. This new LAIR carried out research in medicine, optics, nutrition, and toxicology. [215]

The collocation of the laboratories and units led to the construction of a state-of-the-art laboratory in July 1971. The facility consisted of four concrete buildings that housed the research groups. The construction was accomplished in three phases yielding a 361,000 square foot laboratory. The initial cost was 7.4 million dollars. The first phase of construction was the Research Support component, followed by the Research Laboratory component, and finally, the Administrative Support component.[216] Construction took five years with the final phases ending in 1976. [217]

A unit located at the LAIR, Presidio of San Francisco, led by Colonel William Akers, provided the ointments while the U.S. Army Natick Research Laboratory provided the footgear. Captain Allen's field dermatology team worked in consultation with Colonel Akers and the division surgeons in charge of the program. Before deployment to Vietnam, the team trained in the Everglades in a simulated tropical combat environment. Upon arrival in-theater, the team was given a completely equipped MUST unit as a laboratory. The team accompanied infantrymen in active fire zones and units on patrol to evaluate proposed methods of skin disease prevention. The use of portable field laboratories and special culture media permitted isolation of pathogens that had eluded detection by previous methods. In less than six months, Captain Allen's team had identified the populations most likely to develop disabling skin diseases, isolated the pathogens, measured the effects of exposure, and initiated effective new methods of prevention and treatment. As a result of these studies, tactical procedures were altered and operations were limited in paddies to 48 hours (unless pinned by the enemy) followed by a 24-hour drying period.[218] Another study found that daily administration of griseofulvin was an effective prophylactic against fungus diseases of the skin, and its use reduced incapacitating dermatophytosis in special military units.[219]

During the course of its 25-year history in the USAMRDC, LAIR made significant contributions to military medicine in three areas: ocular hazards, cutaneous hazards, and blood research. Outstanding research milestones included an increased understanding of the nature and extent of ocular injury, improvement in the medical management of ocular injury, and reduction of ocular trauma. Milestones in blood research included the design and development of new military-adaptable resuscitation fluids and improved blood products. The laboratory was deactivated as a result of the 1991 Base Realignment and Closure Act.[220]

U.S. Army Aeromedical Research Laboratory, Fort Rucker, Alabama

The USAARL was established in October 1962 at Fort Rucker, Alabama with the mission to provide direct aviation medical research support to all Army aviation and airborne activities. Technical evaluation of aircraft and personnel equipment, aeromedical inflight observations, and analyses of field problems reported by other aviation agencies were part of the unit's early research. The aeromedical problems that faced Army aviation units in Vietnam provided a challenge to their supporting flight surgeons. No problem was more common yet more elusive than that of optimizing crew rest and endurance. It became more

[215] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter
[216] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter
[217] Hartman et al, page 94
[218] USAMRMC, page 49
[219] USAMRMC, page 49
[220] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter

pronounced after 1965 when the buildup of U.S. forces gained momentum and remained a significant limiting factor in the conduct of airmobile operations. By the end of 1966, aviators were flying 100 to 150 hours or more per month, and the need to know the limits of aviator endurance became evident.[221]

Army aviators were assailed by a multitude of stresses, each to some extent capable of endangering their missions. The stress from hostile fire was aggravated by such factors as heat, dehydration, noise, vibration, blowing dust, hazardous weather, exhaust from engines and weapons, and labyrinthine stimulation. Additional stress was caused by psychic elements, such as fear, insufficient sleep, family separation, and frustration. These stresses, acting on the aviator day after day, combined with the physical exertion of long hours of piloting an aircraft, caused fatigue.

The ever-increasing requirements between 1967 and 1968 for aviation support caused the accrual of extremely high aviator flying times in all units. Night operations, with their extra demand upon the critical judgment of the aviator, increased. The shortage of crews often forced an individual to undertake both day and night missions without adequate rest.[222] In response to expressed concerns of unit commanders and aviation safety officers, flight surgeons at all levels of aeromedical support studied every aspect of crew rest and endurance. Because fatigue was the result of many variables, it was not easily defined and precisely measured.

During 1965 and 1966, USAARL scientists conducted studies on the effectiveness of armor for both men and equipment. By the end of 1965, crashes had caused 101 fatal and 79 nonfatal injuries, and "missiles and shells" had caused 43 fatal and 673 nonfatal wounds. The ineffectiveness of seat armor was a contributing factor, implicit in the notation "most fatalities [are] due to wounds of head, throat, and upper torso."[223]

In January 1966, the Department of the Army approved a project for USAARL to develop flight clothing that would provide fire protection, be compatible with cockpit design, and resemble the uniform worn by the foot Soldier. Deliveries to Vietnam of a two-piece Nomex uniform began early in 1968, and by year's end adequate quantities were on hand to meet all requirements. In 1969, the fire-resistant flight uniform, having been well received by aircrews, was made Standard A for the Army.[224]

Prior to 1969, aircrews were wearing a mixture of APH-5 and AFH-1 helmets. In 1969, a new flight helmet, the SPH-4, incorporating markedly improved retention and noise attenuation qualities, was procured for use in Vietnam and received immediate acceptance in the field. It proved effective in the prevention of injuries and became Standard A early in 1970.[225]

Technical evaluation of aircraft and personnel equipment, aeromedical in-flight observations, and analyses of field problems reported by other aviation agencies were part of the unit's early research. In 1969, it was re-designated a laboratory (USAARL), and construction began on a new vivarium. One year later, the Helicopter In-flight Monitoring System, an airborne system capable of simultaneously measuring pilot and helicopter performance, was installed aboard the laboratory's JUH-1H research helicopter, and a burn laboratory was constructed for studies of post-crash fire characteristics of helicopters and human survival and protection.[226]

[221] USAMRMC, page 53
[222] USAMRMC, page 55
[223] USAMRMC, page 57
[224] USAMRMC, page 57
[225] USAMRMC, page 57
[226] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter

In 1974, USAARL was designated as the lead medical laboratory for vision and acoustics research, and a field research facility was completed to permit research assessing physiological and psychological aviator performance during sustained operations. A helmet evaluation facility was completed in 1975, and investigations into human effects of helicopter vibration were initiated. In 1977, the laboratory began conducting health hazard assessments and countermeasures research on air and tactical ground vehicles and weapons systems.[227]

In May 1978, ground was broken for a new laboratory facility, with completion in March 1981.[228]

Aberdeen Proving Ground and Edgewood Arsenal, Maryland

A new 4.1 million-dollar Army clinical research laboratory building, specifically planned for scientists, was dedicated in Maryland on 16 October 1968. Named the General John R. Wood Building, the one-story masonry structure contains 62 mission laboratories, 78 support labs, 23 offices and a 200-man conference room. Approximately 250 military and civilian personnel highly trained in medical, physical and biological sciences worked in the building, assigned to various branches of the Arsenal's Medical Research Laboratory. [229]

Designed for basic and applied research in the field of aerosols, basic and field toxicology, and neuropharmacology, the Wood Building was constructed at a cost of $3,039,800.[230] The General Wood Building added capacity to the Army's capabilities in the increasingly important field of chemical defense. One of the most modern facilities available for clinical research, the new building was designed for safe and efficient research in clinical investigations, experimental medicine, pathology, psychology, and human engineering.[231] Basically rectangular, it is 316 feet across the face and 222 feet long, with an addition at the rear of the center line measuring 61 by 51 feet. The total area is approximately 72,700 square feet.[232] The structure was air-conditioned and steam heated through the use of an existing plant. Emergency electrical generators provided protection against possible power failure.[233]

In 1973, the U.S. Army Medical Environmental Engineering Research Unit at APG was moved under the U.S. Army Medical Bioengineering Research and Development Laboratory. Its mission was to conduct environmental health engineering research. The Health Effects Research Division conducted research in support of the development of health protection criteria for Army personnel; criteria to protect air, land, and water quality during the production and use of Army-unique materiel; health effects of smoke and visibility-limiting materials, new conventional and chemical weapon systems, and synthetic fuels; and new methods to predict possible adverse effects as well as facilitate the detection of Army-unique chemicals.[234]

U.S. Army Institute of Dental Research, Washington, D.C.

The U.S. Army Institute of Dental Research (USAIDR) was located at the WRAIR in Washington D.C. in 1962. The USAIDR mission included providing dental education.[235] Improving dental care was also an initiative designed to increase soldier retention during the 1960s.[236]

[227] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter
[228] https://www.usaarl.army.mil/pages/about/history/
[229] Press release #EA-885-68, October 4, 1968
[230] Press release #EA-885-68, October 4, 1968
[231] Press release #EA-885-68, October 4, 1968
[232] Requests to see and photograph the building during the site visit were denied.
[233] Press release #EA-885-68, October 4, 1968
[234] USAMRMC, page 32
[235] Hartman et al, page 94
[236] USAMRMC, page 34

Stimulated by the need to reduce time-consuming dental emergencies occurring in troops in South Vietnam, clinical testing of a new dental restorative material that could be inserted quickly in individual teeth, was easily manipulated, and set in two minutes was initiated in 1968.[237] From 1969 to 1972, the U.S. Army Institute of Dental Research modified the dental "water pick" into a sophisticated surgical tool. The tool's pulsing water jet removed (debrided) dead tissue and bacteria faster and with less damage to healthy tissue than scalpel and forceps. Later, by adding detergents/disinfectants to the water stream, the machine also became a much faster method for cleaning surgical teams' hands.[238]

U.S. Army Medical Biomechanical Research Laboratory, Washington, DC.

Although the majority of hospital admissions were due to disease, battle injuries and wounds were responsible for approximately one of six admissions during the period from 1965 to 1969. In 1966, the U.S. Army Medical Biomechanical Research Laboratory (USAMBRL) developed a dexterous and more natural-looking artificial hand than had previously been available to injured soldiers. The new hand was electromechanical, designed primarily for upper extremity amputees, and contained a piezoelectric crystal at the heart of the system. Its designers hailed it as a breakthrough in automatic proportionate control of prehension. Unlike previous electrical devices, it incorporated feedback and control of position, velocity, and force, utilizing a system that responds to slippage signals. This allowed an amputee to focus on positioning and grasp decisions; the applied force was controlled by the hand itself. It was run by a 12-volt planetary-gear-reduced motor that provided a grasp of 15 pounds and could be recharged at night.[239] The USAMBRL was established at Forest Glen, MD in the early 1920s.

U.S. Army Medical Equipment Research and Development Laboratory, Fort Totten, New York

In the 1973 reorganization of the AMEDD; the USAMBRL, located in Forest Glen, MD, and the U.S. Army Medical Equipment Research and Development Laboratory in Fort Totten, New York, were consolidated and moved to Fort Detrick, MD to create the U.S. Army Medical Bioengineering Research and Development Laboratory.[240]

U.S. Army Medical Research Laboratory, Fort Knox, Kentucky

In 1964, WRAIR completed a staff study on blood transfusion that resulted in the establishment of the Blood Transfusion Research Division at the U.S. Army Medical Research Laboratory (USAMRL), Fort Knox, Kentucky in July 1965. Later, in 1971, it was designated as the American Association of Blood Banks Reference Laboratory.[241] The logistics of furnishing fresh whole blood to combat medical facilities was limited by its 21-day shelf life. Studies at the USAMRL demonstrated a twofold prolongation of shelf life by the addition of adenine to the preservative.[242]

In June 1993, this institute (at the time called the Blood Research Division of Letterman Army Institute of Research) formally moved to WRAIR under the provisions of Base Realignment and Closure in 1989 and 1991 and became the Division of Blood Research, WRAIR.

Fort Dix, New Jersey

[237] USAMRMC, page 34
[238] USAMRMC, page 35
[239] USAMRMC, page 31
[240] Hartman, et al, page 93
[241] Excerpted from USAMRMC: 50 years of Dedication to the Warfighter
[242] USAMRMC, page 36

In the late 1960s a new adenovirus vaccine was developed that reduced respiratory infections in trainees. Large-scale field trials of orally administered vaccine of adenovirus type 4 demonstrated its ability to terminate an epidemic of type 4 acute respiratory disease. The use of gamma globulin was tested in overseas troops resulting in the finding that injections gave significant protection against hepatitis but not against most other infections common in Vietnam.[243]

Hepatitis researchers developed the first satisfactory animal model to study this disease. Studies during this time showed that the marmoset develops typical histological and biochemical evidence of hepatitis when given infected human serum. Long-term hepatitis studies were significantly aided by collaboration between WRAIR and the Armed Forces Institute of Pathology in the establishment of a central laboratory at Fort Dix where reference sera, candidate viruses, and tissue culture stocks were maintained and distributed.[244]

In the area of combat surgery, USAMRDC developed a new topical antibacterial preparation, sulfamylon, which, with use in 1969 resulted in a 50 percent reduction of burn mortality due to infection. In the treatment of shock, the control of hemorrhage with novel chemical polymers—a cyanoacrylate spray—was found to be successful. Tissue adhesives and new techniques of repairing internal organs without sutures were other important developments. A new technique for the management of avulsion wounds of the oral region utilized silicon plastic that cures at room temperature. After debridement, this material is placed directly into the defect to restore oral integrity until the time of reconstructive surgery.[245]

Fort Bragg, North Carolina

The war in Vietnam pointed out deficiencies in the knowledge of certain important tropical diseases and, more significantly, the deficiencies in the ability to predict non-effectiveness and in the application of preventive techniques. It also provided the opportunity for a unique and valuable experiment in medical support of military operations in a hostile environment. The FEST was organized in May 1966 by Lieutenant Colonel Llewellyn J. Legters, MC, preventive medicine officer of the John F. Kennedy Center for Special Warfare at Fort Bragg, NC, who recognized that a research group operating in the remote areas where U.S. military forces were being committed could study the epidemiology of tropical diseases in the environment where most of the diseases were transmitted.[246]

The FEST, composed of Special Forces officers and enlisted technicians stationed at Fort Bragg, was trained at Fort Bragg and at WRAIR in specific laboratory and field epidemiological skills suitable for studying diseases of special interest to the Army Medical Department and in providing medical support, preventive and curative, to ground troops in Vietnam. Training was oriented primarily to specified scientific areas of interest, such as the entomological aspects of tropical sprue, febrile illness, schistosomiasis, filariasis, dengue, and malaria.[247]

After the training period, FEST was formally constituted as an element of WRAIR, deployed to Vietnam on 26 September 1966, and became part of the medical research team in Saigon for administration and logistics, but was attached to Headquarters, 5th Special Forces Group. The studies of this team which continued through 1968, diminishing as the war became conventionalized, generated valuable scientific information about malaria, plague, schistosomiasis, filariasis, tropical sprue, and other ailments.[248]

[243] USAMRMC, page 47
[244] USAMRMC, page 48
[245] Department of The Army, Nov 1969
[246] Neel, page 131
[247] Neel, page 131
[248] Neel, page 131

Other Installations

Specialized research programs were also performed at the following USAMRDC institutes and laboratories:

- U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), Frederick, MD: Exotic infectious diseases
- U.S. Army Medical Research and Nutrition Laboratory (USARNL), Denver, Colorado: Metabolism, nutrition
- U.S. Army Institute of Surgical Research (USAISR), Fort Sam Houston, TX: Burns, trauma

3.2.2 NAVY MEDICAL RESEARCH CENTERS

The Naval Medical Research Center (NMRC), located in Silver Spring, MD, was previously known as the Naval Medical Research Institute. It provided facilities for biomedical research on diseases and operational problems that affected sailors and marines. Research facilities were also in place at the Naval Medical Center, Bethesda, MD and the U.S. Naval Hospital, San Diego, CA.[249]

The NMRC laboratory focuses on solutions to operational medical problems, such as battlefield neurotrauma and wound infections, decompression sickness, naturally occurring infectious diseases, and biological threat agents. The NMRC laboratory is co-located in the Daniel K. Inouye Building with the WRAIR at the U.S. Army Forest Glen Annex, Silver Spring, MD. The NMRC also operates a Biological Defense Research Directorate at the U.S. Army Ft. Detrick Garrison in Frederick, MD.[250]

Source: https://globalbiodefense.com/2016/02/17/walter-reed-kicks-of-phase-1-mers-vaccine-trial/

FIGURE 3-7. THE DANIEL K. INOUYE BUILDING ON THE WRAIR CAMPUS

The Infectious Disease research directorate focuses on minimizing the impact of infectious diseases. Operational and Undersea Medicine research studies focus on undersea medicine, neurotrauma and regenerative medicine. In undersea medicine researchers study interventions to improve performance and reduce injury in deployed naval forces engaged in undersea occupations, including the physiologic effects of extreme environments on performance capabilities and work to find effective tools for mitigation. Biological Defense Research military medical researchers have focused on how to defend against the threat of biological and chemical warfare.[251]

[249] Hartman et al, page 122
[250] www.med.navy.mil/sites/NMRC
[251] www.med.navy.mil/sites/NMRC

Camp Lejeune Marine Corps Base

Three Navy commands were tenants at Camp Lejeune Marine Corps Base, including the Naval Hospital, still located in Building H-1; the Field Medical Service School at Camp Geiger; and the Naval Medical Field Research Laboratory (NMFRL) in Building 66.

The NMFRL was one of the most significant operational laboratories in the history of the Navy. It was founded on 30 August 1943 through a joint agreement by BUMED and the Commandant of the Marine Corps, was dedicated to "scientific research, development and testing pertinent and peculiar to the practice of amphibious medicine." The laboratory's proximity to amphibious personnel training under simulated battle conditions allowed for unique "frontline" evaluation of field-level conditions. The lab's achievements include the work on body armor, development of a silicone-based ointment in Vietnam to protect Marines against "paddy foot" and the mosquito jacket.[252]

Source: BUMED

FIGURE 3-8. BUILDING 66, NAVY MEDICAL FIELD RESEARCH LABORATORY, DATE UNK.

For years, the NMFRL had investigated methods for controlling mosquito-based diseases. In the mid-1960s, the lab began experimenting with lightweight, wide-mesh netting treated with insect repellent for use in field tents. Out of this research came the development of the so-called anti-mosquito netting jacket or mosquito shirt. Like the field tents, the polyester-cotton jacket was treated with an insect repellent that produced a "vapor barrier" between the openings of the jacket's mesh fabric. Lab personnel successfully field tested the jacket in Alaska, Africa, Indonesia, Panama, Vietnam, and Guantanamo Bay, Cuba and

[252] Communication with André B. Sobocinski, Historian/Publications Mgr., Communications Directorate, BUMED

found that it could protect the wearer for up to a thousand hours. The jacket would later become commercially available and released under an assortment of names (e.g., "bug jacket.").[253]

Originally partly subsidized by the Marine Corps, BUMED would assume complete funding responsibility for the lab beginning in fiscal year 1972. Soon after, at the behest of BUMED, NMRFL was formally disestablished on 1 July 1976.

3.2.3 AIR FORCE RESEARCH CENTERS

Air Force medical research has primarily focused on medical issues related to aviation. In 1959, a new Aerospace Medical Center opened at Brooks AFB, TX combining the School of Aviation Medicine (from Randolph AFB), the Lackland Hospital and the Air Force Epidemiology Laboratory (also at Lackland), and the Medical Service School, which had been at Gunter AFB, Alabama. It is unknown if Vietnam-specific research was conducted at this facility.[254]

Aerospace Medical Center, Brooks Air Force Base, Texas

In the late 1950s, Brooks AFB was transformed from a flight training center to a center for modern medical research and development and education center. The transition started in the summer of 1959 when the School of Aviation Medicine returned to Brooks AFB from Randolph AFB. Brooks AFB became the headquarters for the Aerospace Medical Center on 1 October 1959.

The Aerospace Medical Center represented the initial step in placing the management of aerospace medical research, education, and clinical practice under one command. In recognition of its participation in the U.S. space program, the school's title was changed to School of Aerospace Medicine in May 1961, and both the school and center were reassigned from Air Training Command to Air Force Systems Command in November 1961, and assigned to the new organization, the Aerospace Medical Division.

On Nov. 21, 1963, President John F. Kennedy dedicated four buildings in the complex that housed the Aerospace Medical Division headquarters and the USAF School of Aerospace Medicine. This was his last official act before his assassination in Dallas, TX the following day.

The aerospace era placed new demands on medical research and education, particularly in space medicine. Research efforts at the USAF School of Aerospace Medicine were instrumental in making manned space flight a reality. Researchers continued to study man's interaction with the aerospace environment, seeking ways to maximize a pilot's ability to use modern, high performance aircraft. Flight simulation devices, the centrifuge, altitude chambers, lasers, and other specially developed equipment, enabled researchers to perform laboratory studies of man's tolerances in the aerospace environment.[255]

The Vietnam War directly increased the school's training load as the number of medical specialists in the Air Force grew. Courses were also added on tropical diseases and aeromedical evacuation. Additionally, the Aerospace Medical Division helped develop body armor for air crews of low and slow flying aircraft and was involved with the initial development of lateral sighting techniques and the original FC-47 gunships.[256]

3.3 MEDICAL UNITS TRAINING FACILITIES

[253] Communication with André B. Sobocinski, Historian/Publications Mgr., BUMED
[254] Hartman et al, page 161
[255] https://www.globalsecurity.org/military/facility/brooks.htm
[256] Alcott and Williford. Aerospace Medical Division: Twenty-five Years of Excellence 1961-1986, pages 47-49

Since World War II, the two service branches responsible for ground combat, the Marine Corps and the Army, staffed their combat medic billets by different means. Navy Hospital Corpsman provide combat medical care for Marine combat units. Navy Corpsmen designated for service in-the-field with Marine combat units completed regular Navy boot camp. They then went to Hospital Corpsman School to receive initial medical training. The Corpsmen then learned how to use Marine field equipment, ground combat tactics and advanced medical skills.[257]

The Army trains and uses their own combat medics. Medic candidates were often tagged from the very first day they joined the Army. Medics went through a combined basic training, infantry class, and medics school.[258]

During Vietnam, both Navy Corpsmen and Army Medics received 13 to 16 weeks of combat medicine training that was conducted completely separate from boot camp. The Vietnam Era also saw battlefield medicine settle on an industry-wide certification (military or civilian) as an Emergency Medical Technician (EMT). Required skills for an EMT are not at the same level as a doctor, nurse, or paramedic. There are certain battlefield trauma procedures taught to and used by Corpsmen and Medics that the average doctor or nurse is not legally allowed to perform.[259]

3.3.1 ARMY MEDICAL TRAINING

Medics were used to their full potential for the first time in Vietnam. By definition, medics were soldiers with medical training. All units received basic training together for eight weeks, regardless of their future Military Operating Specialty (MOS). From there, a combat medic would move on with their medical training, often at Fort Sam Houston, TX, for another eight weeks of training. There, they trained constantly in how to draw blood; start intravenous lines; use splints; treat shock, head wounds, gunshot wounds, burns, seizures, and dislocations; and perform tracheotomies, cardiopulmonary resuscitation (CPR), and hospital duties along with numerous other techniques.[260]

Fort Sam Houston, Texas

Medical wisdom says a causality treated within one hour has an excellent chance of survival. To get treatment in that "golden hour," the choices are either to evacuate the causality from the battlefield or bring the medical facilities to the battlefield – both occur under conditions of extreme danger. The knowledge, skills, and techniques tested at Fort Sam Houston are shared with civilian medical and public safety counterparts and have proven effective during other types of disasters, both natural and man-made.

To evacuate the wounded, the U.S. Army uses the "chain of evacuation" developed during the Civil War. This "chain" is a plan to get causalities to appropriate care in the shortest time possible. It is so effective, that only the technology has changed. The medical evacuation program, called medevac, developed in Vietnam, was refined by medical thinkers at Fort Sam Houston. By 1969, it had proven so successful that the government considered using it stateside. Military Assistance to Safety and Traffic (MAST), tested whether military medevac could effectively be used in civilian emergencies. The MAST was such a success at Fort Sam Houston and San Antonio, that the program directors were directed to "find other San Antonios" for MAST usage. The MAST became Public Law 93-155 in November 1973, funded by the Defense budget. As program directors anticipated, civilian companies have since take over civilian medevacs. The military no longer performs routine MAST missions but assists in exceptional emergencies.

[257] Miller 2015
[258] Miller 2015
[259] Miller 2015
[260] http://www.uglypufferfish.com/2009/11/26/medical-support-in-vietnam/ December 2001

To get a fully functioning hospital to the battlefield, the Medical Department had to design one that could move as the battle required; one that was as mobile as the combat units it supported. The famed MASH, of the Korean War achieved this goal. A seriously wounded soldier who made it to a MASH alive had a greater than 97 percent chance of survival. However, the MASH-operating rooms, laboratories, and wards were all housed in the same dark, dusty, uninsulated general-purpose tent that the rest of the Army used and could be described as primitive. By the 1960s, the Medical Department started development of the MUST, with specialized mobile structure to house combat hospitals.

Modular, flexible, and relatively lightweight, the MUST consisted of inflatable units to serve as wards. Hard-side expandable units contained operating rooms and laboratories. Utility units provided electricity, air conditioning, heating, and pumped water. All these units could be linked together in whatever size and configuration the hospital needed. Everything fit into standard shipping container, so the MUST was described as a "hospital in a box." The MUST was tested at Fort Sam Houston and nearby Camp Bullis and started replacing the MASH-era tents at the end of the Vietnam War. Many combat medics also received their training at Camp Bullis and Fort Sam Houston, where a mock Vietnamese Village offered medics training under very specific conditions.[261]

Source: Fort Sam Houston

FIGURE 3-9. CAMP BULLIS MUST TESTING

The Vietnam War presented many young men with a moral dilemma as they became subject to the draft in the late 1960s. These were men whose deep-seated religious convictions or personal beliefs held that killing was wrong, even in war. At the same time, a number of them also possessed a strong sense of patriotism and felt that service to one's country was a vital duty. Many were torn because family members had served in previous wars. There were four choices for conscientious objectors: serve, leave the country, declare oneself a conscientious objector and refuse induction, or apply to be classified as a conscientious objector who was willing to serve. [262]

Under the Army's program, conscientious objectors would take their weaponless basic training at Fort Sam Houston, and then attend the field medical school there.[263] Approximately 98 percent of all non-combatant

[261] Marsha Prior, Karen Van Citters, and Duane Peter, National Register of Historic Places Themes and Historic Context for Air Force, Army, and Navy in the Cold War, January 2017
[262] https://www.historynet.com/a-conscientious-objectors-medal-of-honor.htm
[263] https://www.historynet.com/a-conscientious-objectors-medal-of-honor.htm

conscientious objectors trained at the Medical Training Center at Fort Sam Houston. The commander at Fort Sam Houston at the time, Colonel Charles Pixley, estimated that between 6 and 8 percent of all individual draftees who came through the Medical Training Center were non-combatant conscientious objectors. All of the conscientious objectors that trained at Fort Sam Houston went to Vietnam, while others from the other companies went to Germany or stayed stateside. Approximately 15,000 conscientious objectors served in Vietnam.[264]

Fitzsimons Army Hospital, Colorado

ln-service professional courses for members of the Army Nurse Corps include programs in anesthesiology, medical surgical nursing, neuro-psychiatric room nursing, and operating nursing. Other professional courses held at Fitzsimons Army Hospital include a uniformed services pediatric seminar, a course in advanced pharmacy techniques, a course in clinical pastoral education, a symposium on current trends in Army Medical Department psychology, and a symposium on current trends in Army social symposium on pulmonary disease. and a course on current programs and trends in medical plans and operations. The 1971 completion and dedication of the Quade Conference Center allowed for more courses to be conducted at Fitzsimons. The center had sophisticated audio-visual equipment and versatility in allowing for various sized groups.[265]

Source: https://www.onlyinyourstate.com/colorado/denver/fitzsimons-hospital-denver/

FIGURE 3-10. FITZSIMONS MEDICAL HOSPITAL, DATE UNKNOWN.

Medical technical training courses conducted primarily for enlisted personnel include clinical specialist (offering training equivalent to an accredited licensed practical nurse program); optical laboratory specialist (conducted in conjunction with the U.S. Army Medical, Optical Maintenance Agency (USAMOMA) which manufactures eyeglasses for military personnel around the world); medical equipment maintenance (basic, advanced, and supplementary and refresher courses open to officers, warrant officers and enlisted men of the Army, Navy, military services of foreign nations, offered through USAMOMA); eye, ear, nose, throat

[264] Bullock Museum, podcast, Vietnam on Tape, Episode 2
[265] Department of Army, Fitzsimons General Hospital 1971

specialist; neuropsychiatric procedures; occupational therapy specialist; orthopedic cast specialist; orthopedic brace specialist; operating room technician; and radiographic procedures.[266]

3.3.2 NAVY MEDICAL TRAINING

Following boot camp and hospital corps school, some corpsmen received orders to naval hospitals where they served as ward corpsmen. The Navy assigned others to the fleet as ship's company on board vessels with medical departments. Naval Hospital Corpsmen who were assigned to USMC combat units received special training to familiarize themselves with the Marine Corps.[267] Through a several-week training program, the corpsmen added field combat skills to their medical skills. This training was done at the Field Medical Service School (FMSS). During the Vietnam War years there were two FMSS schools located at Camp Pendleton, CA and Camp Lejeune, NC.[268]

The FMSS training took place after a corpsman had attended Navy recruit basic training and hospital corps school; then, to attend the FMSS, they were organizationally attached to the Navy's Fleet Marine Force. The course lasted 27 days, training the corpsmen in general combat skills, such as small-unit tactical operations, weapons training, and medically related combat skills.[269] In order to become well-versed in the traditions of the Marine Corps, they engaged with topics that included general military subjects, military drills, and weapons familiarization with the opportunity to qualify on the rifle. Corpsmen were trained in marksmanship, using an M16 and the .45-caliber automatic pistol.[270]

Training at this school resembled boot camp as it was physically taxing. Every morning there was a three-mile company formation run, physical training and conditioning and through the day there was training on field medicine, hygiene, wound management, individual and small unit tactical operations, and weapons training.[271] Students arrived as trained corpsmen, wearing the blue Navy uniform, each having little or no experience with Marines. By the time they graduated, they would wear the uniforms of the U.S. Marine Corps bearing their Navy rating on their sleeves and collar designation.[272]

The FMSS is a C school, meaning it is not required of all corpsmen. However, those who have not attended the school are not eligible to serve in a Marine unit. Although Corpsman are not designated to engage in combat, they are in the thick of the action, and added to their field medical training are classes in combat survival, defensive techniques, the treatment of typical combat injuries and various other associated skills with which field medicine is closely related.[273]

During training, there were also night operations trainings, long hikes on hot days, and trainings to set up Battalion Aid Stations. The primary goal was to make the students strong battlefield medics acclimated to the needs of combat medicine and indoctrinated in USMC methods. The hospital corps school had provided them with good basic first-aid training. The FMSS taught them to stop the bleeding, clear the airway, protect the wound, and treat and prevent shock. Other courses included assessing wounds, applying battle dressings, stabilizing sucking chest wounds, treating abdominal injuries and traumatic amputations, stabilizing a fractured jaw, maintaining an airway, splinting broken limbs, and learning field sanitation.[274]

[266] Department of Army, Fitzsimons General Hospital 1971
[267] Herman, page 36
[268] Murphy, http://326marinesinvietnam.com/Corpsmen.aspx
[269] Hartman, et al, page 120
[270] Herman, page 36
[271] Murphy, http://326marinesinvietnam.com/Corpsmen.aspx
[272] McClendon**,** page 282
[273] Murphy, http://326marinesinvietnam.com/Corpsmen.aspx
[274] Herman, page 36

Corpsmen were also trained to manage multiple casualties under fire. Treating casualties in combat involves more than just medical know-how, which is why much of the school's training focus involved physical and mental conditioning geared toward preparing sailors for the rigors of a Marine Corps lifestyle. Upon completion of training, the corpsmen receive Navy Enlisted Classification of HM-8404.[275] Graduation from the school enabled the corpsmen to serve in a USMC unit, to treat casualties while under fire, and to serve as general medical providers. [276]

During the Vietnam War, doctors, nurses, dentists, and other specialties were often already practicing in civilian life or were recent graduates of medical/nursing schools when they were drafted or volunteered. Navy nurses were required to have completed two years of active duty before deploying to Vietnam. More advanced training for Naval medical personnel often came on the job in one of the Naval Hospitals. The Naval Medical School and the Naval Dental School were part of the medical complex at Naval Medical Center, Bethesda, MD.[277] Corpsman and basic training was primarily conducted at Great Lakes Training Center, Illinois, or at the Hospital Corps School San Diego.[278]

Source: U.S. Navy Medicine, January 1977

FIGURE 3-11. FIELD MEDICAL SERVICE SCHOOL TRAINING EXERCISE

Camp Pendleton, California

The FMSS at Camp Del Mar at Marine Corps base Camp Pendleton, CA is one of two schools that trained and continues to train sailors to become corpsmen in the operating forces. The school's mission is to educate, train and prepare Navy medical personnel to serve with Marine operating forces. The first few weeks of the seven-week cycle are very hard on the students. Corpsmen are trained on how-to live-in combat with

[275] Murphy, http://326marinesinvietnam.com/Corpsmen.aspx.
[276] Hartman, et al, page 122
[277] Hartman, et al, page 122
[278] Hartman, et al, page 122

Source: http://gruntfixer.net/Guide/Vietnam/My%20Story/Camp%20Pendleton/FMSS1.htm

FIGURE 3-12. FIELD MEDICAL SERVICE SCHOOL, CAMP PENDLETON

marines. Not unlike Marine Corps boot camp, FMSS entails stages of training to create warrior corpsmen. In the beginning, they are marched everywhere, and the first few weeks are very difficult.

The first corpsmen graduated from the FMSS on 4 September 1950. The graduating class consisted of 80 hospital corpsmen who had been recalled for Korea.[279]

Camp Lejeune, North Carolina

Field Medical Training Battalion-East, Camp Lejeune, NC was initially activated on 8 April 1943 as Medical Field Service School Battalion, Camp Lejeune, NC. The initial goal was to meet the growing requirement in WWII for combat trained and medically trained officers and enlisted personnel of the Navy Medical Department serving with the Marine Corps. In April 1944, FMSS was reassigned to 2d Medical Battalion, Camp Lejeune, NC. The school was officially deactivated on 31 August 1945 due to the end of WWII. The school was reactivated on 1 October 1950 because of the Korean War. It was reactivated as FMSS, Marine Barracks, Camp Lejeune, NC and was relocated to the Montford Point Camp, now known as Camp Johnson.[280]

In his memoir *The Nam "Doc," A Navy Corpsman's Story*, Stan Gerding describes medical training with the Marine Corps at the Camp Lejeune FMSS during the Vietnam War:

> *"I will give you an overview of some cadence for the Navy: "forward march" means let's go, the cadence caller says either "left, right, left, right" depending on which foot you are on, or "1, 2, 3, 4" and then repeat "1, 2, 3, 4." The Marine Corps says, "Foowardd hoooout, herg, hedoe," I'm guessing. I can go on and on, but the bottom line is that we had a hard time understanding his commands. We looked like a bunch of idiots marching down the street. We were laughed at by anybody who saw us marching. After a few days, we were looking pretty good; I guess we were starting to understand him, I think.*

[279] https://www.pendleton.marines.mil/News/News-Article-Display/Article/536289/fmss-marines-train-those-who-save-lives/
[280] https://www.trngcmd.marines.mil/Units/South-Atlantic/FMTB-E/About/History/

The medical training was excellent with heavy emphasis on combat injuries to include sucking chest wounds, bullet wounds with arterial bleeds, leg and arm breaks with splinting techniques, eye injuries, and many more. One day we visited a mock Vietnam village made to look like a real one, along with booby traps like the ones over in the 'Nam. And then a day at the firing range where many of the Marines joked about our (lack of) expertise in shooting weapons. We weren't good, and I think I was on the top of that list.

We also had to go to the gas chamber again, but this turned out to be a different type, I will explain. We would be taken into this room with a dirt floor and the Marine instructor would light the tear gas off directly in the middle of the floor and instruct us to remove our gas mask one at a time. Then we were to sing the first stanza of the Marine Corps Hymn and then you could leave the room. Now, we were in there in a group of ten guys and even though we had a mask on there still was seepage of the gas around the sides of the mask. Here we go again, the last man standing is all messed up and, guess who that was? Of course, me. I think that was the fastest the Marine Corps Hymn had ever been sung and out the door I went, coughing and hacking.

The last week of training was unique. The first three days the Marines prayed for rain because we went out in the woods for a three-day bivouac with weapons and wounds and basically war. We also watched a gun show put on by the Marines that were going through ITR (infantry training).

We were so happy when Thursday morning came because this was over and we were going to graduate. By the way, it rained all three nights...."[281]

3.3.3 AIR FORCE MEDICAL TRAINING

Air Force Flight Surgeon Training

The USAF policy during the Vietnam era towards its newly drafted physicians was much the same as it had been in Korea. As the young doctors finished internship or the first year of clinical residency, those designated by the Selective Service (draft) for USAF service received a form letter asking if they wanted to volunteer to be flight surgeons. Those who volunteered and were physically qualified attended two weeks of officer training at Gunter AFB in Montgomery, Alabama. Next, they attended the Primary Course in Aerospace Medicine (PCAM) at Brooks AFB in San Antonio, TX. Many then proceeded to Southeast Asia, with some, but not all, also attending a one-week jungle survival course in the Philippines.[282]

Pararescue

The USAF Pararescue is a first responder rescue specialist. The Pararescue is trained to enter any small- or large-scale incident area regardless of location and numbers of injured by the most practical rapid response method (parachute, helicopter, surface) and to provide care for up to 48 hours when immediate casualty evacuation is not practical.[283] Formal training courses and schools did not exist until 1949 at the USAF School of Aviation at Gunter AFB, Alabama.[284] After the force reduction following the Korean War,

[281] Stan Gerding, "Dear Grandson: FMSS Training at Camp Lejeune," published in The Big Smoke 23 Sept. Excerpted from The Nam "Doc," A Navy Corpsman's Story, 2011
[282] John, F. Cassidy, A History of Implementing and Evolving of Medical Instruction and Medical Training Given to USAF Pararescue Men from 1947 to 2000, January 2013
[283] Cassidy, 2013
[284] Cassidy, 2013

the School of Aviation Medicine continued to provide entry into Pararescue specialty medical training, but at a greatly reduced level.

Volunteer applicants for pararescue duties were sought among the recruits going through Basic Military Training. The only required formal medical course instruction being a four-week course conducted by the USAF Medical School. The instruction given at the USAF School of Aviation focused on doing health examination and clinic care more so than doing surgical procedures and providing emergency medical aid and treatments in the austere field environment. The novice Pararescue men were to get on-the-job (OJT) advanced medical training and instruction at their first operational unit of assignment.[285]

Escalating combat activities in Southeast Asia soon overwhelmed in-unit OJT training methods, as the numbers of new Pararescue men needed to support the war effort after 1964 began increasing. By 1967, significant numbers of inadequately medically trained Pararescue men arriving at operational units unable to sufficiently OJT train them was noticeable. Significantly contributing to the problem was "host base medical personnel could not be depended upon to provide the direct professional supervision of the pararescue medical program".[286]

Air Rescue and Recovery Service (ARRS) instituted improvements to the medical training and medical proficiencies of Pararescue men. The Pararescue School (48th ARRS/Training) was reestablished during the 1963-1964 winter months at Eglin AFB, Florida and had responsibilities during 1967 and 1968 to give additional medical training to pararescue students after they completed the four-week course conducted by the USAF Medical School. A live tissue training laboratory was established in January 1968 and opportunities to perform applicatory emergency surgical and medical treatments became part of the medical training curriculum. A seven-level Medical refresher course was also established. This was a one-week course giving comprehensive medical treatment instruction to perform applicatory emergency surgical and medical treatments.[287]

After the Vietnam War conflict ended, the probabilities to have exposure to treating a large volume of trauma patients during clinic training rotations at military hospitals and clinics dropped. The National Registry of Emergency Medical Technicians was established in 1970 to unify training standards, exam and certification of EMTs on the national level to ensure that properly trained response EMS medical aid was available. Many USAF Pararescue men had taken personal initiative to get civilian EMT certification during the 1970s.[288]

The highest-level designation and skill in battlefield trauma care is an Air Force Pararescue Jumper (PJ). Their medical training exceeds a paramedic's and physician's assistant. The PJs are also certified to perform certain combat trauma medical procedures like a Corpsman or Medic, plus other procedures that a Corpsman or Medic is not permitted to do.[289]

Sheppard AFB, Texas

Named in honor of Senator AFB Force Base, TX was activated 17 October 1941, and provided aircrew and aircraft mechanics training during World War II. Today, Sheppard AFB is the largest and most diverse training base in Air Education and Training Command as the only Air Force base that is home to both technical and flying training.

[285] Cassidy, 2013
[286] Cassidy, 2013
[287] Cassidy, 2013
[288] Cassidy, 2013
[289] Miller 2015

In the 1940s, recognizing a need for standardized medical training, the Medical Service Specialist Course was established at the School of Aerospace Medicine at Gunter Air Force Station, Alabama in the summer of 1954. The original course was six weeks long and, throughout the history of the course, has varied between six and 24 weeks. During the Vietnam War, this course was moved to Sheppard AFB.[290] The Pararescue Recovery Specialist Course-Medical School of Health Care Sciences at Sheppard AFB, TX was discontinued in September 1975.[291]

As the Air Force began mobilizing for the Vietnam War in the mid-1960s, Sheppard AFB and other Air Training Command (ATC) bases faced expansion. The daily student load at Sheppard AFB in July 1965 was 4,000 students. The number rose to 9,500 by December of that same year.[292] In 1965, the Air Force Medical Service School (MSS) at Gunter AFB, which occupied 63 semi-permanent buildings, was facing serious problems with its training facilities. Many of the buildings were World War II-era constructions, the facilities were scattered all around the base, and the base was in a rather remote part of Alabama. Furthermore, the Air Defense Command planned to locate a Semi-Automatic Ground Environment (SAGE) facility at Gunter. Since 1960, ATC had conducted many studies regarding the feasibility of moving MSS to Lackland AFB, TX but ultimately decided to move it to Sheppard AFB, TX.[293]

Sheppard AFB was chosen for the new medical training center because it had a large USAF regional hospital, a technical library, a field training area, and ample classroom buildings. The new five-story, 300-bed medical center replaced 95 World War II temporary buildings that had previously served as the hospital.[294] As part of Operation Homecoming in 1972, the regional hospital at Sheppard AFB was chosen as one of 31 stateside military hospitals to care for returning prisoners of war from Southeast Asia.[295]

To meet the field training needs of MSS, the medical school constructed a bivouac area on the east side of the base in April 1966. Located in a rugged area, the facility was originally a series of temporary Butler buildings, tents, a suspension bridge, several field medicine trainers, and a helicopter rescue simulator. The next year, the school received a 36-man air-transportable hospital for training.[296] At the end of the Vietnam War, instruction at the bivouac area was temporarily deactivated.[297] The training area still exists, but it has been altered to meet present training needs. See Appendix F for additional information.

[290] Monson, "The Making of the New Medic," 1988
[291] Cassidy, 2013
[292] Manning et al, 1993: page 162
[293] Ennels 1981, page 52
[294] Air Force Times 1960, page19
[295] Manning et al, 1993, page 200
[296] D.W. Tuttle and G.W. Boyd. A History of Air Force Medical Education & Training. Office of History, Headquarters, 82d Training Wing, Sheppard Air Force Base, Texas. 2002, page 55-56
[297] Tuttle and Boyd 2000, page 87

4.0 APPLICATION OF THE SUBCONTEXT IN THE IDENTIFICATION AND EVALUATION OF HISTORIC RESOURCES

This chapter presents how to apply this historic subcontext in the identification and evaluation of historic resources. The latter portion of this chapter describes the property types on U.S. military installations associated with medical treatment, research, and training during the Vietnam War. The selection of these property types was based on research, primarily conducted online. Additional data was acquired from installations via email, telephone calls, and previous surveys and studies.

Once resources have been identified, evaluation of a property involves two steps. First, the property will be assessed against eligibility criteria for listing on the NRHP then it must be assessed for its integrity. The following National Register publications are useful guides when evaluating Vietnam War medical treatment, research, and training resources:

1. How to Apply National Register Criteria for Evaluation
2. Guidelines for Completing National Register for Historic Places Forms
3. Researching a Historic Property
4. Guidelines for Evaluating and Documenting Historic Aviation Properties
5. Guidelines for Evaluating and Documenting Historic Properties that Have Achieved Significance Within the Last 50 Years

These guides maybe found at: https://www.nps.gov/Nr/publications/index.htm.

4.1 NATIONAL HISTORIC PRESERVATION ACT

The NHPA is the centerpiece of federal legislation protecting cultural resources. In the act, Congress states that the federal government will "provide leadership in the preservation of the prehistoric and historic resources of the United States," including resources that are federally owned, administered, or controlled. The NHPA requires the DoD to identify its significant resources, evaluate them for National Register eligibility, and plan for the protection of the listed or eligible historic properties.

The NHPA established the National Register, which is a list of buildings, structures, objects, sites, and districts that have demonstrated significance to U.S. history, architecture, archeology, engineering, and/or culture. The National Register is maintained by the Secretary of the Interior and is managed by the National Park Service Keeper of the Register. Regulations for listing a property on the National Register were developed by the Department of the Interior and are found in 36 *Code of Federal Regulations* (CFR) Part 60. The NHPA requires that federal agencies identify historically significant properties that are eligible for listing on the National Register.

Section 106 of the NHPA requires the federal government to take into account the effects of its actions on historic properties prior to implementation of the action. For U.S. military installations, this requirement applies to all proposed actions on federal lands and any proposed activities that are federally supported or funded. Consultation with the state historic preservation office (SHPO) and/or the Advisory Council on Historic Preservation (ACHP) is a critical step in this process. Activities on lands held by an American Indian tribe with a designated tribal historic preservation officer must be coordinated with this official. If an undertaking on federal lands may affect properties having historic value to a federally recognized American Indian tribe, such tribe shall be afforded the opportunity to participate as consulting parties during the consultation process defined in 36 CFR 800.

Section 110 of the NHPA requires federal agencies to locate, inventory, and identify all properties under their ownership or control that may qualify for the National Register. It also requires that the agencies manage and protect historic properties. The Federal Agency Preservation Assistance Program provides assistance to federal agencies in meeting Section 110 historic preservation responsibilities.

Section 106 compliance can also be accomplished using agreed-upon streamlined methods and agreement documents such as programmatic agreements. The agreements, which are developed among federal agencies, the ACHP, and SHPOs to provide efficient section 106 compliance guidance for specified historic properties and/or undertakings.

Failure to take into account the effects of an undertaking on historic properties, and afford the ACHP a reasonable opportunity to comment on such effects, can result in formal notification from the Advisory Council to the head of the federal agency of foreclosure of the ACHP opportunity to comment on the undertaking pursuant to the NHPA. A notice of foreclosure can be used by litigants against the federal agency in a manner that can halt or delay critical activities or programs.

The NHPA requires the DoD to identify its significant resources, evaluate them for National Register eligibility, and plan for the protection of the listed or eligible historic properties. The Vietnam War overview historic context "Vietnam and the Home Front: How DoD Installations Adapted, 1962–1975" and this subcontext are designed to assist professionals in the field of cultural resources in identifying significant U.S. military Vietnam War medical treatment, research, and training-related properties that may be present on military installations state-side. Criteria for evaluating these properties, once identified, are provided in Section 4.3.

4.2 IDENTIFICATION OF HISTORIC PROPERTIES AND METHODOLOGY UNDER THIS SUBCONTEXT

The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 *Federal Register* 44716) outline the process for the identification of historic properties. The process includes developing a research design, conducting a review of archival literature, completing a field survey, and analyzing the results of the literature review and field survey.

Those conducting the identification and evaluation of historic properties must meet professional qualifications established by the Secretary of the Interior. The qualifications are divided into five subject areas: History, Archeology, Architectural History, Architecture, and Historic Architecture.

The minimum professional qualifications in history and architectural history are: a graduate degree in history/architectural history or a bachelor's degree in history/architectural history and at least two years of full-time experience in research, writing, teaching, interpretation, or other demonstrable professional activity with an academic institution, historic organization or agency, museum, or other professional institution; or substantial contribution through research and publication to the body of scholarly knowledge in the field of history/architectural history.

The minimum professional qualifications in archeology are a graduate degree in archeology or anthropology and at least one year of full-time professional experience or equivalent specialized training in archeological research, administration, or management; at least four months of supervised field and analytic experience in general North American archeology and demonstrated ability to carry research to completion.

The minimum professional qualifications in architecture are a professional degree in architecture plus at least two years of full-time experience in architecture or a state license to practice architecture. The minimum professional qualifications in historic architecture are a professional degree in architecture or a

state license to practice architecture plus at least one year of graduate study in architectural preservation, American architectural history, preservation planning, or closely related field; or at least one year of full-time professional experience on historic preservation projects.

A research design should define the purpose and objectives of the survey, as well as the methodologies that will be employed to achieve the objectives. Most often, as stated above, surveys to identify historic properties are undertaken in compliance with Section 106 of the NHPA, which requires federal agencies to take into account the effect of its actions on historic properties and to mitigate adverse effects. Another driver for performing inventories is Section 110 of the NHPA that requires agencies to identify historic properties and manage them in the interest of the public. This requires the establishment of a baseline of known historic properties that must be kept updated, which is then used to develop a management plan for the properties. Depending on the driver, identification could be limited to a single property in compliance with a limited Section 106 action, or it may incorporate an entire installation in compliance with Section 110.

After the objective and scope of identification has been defined, a methodology should be developed to ensure that the identification meets the goals and also makes the best use of time and fiscal resources to guarantee the information obtained from the identification is as comprehensive as possible in anticipation of future actions that may be required. The methodology should include how to determine dates for original construction and all alterations, repairs, and additions; construction techniques and materials; history of property function; and the history of surrounding properties. These types of information are essential to place a resource within a specific historic context for the property and determining the property's historic significance and integrity.

Historic properties are identified primarily through a combination of literature and archival record reviews and field surveys. Record reviews are conducted using real property records, historic maps and aerial photographs, blueprints and construction drawings, other archival records, and sometimes oral histories. Generally, major command headquarters, installation real property managers and departments of public works, installation historians, and one or more branches of the NARA keep these types of records. Other sources of information for resources and installation history are local newspaper archives, archives at academic institutions (especially The Vietnam Center and Archive, Texas Tech University), historical societies, websites, and libraries. Previous installation and unit histories may also contain information valuable to understanding the use and history of a building or site in relation to Vietnam War medical treatment, research, and training.

Field surveys should be undertaken with care to gather as much information as possible as efficiently as possible. Contemporary aerial photographs can be consulted before going into the field and used as a guide to map current features of the property and identify elements that have been added or removed. Using a current aerial photograph also could reduce field mapping time. Photographs should be taken of all elements being inventoried. These photographs should be keyed on the aerial photograph to ensure they can be properly labeled. Photographs should be taken of each building and property feature, including close-ups of unique and representative details. Even if the pictures are not used as part of an inventory report, they could be helpful to document a timeline of the property's condition.

4.3 CHOOSING THE CORRECT HISTORIC CONTEXT

The broader overview context contained in *Vietnam and the Home Front: How DoD Installations Adapted, 1962–1975,* can be preliminarily used in determining which properties may be significant on an individual installation by the cultural resources manager; however, the follow-on subcontexts will provide the specifics necessary for determinations of eligibility at the installation level.

Recommendations in *Vietnam and the Home Front: How DoD Installations Adapted, 1962–1975* include the development of additional subthemes for the Vietnam War. The subthemes include ground training, pilot and air support training, special operations and warfare, special schools, medical facilities, and logistical facilities. Every thematic area may not be equally applicable to each branch of the Armed Services. The housing context will not be developed, currently all other subthemes have been developed.

Association with medical treatment, research, and training at an installation between 1961 and 1975 does not automatically imply a relationship to the Vietnam War. There were many other program and developments occurring due to the Cold War with Russia. In other cases, facilities were built previously and may have served an important role during the Vietnam War but may have significance to more than one context.

4.4 APPLYING NATIONAL REGISTER CRITERIA FOR EVALUATION

The Secretary of the Interior has developed the National Register Criteria for Evaluation (36 CFR Part 60.4) to assist in the evaluation of properties eligible for inclusion in the National Register. The National Park Service has published guidance for applying the criteria in *National Register Bulletin 15*: *How to Apply the National Register Criteria for Evaluation*, NPS 1991. To qualify for the National Register, a property must have significance and retain historic integrity. Significance for U.S. military Vietnam War medical treatment, research, and training historic properties can be ascertained through Chapters 2 and 3 of this subcontext.

To be listed on, or considered eligible for listing on the National Register, a cultural resource must meet at least one of the four criteria that follow:

A. Associated with events that have made a significant contribution to the broad patterns of our history.

B. Associated with the lives of persons significant in our past.

C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

D. Have yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting at least one of the above criteria, a historic property must possess integrity of location, design, setting, materials, workmanship, feeling, and association. Integrity is defined as the authenticity of a property's historic identity, as evidenced by the survival of physical characteristics it possessed in the past and its capacity to convey information about a culture or group of people, a historic pattern, or a specific type of architectural or engineering design or technology.

4.4.1 CRITERION A: ASSOCIATION WITH EVENTS

The first criterion recognizes properties associated with single events, such as the evacuation of the U.S. embassy in Saigon, or with a pattern of events, repeated activities, or historic trends, such as innovations in new military strategies, testing, and training. The event or trends, however, must clearly be important within the associated history.

The United States involvement in the Vietnam War comprised a complex series of political, military, diplomatic, and economic events and programs that affected the lives of millions of people in the United States and Asia. The Vietnam War was an event that made significant contributions to the broad patterns of U.S. history; however, because the Vietnam War occurred during the Cold War-era (1947–1989), not all

military properties related to medical treatment, research, or training constructed from 1961 to 1975 are significant under this subcontext. The historic property(ies) being considered must have an important and specific association with medical treatment, research, and training for Vietnam.

Military properties associated with medical treatment, research, and training during the Vietnam War are likely to fall under this criterion. To determine if a property is significant within subcontext under Criterion A:

1. Determine the nature of the property, including date of construction, type of construction, dates and purposes of modifications, and function(s) from time of construction to the end of the Vietnam War (1975).
2. Determine if the property is associated specifically with medical treatment, research, discoveries, or inventions that came about because of the Vietnam War; or associated specifically with training for new medical treatment or evacuation techniques that came about because of the Vietnam War.
3. Evaluate the property's history as to whether it is associated with the Vietnam War in a significant way.

4.4.2 CRITERION B: ASSOCIATION WITH SIGNIFICANT PEOPLE

Properties may be listed in the National Register for their association with the lives of significant people. The individual in question must have made contributions to history that can be specifically documented and that were important within history. This criterion may be applicable, but to only a small portion of buildings or structures, as the history focuses on events and on design and construction rather than on individuals. However, background research on a particular installation or building may indicate that it is associated with an individual who made an important contribution to medical treatment, research, or training in the Vietnam War trends or specific events. To determine if a property is significant within this subcontext under Criterion B:

1. Determine the importance of the individual.
2. Determine the length and nature of the person's association with the property.
3. Determine if the person is individually significant within history.
4. Determine if the property is associated with the time period during which the individual made significant contributions to history.
5. Compare the property to other properties associated with the individual to determine if the property in question best represents the individual's most significant contribution.

Refer to National Register Bulletin 32: Guidelines for Evaluating and Documenting Properties Associated with Significant Persons (National Park Service) for more information.

4.4.3 CRITERION C: DESIGN/CONSTRUCTION

To be eligible for listing on the National Register under Criterion C, properties must meet at least one of four requirements: (1) embody distinctive characteristics of a type, period, or method of construction; (2) represent the work of a master; (3) possess high artistic value; or (4) represent a significant and distinguishable entity whose components may lack individual distinction. Vietnam War medical treatment, research, and training-related resources are most likely to be eligible under the first or fourth of these requirements.

National Register Bulletin 15 defines distinctive characteristics as "the physical features or traits that commonly recur" in properties; type, period, or method of construction is defined as "the certain way properties are related to one another by cultural tradition or function, by dates of construction or style, or by choice or availability of materials and technology." Properties are eligible for listing on the National Register if they are important examples, within history, of design and construction of a particular time. This component of Criterion C can apply to buildings, structures, objects, or districts.

"Significant and distinguishable entities" refers to historic properties that contain a collection of components that may lack individual distinction but form a significant and distinguishable whole. This portion of Criterion C applies only to districts.

Military properties associated with medical treatment, research, and training may fall under this criterion (and may also fall under Criterion A). To determine if a property is significant as an important example of distinctive characteristics of a building type or as a significant and distinguishable district:

1. Determine the nature of the property, including date of construction, type of construction, major modifications (dates and purpose) historic appearance, and functions during the period of significance.
2. Determine the distinctive characteristics of the property type represented by the property in question.
3. Compare the property with other examples of the property type and determine if it possesses the distinctive characteristics of a specific building type construction.
4. Evaluate the property's design and construction to determine if it is an important example of building type construction.

Although many military installations were impacted significantly by increases in troop levels, changing training requirements, and the engineering demands of the Southeast Asian geography, there was the lack of a unified building campaign in response to the Vietnam War's requirements.[298] While many Army, Navy, Marine Corps, and Air Force facilities were reopened, expanded, or adapted, there was no identifying architectural style used during that time. The reuse of WWII and 1950s buildings was common, and new construction was often part of the larger modernization initiatives that were being executed by the DoD during the 1950s and 1960s.

The writers of the report, *Vietnam and the Home Front: How DoD Installations Adapted, 1962–1975,* concluded that the Vietnam War differed from previous 20th century conflicts. It was long in duration and the U.S. involvement was gradual. There was no need to repeat the massive WWII effort to establish and fully construct working installations in a few months. As a result, there was no major overarching construction program across the DoD as a response to the U.S. military activities in the Vietnam War. Consequently, there was also no large-scale effort to produce standardized designs to be replicated across the county. Aside from new training methods such as "Quick Kill" ranges and Viet Cong villages, construction was largely piecemeal and focused on specialized training needs.[299]

4.4.4 CRITERION D: INFORMATION POTENTIAL

Properties may be listed on the National Register if they have yielded, or may be likely to yield, information important in prehistory or history. Two requirements must be met for a property to meet Criterion D: (1)

[298] Hartman et al. 2014
[299] Hartman et al. 2014

the property must have, or have had, information to contribute to the understanding of history or prehistory, and (2) the information must be considered important. This criterion generally applies to archaeological sites. In a few cases, it can apply to buildings, structures, and objects if the property itself is the principal source of information and the information is important. For example, a building that displays a unique structural system or unusual use of materials and where the building itself is the main source of information (i.e., no construction drawings or other historic records) might be considered under Criterion D. Properties significant within this subcontext would rarely be eligible under Criterion D.

4.4.5 INTEGRITY

A historic property determined to be significant under the criteria for evaluation for the National Register must possess integrity. Integrity is the ability of a property to convey its significance through retention of the property's essential physical characteristics from its period of significance. The National Register Criteria for Evaluation lists seven aspects of integrity. A property eligible for the National Register must possess several of these aspects. The assessments of a property's integrity are rooted in its significance. The reason why a property is important should be established first, then the qualities necessary to convey that significance can be identified. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* defines the seven aspects of integrity as the following:

1. Location: the place where the cultural resource was constructed or the place where the historic event occurred.
2. Design: the combination of elements that create the form, plan, space, structure, and style of a cultural resource.
3. Setting: the physical environment of a cultural resource.
4. Materials: the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a cultural resource.
5. Workmanship: the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
6. Feeling: a property's expression of the aesthetic or historic sense of a particular period of time.
7. Association: the direct link between an important historic event or person and a cultural resource.

National Register Bulletin 15 describes the following steps in assessing historical integrity:

1. Determine the essential physical features that must be present for a property to represent its significance.
2. Determine whether the essential physical features are sufficiently visible to convey significance.
3. Compare the property with similar properties if the physical features necessary to convey significance are not well-defined.
4. Determine, based on the property's significance, which aspects of integrity are particularly important to the property in question and if they are intact.

For properties significant for their association with medical treatment, research, and training during the Vietnam War on U.S. military installations, they must retain the key physical features associated with these themes. Properties significant for their design and construction must retain the physical features that are the essential elements of the aspects of the building type construction that the property represents.

In cases of active military installations, buildings are more likely to have been modified to extend their useful life. These modifications generally include adapting buildings for new communication systems or equipment, mission and staff changes, and changes in military assets, such as equipment or weaponry. These integrity issues will be critical in the evaluation process of significant resources.

To qualify for listing as a historic district, the majority of the properties in the district associated with the history must possess integrity and a sufficient number of properties must be retained from the period of significance to represent that significance. The relationship among the district's components, i.e., massing, arrangement of buildings, and installation plan must be substantially unchanged since the period of significance.

4.4.6 CRITERION CONSIDERATIONS

Certain kinds of properties are not usually considered for listing on the National Register, including:

1. religious properties (criterion consideration A)
2. moved properties (criterion consideration B)
3. birthplaces or graves (criterion consideration C)
4. cemeteries (criterion consideration D)
5. reconstructed properties (criterion consideration E)
6. commemorative properties (criterion consideration F)
7. properties that have achieved significance within the last 50 years (criterion consideration G)

These properties can be eligible for listing only if they meet special requirements called "criteria considerations." A property must meet one or more of the four criteria for evaluation (A through D discussed in previous sections) and also possess integrity of materials and design before it can be considered under the various criteria considerations. Three of these criteria considerations may be applicable to U.S. military properties; moved properties (criterion consideration B), commemorative properties (criterion consideration F), and properties that have achieved significance within the last 50 years (criterion consideration G).

A property removed from its original or historically significant location can be eligible if it is significant primarily for architectural value or if it is the surviving property most importantly associated with a historic person or event. Properties that are moveable by their nature, such as a ship or rail car, do not need to meet this criterion consideration.

Commemorative properties are designed or constructed after the occurrence of an important historic event or after the life of an important person. They are not directly associated with the event or with the person's productive life but serve as evidence of a later generation's assessment of the past. The significance comes from their value as cultural expressions at the date of their creation. Therefore, a commemorative property generally must be over 50 years old and must possess significance based on its own value, not on the value of the event or person being memorialized. A commemorative marker erected in the past by a cultural group at the site of an event in its history would not meet this criterion if the marker were significant only for association with the event and it had not become significant itself through tradition.

Properties less than 50 years old are normally excluded from the National Register to allow time to develop sufficient historical perspective. However, under criterion consideration G, a property may be eligible for the National Register if it possesses "exceptional importance" or significance. Vietnam War resources span

from 1961 through 1975, so could have been built 59 years ago (as of 2020), or as recently as 45 years ago. Buildings constructed before 1961 could have significance during the latter part of the Vietnam War. Criterion consideration G (properties that have achieved significance within the last 50 years) applies to buildings and structures that are less than 50 years old at the time of evaluation. This criterion also includes buildings that were constructed more than 50 years ago and that continue to achieve significance into a period less than 50 years ago, or has noncontiguous periods of significance, one of which is less than 50 years ago, or had no significance until a period less than 50 years ago. For buildings, structures, objects, sites, or districts that have achieved significance within the last 50 years, only those of "exceptional importance" can be considered eligible for nomination to the National Register, and the finding of "exceptional importance" must be made within the specific history associated with the property. National Park Service publication *How to Evaluate and Nominate Potential National Register Properties That Have Achieved Significance Within the Last 50 Years* further describes criterion consideration G.

Properties evaluated under criterion consideration G that do not qualify for exceptional importance must be reevaluated when they reach 50 years of age under National Register criteria A through D.

4.5 SIGNIFICANCE

To qualify for the National Register, a cultural resource must be significant, meaning that it must represent a significant part of U.S. history, architecture, archeology, engineering, or culture. A resource may possess significance on the local, state, or national level. The significance of a cultural resource can be determined only when it is evaluated within its history. As outlined in *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, the following steps are taken to evaluate a cultural resource within its history:

- Identify what the property represents: the theme(s), geographical limits, and chronological period that provide a perspective from which to evaluate the property's significance.
- Determine how the theme of the history is significant to the local area, the state, or the nation.
- Determine the property type and whether it is important in illustrating the history.
- Determine how the property represents the history through specific associations, architectural or engineering values, or information potential (the National Register criteria for evaluation).
- Determine what physical features the property must possess in order for it to reflect the significance of the history.

A cultural resource may be significant within more than one area of history. In such cases, all areas of history should be identified. However, significance within only one area is required. If a cultural resource is determined to possess sufficient significance to qualify for the National Register, the level of integrity of those features necessary to convey the resource's significance must then be examined. Medical treatment, research, and training facilities such as hospitals, hospital ships, laboratories, and training facilities were important in the Vietnam War effort.

4.6 PROPERTY CLASSIFICATIONS

Significant properties are classified as buildings, sites, districts, structures, or objects. Sites or structures that may not be considered individually significant may be considered eligible for listing on the National Register as part of a historic district. The classifications are defined as:

- A building such as a house, barn, church, hotel, or similar construction is created principally to shelter any form of human activity. "Building" may also be used to refer to a historically and functionally related unit, such as a courthouse and jail or a house and barn.
- The term "structure" is used to distinguish from buildings those functional constructions made usually for purposes other than creating human shelter.
- The term "object" is used to distinguish from buildings and structures those constructions that are primarily artistic in nature or are relatively small in scale and simply constructed. Although it may be movable, by nature or design, an object is associated with a specific setting or environment.
- A site is the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value regardless of the value of any existing structure.
- A district possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.

4.6.1 INDIVIDUAL ELIGIBILITY VS. HISTORIC DISTRICT

While medical treatment, research, and training facilities as a class of resources, may be significant, not every structure associated with medical treatment, research, and training during the Vietnam War is eligible for listing on the National Register. The framework established by the historic context focuses on the role of medical treatment, research, and training during the Vietnam War to assess its significance and the significance of its component resources. Some military installations may have a hospital for treating Vietnam casualties or an area used for training medevac units, but it was not the primary mission of the installation, while on other installations, the medical treatment, research, and training and training facilities represent the primary mission. The resources of the first type of installation should be evaluated as individually eligible, and the latter should first be evaluated as potential districts.

Source: https://www.afcec.af.mil/About-Us/Fact-Sheets/Display/Article/466118/former-brooks-air-force-base/

FIGURE 4-1. AERIAL VIEW OF AEROSPACE MEDICAL DIVISION AT FORMER BROOKS AIR FORCE BASE, 2013

For component structures and buildings to be individually eligible for listing on the National Register with the context of Vietnam War medical treatment, research, and training, they should individually embody a significant event associated with the discovery of a new medical treatment or technique, or in developing and training new methods to provide medical support. Infrastructure and support buildings typically are not individually eligible.

Where the installation was designed and intended to be utilized as a whole medical treatment or research complex, each structure or element provided a vital component of the overall installation. The overall importance of a particular building or laboratory depended of the mission of the specific installation. For example, a climate-controlled storage building, or recovery ward facility may not be individually significant. However, considered together, they represent a specialized Vietnam War medical complex and could be a significant historic district.

4.6.2 INDIVIDUAL PROPERTIES

Individual properties are those whose physical attributes singularly represent or embody the Vietnam War medical treatment, research, and training subtheme. While individual properties need not be unique, they must have integrity and cannot be part of a multiple property grouping.

For properties that are less than 50 years old to be individually eligible for listing on the National Register, they should:

- Clearly and explicitly reflect the important medical treatment, research, and training mission of the installation.
- Be regarded as symbolic of the installation or of an aspect of the mission.
- Represent particularly significant examples of a type or method of construction or an important technological advancement.

An example for the above may include a research laboratory that specialized in tropical skin diseases. Infrastructure and support buildings are not typically individually eligible unless they were: (1) the site of a particular event, (2) directly associated with a significant individual, or (3) of exceptional note as an example of architectural or engineering design.

4.6.3 HISTORIC DISTRICTS WITH ELEMENTS LESS THAN 50 YEARS OLD

Properties less than 50 years old may be integral parts of a district when there is sufficient perspective to consider the properties as historic. This consideration is accomplished by demonstrating that: (1) the district's period of significance is justified as a discrete period with a defined beginning and end, (2) the character of the district's historic resources is clearly defined and assessed, (3) specific resources in the district are demonstrated to date from that discrete era, and (4) most district properties are over 50 years old. In these instances, it is unnecessary to prove exceptional importance of either the district or of the less than 50-year-old properties.

Exceptional importance still must be demonstrated for districts where the majority of properties or the major period of significance is less than 50 years old, and for less than 50-year-old properties that are nominated individually. Some historic districts represent events or trends that began more than 50 years ago. Frequently, construction of buildings continued into the less than 50-year period, with the later resources resulting in representation of the continuation of the event. In instances where these later buildings make up only a small part of the district and reflect the architectural and/or historic significance of the district

they can be considered integral parts of the district (and contributing resources) without showing exceptional importance of either the district or the less than 50-year-old buildings.

An exceptional historic district is one comprised principally of structures less than 50 years of age that are integral to understanding the unique aspects of the district's mission or association. Structures that clearly contribute to this understanding would be considered contributing elements to the district. Structures that only tangentially or marginally contribute would not be considered contributing members unless they qualify under the standard National Register criteria. Since the Vietnam War and corresponding construction span a period of time that stretches from 45 to 59 years ago, there may be districts or features of districts that will fall into this category.

4.6.4 ONE-OF-A-KIND PROPERTIES

These are properties whose character-defining features singularly embody the medical treatment, research, and training subtheme and that are the only known property of its type. Singularity alone does not impart exceptional importance if the property is less than 50 years old. Vietnam War medical treatment, research, and training properties that are singular must be compared against other property types within the same theme to determine if they are truly exceptional. Although unique properties can never be precisely compared quantitatively, a qualitative comparison must take place to protect the exclusivity of the term "exceptional."

The phrase "exceptional importance" may be applied to the extraordinary importance of an event or to an entire category of resources so fragile that survivors of any age are unusual. Properties listed that had attained significance in less than 50 years include, for example, the launch pad at Cape Canaveral from which astronauts first traveled to the moon. Properties less than 50 years old that qualify as exceptional because the entire category of resources is fragile. An example of a fragile resource is a traditional sailing canoe in the Trust Territory of the Pacific Islands, where because of rapid deterioration of materials, no working Micronesian canoes exist that are more than 20 years old.

4.6.5 PROPERTIES SIGNIFICANT WITHIN MORE THAN ONE AREA OF HISTORY

Properties may possess significance within multiple areas of history. Military installations should be evaluated holistically, with attention to their interrelated historic associations over time. When evaluating the significance of a military property, the period of significance should be defined based on the range of important associations over time. In districts, buildings may illustrate various dates of construction, architectural design, and historical associations. A single building may be associated with several periods of history. For example, a building may have played a vital role in both the Vietnam and Korean Wars. Significance within one historic period is sufficient for the property to meet the National Register criteria for evaluation. However, all areas of significance should be identified to have a comprehensive picture of the property's importance. For properties constructed during the period of the Vietnam War (1961–1975), other Vietnam War subtheme reports should be referenced (on www.denix.osd.mil as available).

For example, the Headquarters for the NHRC was housed in World War II vintage wooden barracks on Point Loma, San Diego. The NHRC was established as the Navy Medical Neuropsychiatric Research Unit (NMNPRU) on June 1, 1959. Throughout the 1960s, NMNPRU initiated several important studies ranging from psychological fitness of recruits to examination of performance of naval duties under stressful environments. See Appendix D for additional examples of Naval facilities.

Source: US Navy Bureau of Medicine and Surgery, Communications Directorate (M09B7) Archives

FIGURE 4-2. NAVAL HEALTH RESEARCH CENTER HEADQUARTERS, CA. 1970S

Another example is the National Naval Medical Center is located in Bethesda, MD. It is one of the nation's largest and most renowned military medical centers, best known for its history of providing care to war heroes and presidents alike for over 75 years. The pre-World War II U.S. Naval Hospital, Bethesda, MD heavily utilized during the Vietnam era.[300]

Source: https://www.history.navy.mil/content/history/nhhc/our-collections/photography/numerical-list-of-images/nhhc-series/nh-series/80-G-K-13000/80-G-K-13802.html

FIGURE 4-3. U.S. NAVAL HOSPITAL, BETHESDA, MD UNDER CONSTRUCTION, CIRCA 1942-43

[300] Hartman et al. 2014

4.7 PROPERTY TYPES ASSOCIATED WITH MEDICAL TREATMENT, RESEARCH, AND TRAINING DURING THE VIETNAM WAR ON U.S. MILITARY INSTALLATIONS

The Vietnam war brought advances in medical care, some of which continue to be used as standard practice in civilian medical care today. The Vietnam War catalyzed medical advancements in treatment of diseases, surgical techniques, and the rapid evacuation of casualties. Buildings, structures and other infrastructure were needed to provide these advancements in treatment and techniques.

Buildings and structures do not necessarily need to have been built during the Vietnam War period (1962–1975); they may have been previously constructed and repurposed for the Vietnam War. For example, many Vietnam-era construction projects augmented existing World War II-era infrastructure that became heavily reutilized in support of the Vietnam War. Additionally, the financial demands of the Vietnam War came to overshadow most stateside military decisions and operations. Therefore, mobilizing and supporting the war slowed stateside military construction and led to a piecemeal approach of reactive construction efforts that corresponded to the immediate and ever-changing combat requirements.[301]

For buildings and indoor spaces used for medical treatment, research, and training, the Vietnam War-era did not feature an identifiable, unified architectural style that was unique to the time; as such, many buildings associated with the subtheme were constructed using standard designs that do not make them readily-distinguishable for this specific period or medical mission. In some cases, new construction was often part of larger modernizing initiatives. Navy hospitals, for example, underwent modernization and expansion in the late 1950s and early 1960s. These hospitals cared for returning sailors and marines, including convalescing POWs at the end of the war.[302]

Three broad types of installations are presented in this report; these installations supported medical treatment, research, and training. In addition, as with the other Vietnam subcontext reports, other support buildings may have also been constructed to support treatment, research, or training. These support building types include those constructed to accommodate and house increased numbers of troops and officers at the installations during the war. Building types that could accommodate these needs included shops, administration, and storage buildings.

The following sections identify the types of buildings, structures, and landscape features that are associated with medical treatment, research, and training on U.S. installations during the Vietnam War. Individual properties need to be investigated at the installation level to determine if they are eligible for listing on the NRHP under Criterion A (see section 4.4.1). The omission of a property type in the following sections does not automatically exclude it from potential significance under this subtheme as a contributing resource of a historic district.

Because there is no identifying architectural style that defines medical treatment, research laboratories, medical training facilities, or mortuaries during the Vietnam War, buildings would not be evaluated for listing on the NRHP under Criterion C (see section 4.4.3). Many DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers several architectural movements and styles. If the building was constructed during this period and possesses an architectural style beyond utilitarian, refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, Hampton et al. 2012, to determine if it would be eligible and to assess character defining features for the various architectural movements.

[301] Hartman et al. 2014
[302] Hartman et al. 2014

4.7.1 TREATMENT FACILITIES

Medical treatment facilities potentially affected by the Vietnam War include hospitals, clinics, hospital ships, and mortuaries. Many hospitals that pre-dated the Vietnam War were expanded to accommodate the increase in patients and major hospitals were also constructed during this time. Improved dental care was provided to increase recruitment and retention of personnel during the Vietnam War period. Mortuary processing facilities were also available at locations such as Travis and Dover AFBs.

A hospital is an institution that is built, staffed, and equipped for the diagnosis of disease; for the treatment, both medical and surgical, of the sick and the injured; and for their housing during these and the recovery processes. The modern hospital also often provides a venue for teaching and investigative research. A clinic is a healthcare facility that is primarily focused on the care of outpatients. A mortuary has facilities for the preparation and disposition of human remains of Services personnel.

Source: Hartman et al, 2014

FIGURE 4-4. AERIAL VIEW OF LETTERMAN GENERAL HOSPITAL WHILE UNDER CONSTRUCTION, PRESIDIO OF SAN FRANCISCO, CALIFORNIA, MARCH 1967

Hospital designs have changed considerably over the years, both in terms of the technology that is used within them and the actual design of the hospital itself. Early 20th century hospitals were significantly larger and had long corridors, meaning that doctors and nurses walked miles each day just to reach their patients. Designers realized that this was not practical. They also realized that the design of the building significantly impacted the patient's chances of survival. As a result, hospital designers today consider important factors such as the distance between accident and emergency facilities and operation rooms, making sure that all the necessary units are located close together. Although, most hospitals are still sprawling complexes with extensive corridor networks, they are better laid out and the corridors are wider meaning multiple hospital beds can be transported along them at once.[303]

[303] https://www.healthcarefacilitiestoday.com/post

Character Defining Features

These facilities include those constructed or adapted and heavily used during 1962–1975 and that were directly related to providing medical treatment or mortuary services. This property type will vary in size, shape, and design; they may include an entire building, a portion of the building, or a specialized operating or treatment room or facility. Buildings may be of similar design to other installation buildings constructed during the same period, may be former World War II temporary or permanent structures, or may be of a one-off design (see section 4.4.3). Interior features include original floor plans; furnishings; and training equipment and materials. Exterior features include finishes and construction materials. Medical treatment features may include operation, treatment, and diagnostic equipment.

Hospitals were made up of wards, divisions within a hospital for the care of numerous patients with the same condition. A ward may consist of operating rooms, recovery rooms, medical or nursing stations, and patient rooms. Some hospital or treatment facilities may have been modified or established to treat specific diseases or wounds, such as burns, during the war.

Portsmouth Naval Hospital, Virginia, 1960

Wilford Hall Medical Center, Lackland AFB, Texas, 1957

Naval Hospital Great Lakes Training Station, Illinois, 1960

Source: Hartman et al, 2014

FIGURE 4-5. VIETNAM-ERA MILITARY MEDICAL HOSPITALS

Naval hospital ships associated with the Vietnam War have been decommissioned and are no longer in the Navy's possession.

Evaluation and Integrity

As discussed in section 4.4.3, there was no identifying architectural style used specifically for Vietnam War construction. Therefore, Criterion C would not be applicable for evaluating properties under this subcontext. However, many DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers a number of architectural movements and styles. If the building was constructed during this period and possesses an architectural style beyond utilitarian, refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, Hampton, et al, 2012 for character defining features for the various architectural movements.

Properties may be eligible under Criterion A (see section 4.4.1). Installations may have supported special treatment programs or surgical techniques. For example, the expansion at some installations was driven by the demand for hospital beds, while other expansion or renovations occurred because of the need for new specialized treatment of burns or new surgical techniques (see Appendix E for an example of a hospital).

National Register Bulletin 15 states that for each property, there are essential features that must have been retained for the property to have integrity and to be able to convey a sense of the significant place and time

with which it is associated. Layout of wards and treatment areas would be important. Many of these properties would not likely be eligible unless containing unique equipment, such as the specialized surgical equipment or treatment chambers. Without these features, a property could no longer be identified as a product of the place and time from which it came. Many of these properties would not likely be eligible unless they have not been significantly altered since the end of the Vietnam War.

Some buildings of this type may be individually eligible due to the program it supported. Others may have provided support functions and individually are not significant but do contribute to a district (see section 4.6.1). These properties would be more likely to be part of a district.

4.7.2 RESEARCH FACILITIES

Laboratories and research facilities are equipped for experimental study in a science, prototype development, or for testing and analysis. Laboratories may be developing medicines or chemicals, procedures, equipment, or tools to aid in treatments and recovery of diseases and wounds.

Research facilities associated with the Vietnam War may have been used to advance medical discoveries in the fields of environmental extremes, skin disease, aviation medical research, dental research, prosthetics, field medical equipment, blood transfusions, blood preservation, biophysics, psychophysiology, exotic infectious diseases, metabolism, nutrition, trauma, and burns. The types of buildings, structures, and features on installations that are associated with medical research include:

- Research and design laboratories
- Specialized chambers
- Classrooms and auditoriums
- Production plants and shops
- Testing laboratories

In some cases, the massive buildup of production capacity was required by the government to produce materials not available through commercial sources. This resulted in large scale construction at production installations, either for new construction or major renovation of existing buildings. Many of the buildings and structures were constructed using standard designs and represent a repetitive but cohesive area. Many of the buildings associated with research were modern in design.

A laboratory associated with the development of a treatment for a specific disease endemic in Vietnam or a typical type of injury from the weapons used in fighting could have significance under Criterion A. For example, the Naval Medical Research Center, located in Silver Spring, MD, provided facilities for biomedical research on diseases and operational problems that affected sailors and marines. Research and testing facilities associated with medical breakthroughs and invention could be significant, either individually or as primary resources of a historic district, under Criterion A.

Character Defining Features

These facilities include those constructed or adapted and heavily used from 1962 to 1975 and were directly related to medical research. These property types will vary in size, shape, and design; they may include an entire building or a portion of the building. Buildings may be of similar design to other installation buildings constructed during the same period, may be former World War II temporary or permanent structures, or may be of a one-off design (see section 4.4.3). Interior features include original floor plans, furnishings,

and specialized testing and production equipment. Exterior features include finishes and construction materials.

Source: https://en.wikipedia.org/wiki/Building_40_(Army_Medical_School)

FIGURE 4-6. BUILDING 40 - HOME TO THE WRAIR FROM 1953 TO 1999, WASHINGTON D.C.

These properties would not likely be individually eligible unless containing unique equipment. These properties would be more likely to be part of a district if the resources still have integrity.

As discussed above, there was no identifying architectural style used specifically for Vietnam War construction. Therefore, buildings would not be evaluated for listing on the NRHP under Criterion C (see section 4.4.3). Many DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers several architectural movements and styles. If the building was constructed during this period and possesses an architectural style beyond utilitarian, refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, Hampton, et al, 2012, to determine if it would be eligible under this context and to assess character defining features for the various architectural movements.

Laboratories and research institutes may include unique or highly specialized equipment and facilities. For example, the USARIEM maintains the following facilities (not all may have been in existence during the Vietnam War):

- Hypobaric Chamber Facility or HCF (altitude chambers)
- 13 Environmental Chambers
- 5 Biophysical Evaluation Chambers
- Biomechanics Laboratory
- Water Immersion Laboratory
- Human Exercise Physiology Laboratory
- Human/Animal Physiology Laboratory
- Psychology Laboratory
- Electron Microscopy Laboratory
- Animal Housing and Care Facility
- Doriot Climatic Chamber Complex
- Laser and Flow Cytometry

The Doriot Climatic Chambers were constructed from 1952 to 1954. A major renovation was completed in 1996. The Doriot Climatic Chambers are two, 60-feet long, 11-feet high, 15-feet wide chambers. The Doriot Climatic Chambers are capable of simulating environmental conditions ranging from the arctic to the tropics. The chambers contain 5-person treadmills that are used to assess the effects of ambient temperature on the physical performance and physiological responses of Soldiers.

Source: https://en.wikipedia.org/wiki/Doriot_Climatic_Chambers

FIGURE 4-7. DORIOT CLIMATE CHAMBERS, ARMY RESEARCH INSTITUTE OF ENVIRONMENTAL MEDICINE, NATICK, MA

The water immersion facility at USARIEM provides an example of a specialized chamber, the date of construction is unknown. The facility simulates cold and hot environments by changing water temperature in a 10,000-gallon concrete vessel. The tank is 10-feet long, 10-feet wide, and 14-feet deep. The facility provides the ability to test human performance while exercising on a single underwater walking treadmill or with two cycle ergometers while sitting on a bolted-down stainless-steel chair. Water temperature can be controlled in a range of 5°C to 50°C.

Source: https://www.usariem.army.mil/index.cfm/about/locations/natick

FIGURE 4-8. WATER IMMERSION LABORATORY, ARMY RESEARCH INSTITUTE OF ENVIRONMENTAL MEDICINE, NATICK, MA

Evaluation and Integrity

National Register Bulletin 15 states that for each property, there are essential features that must have been retained for the property to have integrity and be able to convey a sense of the significant place and time with which it is associated. Many of these properties would not likely be eligible unless containing unique manufacturing or testing equipment. Without these features, a property could no longer be identified as a product of the place and time from which it came. Many of these properties would not likely be eligible unless they have not been significantly altered and modernized since the end of the Vietnam War (see Appendix D and E for examples of research facilities).

Some buildings and testing areas may be individually eligible due to the program it supported. Others may have provided support functions and individually are not significant but do contribute to a historic district (see section 4.6.1). Under 36 CFR Part 60, a historic district is defined as a "Geographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united by past events or aesthetically by plan or physical environment." In addition to being recognizable, a district must also be significant. The significance of a historic district may be achieved if it also meets NRHP requirements under Criterion A (see section 4.4.1).

4.7.3 TRAINING FACILITIES

Training facilities include those that were constructed, underwent a major expansion, or were adapted and heavily used during 1962–1975 and were directly related to medical training for the war.

Training was conducted inside and outside. Academic buildings, classrooms, libraries, and auditoriums provided venues for various medical procedures, techniques, applications, and demonstration of these skills. Specialized equipment would have been required to demonstrate and practice skills. Other buildings or rooms provided locations for hands-on training and included laboratories, operating and examination rooms. Outdoor training areas include tactical instrument training courses, aircraft carrier landing deck simulators, and landing sites. These properties might be in a variety of settings including woods, beaches, water bodies, jungles, or clearings.

Source: Prior, et al. 2006

FIGURE 4- 9. MEDICAL FIELD TRAINING, CAMP BULLIS

Character Defining Features

Combat Medic Training During the Vietnam War required medics to be able to give shots, draw blood, start IVs, splint broken bones, treat wounds and burns, perform CPR and tracheotomies, and suture. This training was typical done in a classroom and hospital setting. Training films were heavily used during the training process.

These facilities include those constructed or adapted and heavily used during 1962–1975 and were directly related to providing medical training. This property type will vary in size, shape, and design; they may include an entire building, a portion of the building, or designated classrooms. Buildings may be of similar design to other installation buildings constructed during the same period, may be former World War II temporary or permanent structures, or may be of a one-off design (see section 4.4.3). Interior features include original floor plans, furnishings, and training equipment and materials. Exterior features include finishes, and construction materials. Equipment may include mannequins, audio visual equipment and close circuit televisions, and medical and first aid equipment. Many of these facilities would be similar to medical training facilities used for all combat medical training regardless of area of deployment.

Source: https://www.flickr.com/photos/26574751@N06/3721288305Figure

FIGURE 4-10. TYPICAL SURGICAL ROOM IN VIETNAM

Source: https://lastpatrol.wordpress.com/going-for-the-look/medical-corpsman/

FIGURE 4-11. M5 MEDICAL BAG

Field training taught medics in stretcher usage, correct procedures for moving and carrying patients, techniques for approaching and treating patients under combat situations, setting up different types of tents, and air medevac. Outdoor training areas could include a mock helicopter landing deck, natural or hardscapes, clearings, forested areas, or landing zones. Ranges and training areas were designed to serve different training programs; therefore, features may vary from one range to another. Since some medical personnel were imbedded in fighting units, outdoor training areas may have been used for many different types of skill training.

Source: https://www.thebalancecareers.com/field-medical-service-school-fmss-3356093

FIGURE 4-12. FIELD MEDICAL SERVICE SCHOOL TRAINING

Source: https://www.operationmilitarykids.org/navy-hospital-corpsman/

FIGURE 4-13. NAVY FIELD MEDICAL SERVICE TRAINING

Evaluation and Integrity

As discussed in section 4.4.3, there was no identifying architectural style used specifically for Vietnam War construction. Therefore, Criterion C would not be applicable for evaluating properties under this subcontext. However, many DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers a number of architectural movements and styles. If the building was constructed during this period and possess an architectural style beyond utilitarian, refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, Hampton, et al, 2012, for character defining features for the various architectural movements.

Properties may be eligible under Criterion A (see section 4.4.1). Installations may have supported medical training programs. These properties would not likely be individually eligible unless containing unique equipment or were part of a highly specialized mission. These properties would be more likely to be part of a district (see Appendix F for an example of a training facility).

National Register Bulletin 15 states that for each property, there are essential features that must have been retained for the property to have integrity and to be able to convey a sense of the significant place and time with which it is associated. Many of these properties would not likely be eligible unless containing unique equipment. Without these features, a property could no longer be identified as a product of the place and time from which it came. Many of these properties would not likely be eligible unless they have not been significantly altered since the end of the Vietnam War.

Some buildings of this type may be individually eligible due to the program it supported. Others may have provided support functions and individually are not significant but do contribute to a district.

Properties may be eligible under Criterion A (see section 4.4.13) as a historic district. Under 36 CFR Part 60, a historic district is defined as a "Geographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united by past events or aesthetically by plan or physical environment." In addition to being recognizable, a district must also be significant. The significance of a historic district may be achieved if it also meets NRHP requirements under Criterion A (see section 4.4.1).

These types of buildings, structures, and landscapes may also be associated with other types of specialized training that occurred during the Vietnam War. Specialized training that has already been addressed under prior subcontexts includes Special Forces, logistics, and fixed-wing and helicopter pilot training.

4.7.4 ADDITIONAL SUPPORT FACILITIES

Additional building types that could be associated with this subcontext include those that were constructed in support of the increased need for medical treatment and research during the war. The unique demands and technological advancements during the Vietnam War also influenced the construction and renovation of structures that included administration buildings, classrooms, libraries, auditoriums, environmental chambers, and other indoor and outdoor training and testing areas. To support medical research and treatment, additional buildings may have been built or renovated to house additional and necessary support functions.

Character Defining Features

These facilities include those that were constructed or adapted and heavily used between 1962 and 1975 and were directly related to supporting medical treatment or research. This property type will vary in size, shape, and design and may include entire buildings, portions of buildings, or may only include specific and

unique man-made features. Buildings may be of similar design to other installation buildings constructed during the same period, may be former World War II temporary or permanent structures, or may be of a one-off design (see section 4.4.3). Interior features include original floor plans and exterior features include finishes and construction materials. Features may include specialized testing or training equipment, audio visual equipment and close circuit televisions; communication equipment; simulators; and engineering equipment.

Source: https://www.cardcow.com/357144/trainees-advanced-infantry-training-fort-polk/

FIGURE 4-14. MOCK VIETNAM VILLAGE FOR TRAINING

As discussed in section 4.4.3, there was no identifying architectural style used specifically for Vietnam War construction. Many of the buildings were constructed using modern designs and are not necessarily unique in architectural design or style to a training mission or to the Vietnam War. A special unit could have been stationed in a separate area of a base; however, the housing and support buildings (mess, offices, etc.) may have been of a similar design to other housing built around the same time. Therefore, Criterion C would not be applicable for evaluating properties under this subcontext. However, many DoD buildings constructed during this time were influenced by architectural Modernism. Modernism covers a number of architectural movements and styles. If the building was constructed during this period and possess an architectural style beyond utilitarian, refer to Legacy Project Number 11-448, *Historic Context for Evaluating Mid-Century Modern Military Buildings*, Hampton, et al, 2012, for character defining features for the various different architectural movements.

Evaluation and Integrity

Properties may be eligible under Criterion A (see section 4.4.1). Installations may have supported medical treatment or research programs. Some buildings of this type may be individually eligible due to the program it supported. Others may have provided support functions and individually are not significant but do contribute to a district (see section 4.9). These properties would not likely be individually eligible (unless

of a unique design and under a different historic context) but could be a contributing resource to a historic district if the research or treatment area was a distinct area within the installation.

National Register Bulletin 15 states that for each property, there are essential features that must have been retained for the property to have integrity and be able to convey a sense of the significant place and time with which it is associated. Many of these properties would not likely be eligible unless they have not been significantly altered since the end of the Vietnam War.

Additional billeting/housing, offices, and other buildings may have also been necessary to provide lodging and support for an influx of medical and research personnel. These areas may have been separated from other base areas or integrated into the overall installation. Buildings and structures did not necessarily need to be constructed during the Vietnam War period (1962–1975); they may have been previously constructed and repurposed for the Vietnam War.

4.8 CONCLUSION

For this report, a context was developed to evaluate the historical significance of resources constructed on military installations as they pertained to medical treatment, research, and training during the Vietnam War. The goal of this historic context was to provide military and cultural resource professionals with a common understanding for determining the significance of DoD facilities within this context in order to increase efficiency and cost savings for NHPA compliance. It outlines medical treatment, research, and training that occurred in the U.S. Army, Navy, Marine Corps, and Air Force as necessitated by the Vietnam War and provides examples of medical treatment, research, and training installations and facilities. Finally, it provides a means for applying the medical treatment, research, and training subcontext for the identification and evaluation of historic resources at these and other military installations. Historic properties include structures and buildings built and renovated based on the need to treat casualties in Vietnam. These include hospitals, mortuaries, laboratories, and training facilities. Support building types could include administrative buildings, storage, and shops.

The Vietnam war led to major advances in the areas of trauma care and blood supply. Some treatments and techniques for the care of burns and other wounds were available for the first time in the Vietnam-theater of operations. One program, medevac, provided the model for today's civilian EMT practice. These great advances in medical treatment, research and training may still be represented by some buildings, structures and landscapes on DoD military installations. However, it is likely that many of the buildings and structures have been modernized and changed since the Vietnam War to keep pace with more recent advances in procedures, technology, and equipment.

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APPENDIX A: ACRONYMS

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AAF	Army Air Force
ACHP	Advisory Council on Historic Preservation
AFB	Air Force Base
AMEDD	U.S. Army Medical Department
APG	Aberdeen Proving Ground
ARRS	Air Rescue and Recovery Service
ATC	Air Training Command
BAMC	Brook Army Medical Center
BUMED	Bureau of Medicine and History
CFR	Code of Federal Regulations
CIA	Central Intelligence Agency
CPR	Cardiopulmonary Resuscitation
CTZ	Corps Tactical Zones
DMZ	Demilitarized Zone
DoD	Department of Defense
EMS	Emergency Medical System
EMT	Emergency Medical Technician
ERDC	Engineer Research and Development Center
FEST	Field Epidemiologic Survey Team
FMSS	Field Medical Service School
ICU	Intensive Care Unit
LAIR	Letterman Army Institute of Research
LAMC	Letterman Army Medical Center
MAAG	Military Assistance Advisory Group
MAC	Military Aircraft Command
MASH	Mobile Army Surgical Hospital
MAST	Military Assistance to Safety and Traffic
MOS	Military Operating Specialty
MRO	Medical Regulating Officer
MSS	Medical Service School
MUST	Medical Unit Self-Contained Transportable
NAMRU	U.S. Naval Medical Research Unit
NARA	National Archives and Records Administration
NHPA	National Historic Preservation Act of 1966
NMFRL	Naval Medical Field Research Laboratory
NMNPRU	Navy Medical Neuropsychiatric Research Unit
NMRC	Naval Medical Research Center

NMRI	Naval Medical Research Institute
NRHP	National Register of Historic Places
NSA	Naval Support Activity
OR	Operating Room
OTJ	On-the-job
PCAM	Primary Course in Aerospace Medicine
PJ	Pararescue Jumper
POW	Prisoner of War
PTSD	Post-Traumatic Stress Disorder
SAGE	Semi-Automatic Ground Environment
SEAL	Sea, Air, and Land
SEATO	Southeast Asia Treaty Organization
SHPO	State Historic Preservation Office
TO&E	Table of Organization and Equipment
USAARL	U.S. Army Aeromedical Research Laboratory
USACERL	U.S. Army Construction Engineering Research Laboratories
USAF	U.S. Air Force
USAIDR	U.S. Army Institute of Dental Research
USAISR	U.S. Army Institute of Surgical Research
USAMBRL	U.S. Army Medical Biomechanical Research Laboratory
USAMERDL	U.S. Army Medical Research and Development Laboratory
USAMOMA	U.S. Army Medical, Optical Maintenance Agency
USAMRDC	U.S. Army Medical Research and Development Command
USAMRIID	U.S. Army Medical Research Institute of Infectious Diseases
USAMRL	U.S. Army Medical Research Laboratory
USARIEM	U.S. Army Research Institute of Environmental Medicine
USARNL	U.S. Army Research and Nutrition Laboratory
USARV	U.S. Army Republic of Vietnam
USMC	U.S. Marine Corps
WRAIR	Walter Reed Army Institute of Research

APPENDIX B: MEDICAL UNITS

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Medical Units in Vietnam

The following list of medical units is from "Vietnam Studies, Medical Support of the U.S. Army in Vietnam 1965-1970," by Major General Spurgeon Neel, Department of the Army, Washington, D.C., 1991 Library of Congress Catalog Card Number: 72-600264. Accessed at http://the45thsurg.freeservers.com/custom7.html. Neel cites the book "Vietnam Order of Battle", Complete Illustrated Reference to U.S. Army Combat and Support Forces in Vietnam 1961 - 1973. Copyright MCMLXXXI by Shelby L. Stanton, Captain Shelby L. Stanton, U.S. Army, Retired as the source for this information.

44th MEDICAL BRIGADE

43rd Medical Group, Responsible for II Corps Tactical Zone

61st Medical Battalion (Non-divisional)
Cam Ranh Bay and later Qui Nhon and later Da Nang
8 June 1966 - 17 February 1972

6th Convalescent Center
Cam Ranh Bay 15 April 1966 - 30 October 1971

8th Field Hospital Nha Trang 10 April 1962 - September 1970
An Khe September 1970 - 1971
Moved under 68th Medical Group to Tuy Hoa

523rd Field Hospital
23 September 1965 - September 1968 (attached to 8th Field Hospital)

9th Field Hospital (1968 was merged with 8th Field Hospital)
Nha Trang 14 July 1965 - September 1968

17th Field Hospital
Qui Nhon July 1969 - 7 October 1969 moved 55th Med Grp An Khe

71st Evacuation Hospital (Semi-Mobile)
Pleiku 15 November 1966 - 15 December 1970

85th Evacuation Hospital (Semi-Mobile)
Qui Nhon 31 August 1965 - 1 July 1966
controlled by 55th Med. Grp. 1 July 1966

91st Evacuation Hospital (Semi-Mobile)
Tuy Hoa 3 December 1966 - 1 July 1969 moved to Chu Lai 67th Med. Grp.

55th Medical Group, Responsible for Northern II Corps Tactical Zone

70th Medical Battalion (Non-divisional)
7 November 1965 - 2 February 1971
2nd Surgical Hospital (Mobile Army)

Qui Nhon 1 July 1966 - April 1967

17th Field Hospital
An Khe 10 March 1966 - 1968 moved to 43rd Medical Grp Qui Nhon
An Khe 7 October 1969 - 1 August 1970

18th Surgical Hospital (Mobile Army)
Pleiku 10 March 1966 - 15 December 1967
Lai Khe 15 December 1967 - February 1968
Quang Tri February 1968 - March 1969
Camp Evans, Gia Le Installation, Quang Tri Area March 1969 - 31 August 1971

67th Evacuation Hospital (Semi-Mobile)
Qui Nhon 7 March 1966 - Mid 1969 Moved under 43rd Med. Grp. And controlled
By 67th Med. Grp. After February 1970 in 1972 the hospital was moved to Pleiku
And placed under U.S. Army Hospital, Saigon.

311th Field Hospital
Qui Nhon 11 October 1968 - early 1969
Phu Thanh early 1969 - 8 August 1969

67th Medical Group, Supported XXIV Corps

74th Medical Battalion (Non-divisional)
4 June 1966 - 15 November 1969

U.S. Army Prisoner-of-War Hospital
Long Binh 4 June 1966 - 1 August 1969 (operated by 74th Field Hospital)

27th Surgical Hospital (Mobile Army)
Chu Lai 25 March 1968 - 16 June 1971

85th Evacuation Hospital (Semi-Mobile)
Phu Bai 1969 - 9 December 1971

91st Evacuation Hospital (Semi-Mobile)
Chu Lai 1 July 1969 - 29 November 1971

95th Evacuation Hospital (Semi-Mobile)
Da Nang 25 March 1968 - 28 March 1973

312th Evacuation Hospital (Semi-Mobile)
Chu Lai 6 September 1968 - 2 August 1969
68th Medical Group, Responsible for both III and IV Corps Tactical Zones

58th Medical Battalion (Non-divisional)
Long Binh 29 MAY 1965 - 17 February 1972

2nd Surgical Hospital (Mobile Army)
Chu Lai April 1967 - 1968

3rd Field Hospital
Tan Son Nhut 11 May 1965 - 31 May 1972

51st Field Hospital
Tan Son Nhut 31 October 1965 - 30 June 1971

3rd Surgical Hospital (Mobile Army)
Bien Hoa, Long Binh 23 August 1965 - May 1967
Dong Tam May 1967 - 5 September 1969
Binh Thuy 5 September 1969 - 20 April 1972

7th Surgical Hospital (Mobile Army)
Cu Chi 4 June 1966 - 23 April 1967
Long Giao 23 April 1967 - 10 May 1969

8th Field Hospital
Moved from 43rd Medical Group to 68th Med. Grp.
An Khe September 1970 - 1971
Tuy Hoa 1971 - Aug 1971

22nd Surgical Hospital (Self-Contained, Transportable)
Long Binh 27 December 1967 - 30 January 1968
Phu Bai vicinity 30 January 1968 - 18 October 1969

24th Evacuation Hospital (Semi-Mobile)
Long Binh 10 July 1966 - 10 November 1972

U.S. Army Prisoner-of-War Hospital
Long Binh 1 August 1969 - 31 December 1969 (operated by 24th Evacuation Hospital)

29th Evacuation Hospital (Semi-Mobile)
Can Tho - Binh Thuy Area 20 May 1968 - 22 October 1969

36th Evacuation Hospital (Semi-Mobile)
Vung Tau 7 March 1966 - 28 November 1969

45th Surgical Hospital (Self-Contained, Transportable)
Tay Ninh 4 October 1966 - 28 November 1969

74th Field Hospital
Long Binh 15 September 1968 - 14 August 1969

93rd Evacuation Hospital (Semi-Mobile)
Long Binh 4 November 1965 - 1966
Da Nang 1966 - 28 March 1973

1st Medical Battalion (Divisional, 1st Infantry Division)
20 October 1965 - 9 April 1970

4th Medical Battalion (Divisional, 4th Infantry Division)

7 September 1966 - 7 December 1970

9th Medical Battalion (Divisional, 9th Infantry Division)
4 January 1967 - 18 August 1969

15th Medical Battalion (Airmobile Division, 1st Cavalry Division)
28 July 1965 - 15 April 1971

23rd Medical Battalion (Divisional, 23rd Infantry Division)
8 December 1967 - 8 November 1971

25th Medical Battalion (Divisional, 25th Infantry Division)
30 March 1966 - 7 December 1970

12th Evacuation Hospital (Semi-Mobile, associated with 25th Infantry Division)
Ch Chi 9 September 1966 - 15 December 1970

326th Medical Battalion (Divisional, 101st Airborne Division (Airmobile))
22 October 1967 - 23 December 1971

U.S. Army Hospital, Saigon
31 May 1972 - 14 March 1973 was established using assets of the 3rd Field Hospital, and served under the U.S. Army Health Services Group, Vietnam.

MEDICAL COMPANIES IN VIETNAM

1stMED, Ambulance, Pleiku, 23 NOV 66 - 4 FEB 70
37th MED, Separate Bde - 11th Arm Cav, Long Giao, 7 SEP 66 - 20 MAR 72
45th MED, Air Ambulance, Long Binh, 19 JUL 67 - 30 APR 71
50th MED, Clearing, Bear Cat, 4 JUN 66 - 30 OCT 71
51st MED, Ambulance, Phu Thanh, 7 NOV 65 - 1 OCT 70
418th MED, Ambulance, Cam Ranh Bay, 21 JUN 66 - 30 APR 71
498th MED, Air Ambulance, An Son, 16 AUG 65 - 30 AUG 71
520th MED, Clearing, Chu Lai, 26 MAR 68 - 26 OCT 69
542nd MED, Clearing, Phu Thanh, 27 AUG 65 - 25 JUN 70
561st MED, Ambulance, Long Binh, 23 AUG 65 - 1 OCT 70
563rd MED, Clearing, Phu Bai, 20 SEP 66 - 25 JUN 70
566th MED, Ambulance, Chu Lai, 26 MAR 68 - 30 APR 72
568th MED, Clearing, Cam Ranh Bay, 1 JAN 66 - 15 MAR 71
584th MED, Ambulance, Long Binh, 15 OCT 66 - 26 DEC 71
616th MED, Clearing, Phu Bai, 18 OCT 65 - 31 MAR 72
658th MED, Team Area Control Headquarters, Long Binh, 10 MAY 67 - 25 JUN 70
667th MED, Team Area Control Headquarters, Long Binh, 10 MAY 67 - 25 JUN 70

Note: Additionally, some other medical companies such as the USARV Patient Casual Company (organized 26 OCT 66) were formed.

APPENDIX C: CONTRIBUTORS

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Jayne Aaron, LEED AP Environmental Planner / Architectural Historian

Education

- Master of Environmental Policy and Management, University of Denver
- Bachelor of Environmental Design (Architecture and Planning), University of Colorado, Boulder

Summary

Ms. Aaron has over 20 years of hands-on experience as a project manager, architectural historian / cultural resources specialist, and NEPA specialist. Ms. Aaron meets the qualification of the Secretary of the Interior for Architectural Historian. She has been involved in all aspects of Section 106 compliance for cultural resources, including the evaluation of U.S. Coast Guard vessels, campgrounds, civil works projects, numerous military installations, and other buildings and structures. She has also designed innovative strategies and management plans to integrate new and existing regulations, policies, and guidance, and cultural and natural resource management activities into single planning and compliance programs, including NEPA, Environmental Justice, and the National Historic Preservation Act, and Native American Graves Protection and Repatriation Act of 1990. As part of her compliance responsibilities, Ms. Aaron has participated in consultation and meetings with a variety of stakeholder groups, including state and federal regulators, Indian tribes, environmental consultants, and the public. She has written public releases, given presentations, responded to public comments, and facilitated meetings for various sized groups. She has also designed and developed training courses and has taught in numerous educational and training programs.

As an Architectural Historian and Cultural Resources Specialist, she has extensive experience evaluating a large variety of historic properties for many federal agencies, developing management plans and strategies, and, when necessary, completing mitigation strategies for historic buildings, structures, and districts. The following are just a few project examples to illustrate this experience:

Project Experience

Vietnam War: Helicopter Training and Use on U.S. Military Installations Vietnam Historic Context Subtheme, Legacy 14-739. Ms. Aaron was the project manager and principal investigator to develop a historic context and typology for Vietnam War (1962–1975) helicopter-related resources on Department of Defense (DoD) installations in the United States. The report can be used to identify and evaluate Vietnam War helicopter-related facilities at DoD military installations in the United States. This report's historic context provides military cultural resources professionals with a common understanding for determining the historical significance of Vietnam War helicopter-related facilities, greatly increasing efficiency and cost-savings for this necessary effort.

Wake Atoll Hurricane Damage Assessment, Cultural Resources Inventory, and HABS Documentation for Air Force, Wake Island. Ms. Aaron was the project manager and principal investigator for the survey and evaluation of 128 buildings and structures for listing on the National Register of Historic Places (NRHP). Ms. Aaron also assessed 139 features that comprise the Wake Island National Historic Landmark for damage caused by Typhoon Ioke in 2006. Upon completion of the inventory, Ms. Aaron prepared the HABS documentation for the air terminal on Wake Island. The package included 123 black and white 4 x 5 photographs of the exterior, interior, and architectural details, and architectural drawings and a Level II report.

Project Manager / Principal Investigator. DoD Legacy Project. A National Historic Context for the Hush House (Test Cell) on Current DoD Installations Nationwide and Evaluation of a Representative Sample of Extant Hush Houses on DoD Installations. Ms. Aaron was the project manager and principal investigator for the development of a historic context, survey, and evaluation of a sample of ANG and other military branch hush houses. Ms. Aaron led a team of researchers to develop a context detailing the military development and use of the hush house at installations throughout the United States, spanning from WWII through the Cold War. The report provides an understanding of the evolution of test cell structures and technology from propeller testing rigs to jet engine development and maintenance. The context further examines different types of hush houses with attention being paid to technical demands, their spatial arrangement on the landscape, function, and other influences, such as fire considerations, military construction and design regulations, federal FAA regulations, aircraft changes with related maintenance practices, and requirements based on surrounding population density and "good neighbor" policies. The report includes examples of hush houses from all military branches, addressing similarities and differences based on service branch, function, and aircraft.

Principal Investigator. Determination of Eligibility and Determination of Affect for Building 2050, Fairchild Air Force Base, Spokane Washington. Ms. Aaron developed a Determination of Eligibility and Determination of Affect for a World War II-constructed hangar at Fairchild Air Force Base in support of an environmental assessment. The project was on a short time schedule and both the DOE and DOA were conducted simultaneously and presented in the same report. The entire process, including consultation with the SHPO and the Spokane County Historic Preservation Office, was completed in less than four months.

Project Manager / Principal Investigator. Cultural Resource Evaluations for the Air National Guard. Ms. Aaron was the Project Manager and Technical Lead for aboveground cultural resources on the development of four Air National Guard Base (ANGB) installations. The installations are Camp Perry ANG Station and its sub-installation Plumbrook ANG; Alpena ANGB and its sub-installation Grayling Weapons Range; Klamath Falls ANGB; and Des Moines ANGB. The team is identifying significant cultural resource properties and making recommendations on potential National Register of Historic Places eligibility, special protection requirements, and management requirements. Ms. Aaron evaluated over 275 buildings and structures at these four installations.

Project Manager, Case Study for Preserving a DoD Historic Building and Achieving LEED Certification for Renovation Project. Ms. Aaron was the project manager for a Legacy project to determine the feasibility of renovating a DoD historic building to achieve LEED certification and preserve the historic integrity of the building. The purpose of this feasibility study is to apply existing guidance and other studies and involve military and industry experts into an actual renovation scenario to determine whether preservation, sustainability, and energy conservation goals can be incorporated, and to understand the costs, benefits, and tradeoffs of doing so. The building is Indiana Army National Guard (INARNG), Indianapolis Stout Field Building 5. Building 5 was built in 1941 as a National Defense Project funded by the federal New Deal Works Projects Administration. The feasibility study and information provided as part of this project will be used by the INARNG in the design and construction phases of the renovation of Building 5.

Project Manager / Principal Investigator. Historic American Engineering Record (HAER) for the Northwest Field, Andersen Air Force Base, Guam. Ms. Aaron is managing, designing, and developing the HAER for the Northwest Field Complex at Andersen Air Force Base, Guam, which is eligible for listing on the National Register of Historic Places. The final HAER documentation is mitigation for the proposed adverse effects to the field. The package will record five historic contexts, including large format photography and drawings to depict the critical role that the field played in World War II and the firebombing of Japan.

Historical and Architectural Overview of Aircraft Hangars of the Reserves and National Guard Installations from World War I through the Cold War, DoD Legacy Project. Ms. Aaron was the project manager for the development of a nationwide historical and architectural context for U.S. Military Reserve and National Guard installations. The report provides a context for understanding the history and design of Reserve and National Guard hangars, an inventory of hangars, and methodology for applying the context to hangar evaluations.

Regional Cold War History for Military Installations, Including Air Force, Navy, and Army in Guam and the Northern Mariana Islands, DoD Legacy Project. Ms. Aaron was the project manager for the development of a Regional Cold War Context for U.S. military installations in Guam and the Commonwealth of the Northern Mariana Islands (CNMI). The report presents a framework for determining NRHP eligibility within the definitive context. This context focuses on the specific relevance of U.S. military installations on Guam and CNMI, with emphasis on two primary events when the Cold War went "hot," namely, the Korean and Vietnam Wars and the proximity of Guam and CNMI to these war fronts.

Kierstin Miller
Historian/Cultural Resources Specialist

Education

- M.S.; Oregon State University; Environmental Engineering; 2016
- B.S.; Colorado State University; Biochemistry; 2010
- B.A.; Colorado State University; Art History; 2010

Summary

Ms. Miller has three years of experience as a Historian and Cultural Resources Specialist. She has researched and written numerous historic contexts for evaluating historic properties.

Relevant Project Experience

Logistics Support on U.S. Military Installations; Vietnam Historic Context Subtheme, Legacy 16-518. Ms. Miller conducted research and assisted with the development a historic context and typology for Vietnam War (1962–1975) logistics-related resources on Department of Defense (DoD) installations in the United States. The report can be used to identify and evaluate Vietnam War logistics-related facilities at DoD military installations in the United States. This report's historic context provides military cultural resources professionals with a common understanding for determining the historical significance of these Vietnam War facilities, greatly increasing efficiency and cost-savings for this necessary effort.

Special Warfare on U.S. Military Installations Vietnam Historic Context Subtheme, Legacy 16-518. Ms. Miller conducted research and assisted with the development a historic context and typology for Vietnam War (1962–1975) special warfare and special ops-related resources on Department of Defense (DoD) installations in the United States. The report can be used to identify and evaluate Vietnam War special warfare-related facilities at DoD military installations in the United States. This report's historic context provides military cultural resources professionals with a common understanding for determining the historical significance of these Vietnam War resources.

Special Schools on U.S. Military Installations Vietnam Historic Context Subtheme, Legacy 17-835. Ms. Miller conducted research and assisted with the development a historic context and typology for Vietnam War (1962–1975) special schools and training-related resources on Department of Defense (DoD) installations in the United States. The report can be used to identify and evaluate Vietnam War special schools and training facilities at DoD military installations in the United States. This report's historic context provides military cultural resources professionals with a common understanding for determining the historical significance of these Vietnam War resources.

Vietnam War: Pilot and Air Support Training on U.S. Military Installations Vietnam Historic Context Subtheme, Legacy 17-835. Ms. Miller conducted research and assisted with the development a historic context and typology for Vietnam War (1962–1975) pilot training and air support-related resources on Department of Defense (DoD) installations in the United States. The report can be used to identify and evaluate Vietnam War pilot and air support training facilities at DoD military installations in the United States. This report's historic context provides military cultural resources professionals with a common understanding for determining the historical significance of these Vietnam War resources.

Cultural Support for Joint Base Elmendorf Richardson and Pacific Air Force Support Center; Alaska and Wake Island Cultural Resources Specialist Ms. Miller conducted research and assisted with the development a Historic Facilities Maintenance and Repair Plan (HFMRP)/Programmatic Agreement (PA) for Joint Base Elmendorf Richardson (JBER) historic districts. The Plan describes each historic property (individual resources and districts); describe the character defining features of each property; and what materials, floor plans and circulation elements are important to maintain; and avoidance of visual intrusion. Standard treatments for renovation and restoration of historic feature will be included. Based on the maintenance activities and treatments, the PA identifies the types of maintenance activities for repair and renovation that would not have the potential to adversely affect the buildings, and therefore would not require additional section 106. The PA provides a streamlined-process for section 106 consultation and under what situations the streamlined-process can be applied, and when full consultation will be required. Ms. Miller also assisted with the preparation of a historic context report for the LORAN Station on Wake Atoll (Peale Island) established in 1951 and abandoned in 1977.

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APPENDIX D: GENERAL JOHN R. WOOD BUILDING, EDGEWOOD ARSENAL, MARYLAND

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General John Ruxton Wood Building, Edgewood Arsenal, Maryland

On 16 October 1968, a new 4.1 million-dollar Army clinical research laboratory building was dedicated. The building, named the General John R. Wood Building, was a one-story masonry structure containing 62 mission laboratories, 78 support laboratories, 23 offices, and a 200-man conference room. The General Wood building was a rectangular structure measuring 316-feet across the front and 222-feet long. It had a 61-foot by 51-foot rear addition off the centerline and a center courtyard. The total area of the new facility was approximately 72,000 square feet and was built by the Arthur Venneri Construction Co., Washington, D.C. under the supervision of the U.S. Army Corps of Engineers, Baltimore District.

One of the most modern facilities available for clinical research, the new building was designed for safe and efficient research in clinical investigations, experimental medicine, pathology, psychology and human engineering. Activities supporting this versatile clinical research program included both basic and applied research in the fields of aerosols, basic and field toxicology, and neuropharmacology.

In the 1960s and 1970s, approximately 250 military and civilian personnel trained in medical, physical and biological sciences worked in the facility. They were assigned to various branches of the Arsenal's Medical Research Laboratory. The building added to the Army's capabilities in the increasingly important field of chemical defense. Edgewood Arsenal has been the center of Army chemical research, development and procurement since May 1918. During the 1960s, the arsenal was a commodity management center for chemical weapons, defensive systems and related test and handling equipment.

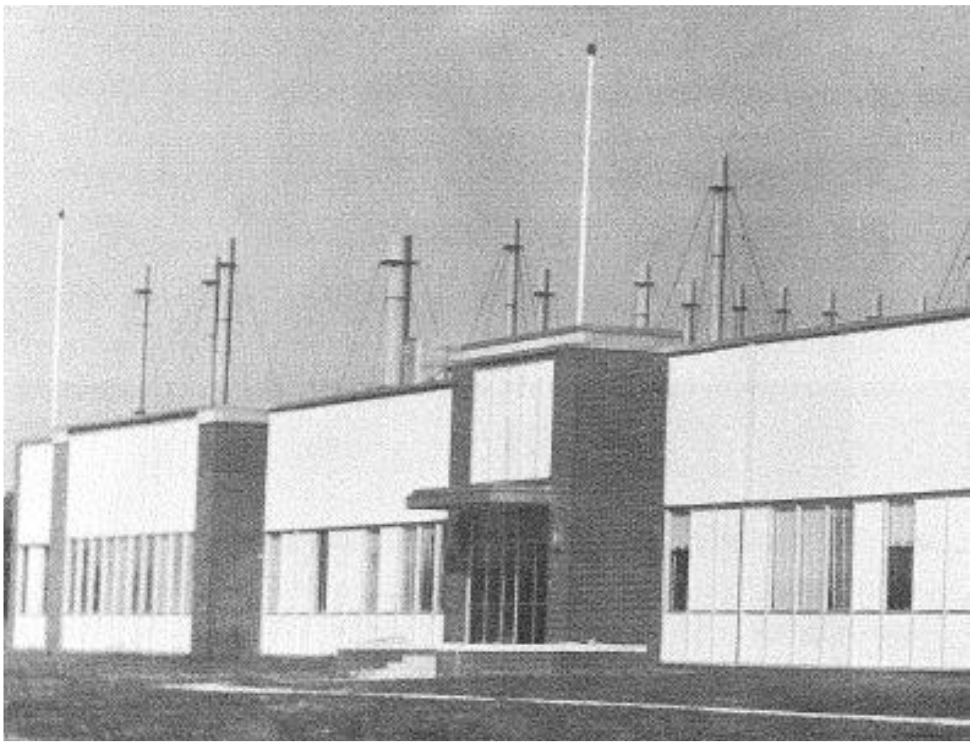

FIGURE D-1. GENERAL JOHN R. WOOD BUILDING, EDGEWOOD ARSENAL
(Source: 1968 Program)

The new laboratory building was dedicated to the memory of Brigadier General John Ruxton Wood, whose achievements while chief of medical research at Edgewood Arsenal from December 1942 to June 1950 contributed greatly to the development of medical defense against chemical warfare. Upon leaving

Edgewood Arsenal, General Wood served as director of the research and development division of the office of the Surgeon General of the Army, and director of the Walter Reed Army Institute of Research.

Reference:

Dedication of the John R. Wood Building program, 16 October 1968, Edgewood Arsenal, MD

Evaluating This Building Under This Subcontext

Note: The area where the General John R. Wood Building is located at Edgewood Arsenal was off limits for viewing and photography. The following is to illustrate how this context may be applied to a research facility. Additional research on specific studies conducted at the facility and if these were conducted due to the Vietnam War would necessary to make a conclusive determination of significance under this context. Information would also be needed to determine if the facility retains integrity for the period of 1962 to 1975.

A laboratory associated with the development of a treatment for a specific disease endemic in Vietnam or a typical type of injury from the weapons used in fighting could have significance under Criterion A. Research and testing facilities associated with medical breakthroughs and invention could be significant, either individually or as primary resources of a historic district, under Criterion A. Therefore, the General John R. Wood building could be eligible under Criterion A, Associated with Events. In order to be eligible under Criterion A, the property must have an important and specific association with medical research for the Vietnam War. It would need to be determined if research or discoveries came about in response to and/or to prevent specific types of casualties associated with the Vietnam War. The importance of the discoveries or research that led to medical advancement would also need to be determined.

This building could be eligible under Criterion B, Associated with Significant People, if it is associated with an individual who made an important contribution to medical treatment or research as a result of medical issues specific to the Vietnam War. This building could be eligible under Criterion C, Design or Construction, if it embodies distinctive characteristics of a type, period, or method of construction; required for the specific research associated with the Vietnam War.

If the building is significant under one of the criteria, it must also be determined if it retains its ability to convey its significance through retention of the property's essential physical characteristics from its period of significance. The seven aspects of integrity are as the following:

1. Location: the place where the cultural resource was constructed or the place where the historic event occurred.
2. Design: the combination of elements that create the form, plan, space, structure, and style of a cultural resource.
3. Setting: the physical environment of a cultural resource.
4. Materials: the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a cultural resource.
5. Workmanship: the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
6. Feeling: a property's expression of the aesthetic or historic sense of a particular period of time.
7. Association: the direct link between an important historic event or person and a cultural resource.

For properties significant for their association with medical research during the Vietnam War on U.S. military installations, they must retain the key physical features associated with these themes. Properties significant for their design and construction must retain the physical features that are the essential elements of the aspects of the building type construction that the property represents.

In cases of active military installations, buildings are more likely to have been modified to extend their useful life. These modifications generally include adapting buildings for new communication systems or research equipment, mission and staff changes, and changes in military assets such as equipment. These integrity issues will be critical in the evaluation process of significant resources.

The building would need to still retain its original floor plans, furnishings, and specialized testing and production equipment. Exterior features, and whether they are original, should also be noted.

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APPENDIX E: NAVY MEDICAL RESEARCH HERITAGE SITES

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Navy Medical Research Heritage Sites

Naval Medical Research Institute Headquarter Building

Commissioned on Navy Day (October 27), 1942 in Bethesda, MD, the Naval Medical Research Institute (NMRI) could be called one of the most innovative organizations ever established in the annals of Navy Medical Department history. Throughout World War II, its crew of scientists and researchers—some of the most brilliant minds in the military—embarked on an ambitious mission of "comprehensive research" relating to all aspects of military and especially naval problems.

Source: A. Sobocinski, Historian, BUMED, 2019

FIGURE E-1. NAVAL MEDICAL RESEARCH INSTITUTE HEADQUARTERS, CA. 1970S

Medical research was not unknown to the Navy at the beginning of World War II. The inter-wars years saw a vast array of pioneering medical research conducted at the Naval Medical School in Washington, D.C., the Submarine Base, New London, Connecticut, the Experimental Diving Unit, Navy Yard, Washington, D.C. and aviation bases at Pensacola and San Diego. During these years Navy medical personnel would unlock mysteries like decompression sickness, anti-G forces, and help lead the development of liquid plasma, immunization of tetanus typhoid, and means for combating heat stress.

Plans for establishment of a special "Research Laboratory" to oversee and direct Navy Medical Research efforts had existed since the 1930s and can be considered an uber-collaborative effort that benefited from perfect storm of need (the impending war), influential support (President Roosevelt), and the availability of a prime location (new Naval Medical Center in Bethesda, MD)

The NMRI originally consisted of 13 officers, 50 enlisted men, and one civilian. Capt. (later Rear Adm.) William Mann, MC, USN was selected to take the helm as the first commanding officer. Mann was best known as the founder of the "field medical school" concept from decades earlier. In the inaugural year of NMRI, Mann would be assisted by Dr. Andrew C. Ivy, the institute's first scientific director (1942-1943). Dr. Ivy, a Northwestern University professor of physiology (and one of the most famous physicians in the country at the time), would later earn renown as one of the developers of the Nuremburg Medical Code, a set of research principles on human use experimentation.

Organized under four research departments—naval environmental medicine, naval preventive medicine, dental research, and equipment research—NMRI's mission would become increasingly specialized. In July 1943, the four research departments were reorganized into "facilities" for: Animal Laboratories, Aviation, Bacteriology, Biochemistry, Biophysics, Chemistry and Assay, Analysis, Experimental Dentistry, Diving and Underwater Physiology, Heating, Air conditioning and Ventilation, Industrial Hygiene, a library, Nutrition, Pathology, Personal Equipment Design, Pharmacology and Toxicology, Physiology, Psychology and Statistics, Psychometric and Metabolism, Hematology, Technical Shops, Experimental Surgery, and Virology.

Throughout World War II, the NMRI investigated practically every problem relating to the health of Navy and Marine Corps. The NMRI scientists researched and developed everything from: first aid kits for aviators, means of desalination of seawater, protective creams for flashburns, sunburn protection, protective clothing and armor, means of preventive medicine (including development of insect repellents and fungistatic agents), testing of Penicillin for peritonitis, prevention of general effects of cold water immersion, resuscitation devices, treatment for seasickness, transportation methods for whole blood, and research into tropical disease (including treatment for malaria, scrub typhus and schistosomiasis).

The Navy's Surgeon General Ross McIntire once outlined the Medical Department World War II mission as "…to maintain naval tradition by keeping as many men at as many guns as many days as possible." There is no denying that through its vast output of basic and applied research, NMRI helped the Medical Department better achieve this mission.

Through the years, the NMRI established the world's first Tissue Bank (1949), support Project Genesis and later the SEALAB program, sponsor the aerospace research (e.g., Strato-Lab) that would prove vital for the success of the Mercury space mission. In the 1960s, lab personnel would collaborate with aviator icon Charles Lindbergh on heart-lung machine (perfusion pump), pioneer some of the first hyperbaric medicine studies, and oversee important research on infectious diseases.

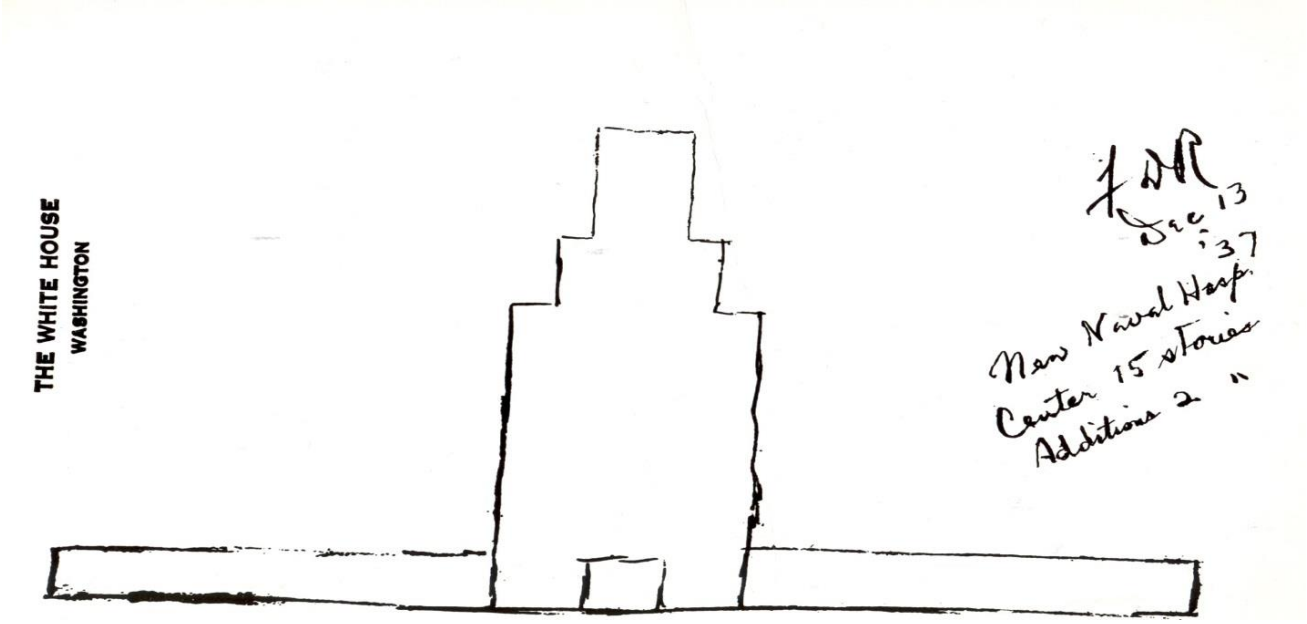
Although closed in 1998, and later renovated, part of the old NMRI still stands at Naval Support Activity Bethesda, MD.

Naval Support Activity Bethesda (NSAB), MD: ***The Old Naval Hospital Bethesda Tower—the "President's Hospital"***

From his days as Assistant Secretary of the Navy to his time as president, Franklin Roosevelt could be called a Navy man. His personal physician, Dr. Ross McIntire, was Navy, he collected Navy memorabilia, and when it to selecting the site of the new naval hospital he took personal interest. Roosevelt not only selected the location of the future National Naval Medical Center (NNMC) Bethesda, MD, he even drew the preliminary design of the hospital and dedicated it on August 31, 1942.

Since that date, the NNMC (and later Water Reed National Military Medical Center) has provided medical care to every president since Roosevelt and can even boast its own presidential unit. From Johnson's gallbladder removal to Reagan's colon and skin cancer surgeries to the annual Chief Executive "check-ups" the hospital has truly lived up to its moniker, the "President's Hospital."

The tower would later serve as the home for the Naval Medical Research and Development Command (NMPRDC) until 1999 when the command was closed.



Source: A. Sobocinski, Historian, BUMED, 2019

FIGURE E-2. PRESIDENT FRANKLIN ROOSEVELT'S ORIGINAL DESIGN FOR THE FUTURE NAVAL HOSPITAL BETHESDA, 1937

Original NHRC Headquarters

The Naval Health Research Center (NHRC) was established as the Navy Medical Neuropsychiatric Research Unit (NMNPRU) on 1 June 1959. The laboratory was housed in World War II vintage wooden barracks on Point Loma, San Diego, immediately adjacent to the Naval Personnel Research and Development Center (NPRDC). Originally served as a tenant activity of what was then the Navy Electronics Laboratory Command (NELC), in close proximity as well to Navy and Marine Corps recruit training commands and virtually every arm of the operating naval forces, was another small research activity of the Navy Medical Department.

Source: A. Sobocinski, Historian, BUMED, 2019

FIGURE E-3. NAVAL HEALTH RESEARCH CENTER HEADQUARTERS, CA. 1970S

Throughout the 1960s, NMNPRU initiated several important studies ranging from psychological fitness of recruits to examination of performance of naval duties under stressful environments. In January 1969, the laboratory conducted the first psychological evaluations on 81 crewmembers of *U.S.S. Pueblo*. Crewmembers had been held as prisoners of war in North Korea from January 23 to December 23, 1968.

It was re-designated the Naval Health Research Center (NHRC) in 1974.

Aviation Medical Research Activities

The Naval School of Aviation Medicine, later known as the Naval Aerospace Medical Institute (NAMI), is best known for ensuring physical standards and qualifications of pilots and training aviation medical personnel for operational assignments and, in the 1950s and 1960s, the preparation of Mercury, Gemini and Apollo astronauts for space flight. For the first decades of its existence (1939-1970), NAMI also operated an extensive basic and applied research laboratory (later a separate command known as the Naval Aviation Medical Research Laboratory, 1974-2011).

Under the leadership of legendary aerospace medical researcher Capt. Ashton Graybiel (1902-1995), NAMI's research component explored the effects of fatigue, vestibular physiology, neurological science, cosmic radiation and cardiovascular fitness, all of which would prove invaluable for the first manned space flights. NAMI operated special laboratories for researching spectroscopy, nuclear admission, low-level alpha radiation, medical electronics, ballisto-cardiography, and bioacoustics/psychoacoustics. Many of the original buildings that proved so vital in preparing and ensuring the safety of Navy and Marine pilots and NASA astronauts still remain on the Naval Air Station Pensacola.

Source: A. Sobocinski, Historian, BUMED, 2019

FIGURE E-4. VESTIBULAR PHYSIOLOGY BUILDING (SLOW ROTATING ROOM), NAVAL AIR STATION PENSACOLA, CA. 1960S

Evaluating These Buildings Under This Subcontext

Note: The following is to illustrate how this context may be applied to research facilities and hospitals. Additional research on the activities at these facilities, and whether these activities were conducted as a result of the Vietnam War, would be necessary to make a conclusive determination of significance under

this context. Additional information to determine whether the facility retains integrity for the period of 1962 to 1975 would also be required.

Research institutions associated with the development of a treatment for a specific disease endemic in Vietnam or a typical type of injury from the weapons used in fighting could have significance under Criterion A. Research and testing facilities associated with medical breakthroughs and invention could be significant, either individually or as primary resources of a historic district, under Criterion A. The NMRI Headquarters, the NHRC, and the NAMI buildings could be individually eligible under Criterion A, Associated with Events. In order to be eligible under Criterion A, a property must have an important and specific association with medical research for the Vietnam War. It would need to be determined if research or discoveries came about in response to the Vietnam War. The importance of the discoveries or research that led to medical advancement would also need to be determined.

These buildings could be individually eligible under Criterion B, Associated with Significant People, if it is associated with an individual who made an important contribution to medical treatment or research as a result of medical issues specific to the Vietnam War. This building could be eligible under Criterion C, Design or Construction, if it embodies distinctive characteristics of a type, period, or method of construction; required for the specific research associated with the Vietnam War.

Hospitals could have significance under Criterion A. Operating and examination rooms used for experiemental treatments and procedures may have provided venues for various medical procedures, techniques, applications, and demonstration of these skills. Specialized equipment would have been required to demonstrate and practice skills. The Old Navy Hospital Medical may have been a vital treatment facility during the Vietnam War, and therefore, could have significance under Criterion A, Associated with Events. In order to be eligible under Criterion A, the property must have an important and specific association with medical treatment for the Vietnam War. It would need to be determined if treatments were unique or specialized for wounds and disease brought on by service in the Vietnam War. The hospital also may have been used to treatment a special population of patients, such as returning prisoners of war.

This complex could be eligible under Criterion B, Associated with Significant People, if it is associated with an individual who made an important contribution to medical treatment for the Vietnam War. The building would likely not be eligible under Criterion C, Design or Construction, because it was originally built during a different time and would not embody distinctive characteristics of a type, period, or method of construction required for the specific training associated with the Vietnam War.

If any of the buildings are significant under one of the criteria, it must also be determined if it retains its ability to convey its significance through retention of the property's essential physical characteristics from its period of significance. The seven aspects of integrity are as the following:

1. Location: the place where the cultural resource was constructed or the place where the historic event occurred.
2. Design: the combination of elements that create the form, plan, space, structure, and style of a cultural resource.
3. Setting: the physical environment of a cultural resource.
4. Materials: the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a cultural resource.
5. Workmanship: the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
6. Feeling: a property's expression of the aesthetic or historic sense of a particular period of time.

7. Association: the direct link between an important historic event or person and a cultural resource.

For properties significant for their association with medical research during the Vietnam War on U.S. military installations, they must retain the key physical features associated with these themes. Properties significant for their design and construction must retain the physical features that are the essential elements of the aspects of the building type construction that the property represents.

In cases of active military installations, buildings are more likely to have been modified to extend their useful life. These modifications generally include adapting buildings for new communication systems or research equipment, mission and staff changes, and changes in military assets, such as equipment. These integrity issues will be critical in the evaluation process of significant resources.

The building would need to still retain its original floor plans, furnishings, and specialized testing and production equipment. Exterior features, and whether they are original, should also be noted.

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APPENDIX F: SHEPPARD AIR FORCE BASE

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SHEPPARD AIR FORCE BASE

The following is from the Air Force Base Cold War-Era Buildings and Structures Inventory and Assessment, May 2002 (Salo, Edward, Marsha Prior, Joe C. Freeman, 2002).

Sheppard Air Force Base During Vietnam

As the Air Force began mobilizing for the Vietnam War in the mid-1960s, Sheppard and other Air Training Command (ATC) bases again faced expansion. The daily student load at Sheppard in July 1965 was 4,000 students. The number rose to 9,500 by December of that same year (Manning et al. 1993:162). As it had in earlier military crises, basic military training returned to Sheppard in 1965 to handle the overflow from Lackland Air Force Base (AFB). Basic training was later relocated from Sheppard AFB to Amarillo AFB, Texas, in 1966. Although Amarillo AFB had been slated for closure and technical training was being phased out, the Vietnam War gave Amarillo a temporary reprieve (Tuttle et al. 1991:107–108).

As part of McNamara's plan to consolidate AFBs during the 1960s to cut costs, helicopter flight training returned to Sheppard from Stead AFB, Nevada. Because of the military's reliance on helicopters for transportation, observation, and close air support in Southeast Asia, helicopter pilot training had become a very important mission for ATC. The nearby Wichita Mountains provided pilots an adequate training area for the search-and-rescue operations that they would be conducting in Vietnam. By 1967, 60 various types of helicopters were available for training at the base (Tuttle et al. 1991:111–113).

In 1965, the Air Force Medical Service School (MSS) at Gunter AFB, Alabama, which occupied 63 semi-permanent buildings, was facing serious problems with its training facilities. Many of the buildings were World War II-era constructions, the facilities were scattered all around the base, and the base was in a rather remote part of Alabama. Furthermore, the Air Defense Command planned to locate a Semi-Automatic Ground Environment (SAGE) facility at Gunter. Since 1960, ATC had conducted many studies regarding the feasibility of moving MSS to Lackland AFB, but ultimately decided to move it to Sheppard AFB (Ennels 1981:52).

Sheppard was chosen for the new medical training because it had a large U.S. Air Force (USAF) regional hospital, a technical library, a field training area, and ample classroom buildings. The new five-story, 300-bed medical center replaced 95 World War II temporary buildings that had previously served as the hospital (*Air Force Times* 1960:19). As part of Operation Homecoming in 1972, the regional hospital at Sheppard was chosen as one of 31 stateside military hospitals to care for returning prisoners of war from Southeast Asia (Manning et al. 1993:200).

Due to decreased importance of missile training, building 1900 was converted into a medical training complex to save the cost of constructing a new facility. In December 1966, a $459,000 contract was awarded to rehabilitate the entire missile training complex into a medical training facility. The interior of Building 1900 was extensively remodeled to accommodate medical laboratories, operating suites, a pharmacy, and veterinary and x-ray facilities. In another project, the U.S. Army Corps of Engineers spent $307,000 to rehabilitate the missile bay in the rear of the building for use as a medical equipment repair laboratory and a 300-seat auditorium. Building 1918 was transformed into a dental training building and Building 1924 was converted into administrative offices (Tuttle and Boyd 2000:54).

To meet the field training needs of MSS, the medical school constructed a bivouac area on the east side of the base in April 1966. Located in a rugged area, the facility was originally a series of temporary Butler buildings, tents, a suspension bridge, several field medicine trainers, and a helicopter rescue simulator. The

next year, the school received a 36-man air-transportable hospital for training (Tuttle and Boyd 2000:55–56). At the end of the Vietnam War, instruction at the bivouac area was temporarily deactivated (Tuttle and Boyd 2000:87). The training area still exists, but it has been altered to meet present training needs.

Sheppard AFB, and the U.S. military in general, faced a period of adjustment in the 1970s as the USAF tried to adapt to the all-volunteer military after the defeat in Vietnam. It was also a period of growth and consolidation at Sheppard. In July 1971, Sheppard assumed operational control over all field training conducted by ATC. However, the base lost the helicopter training school that was transferred to Hill AFB, Utah, in 1971 (82 TRW/HO 1996:31; Tuttle et al. 1991:134). Medical training at Sheppard continued to expand in the 1970s and 1980s. The MSS began medical readiness training in 1983 to train military personnel in medical skills for the battlefield.

The school used a hangar (Building 1060) as a classroom building with an obstacle course inside. Soon the bivouac area was transformed into a medical readiness training area with the addition of an academic building, litter obstacle course, and a gas chamber. In 1988, the MSS constructed a blast-hardened underground medical shelter, Survivable Collective Protection System-Medical, to train for operational deployment in Europe. Sheppard also played a part in the USAF's support of the National Aeronautics and Space Administration's (NASA's) manned space program. The Skylab astronauts received in-flight medical support system training in 1972 and 1973 at MSS to provide them with basic medical training for their month-long missions (Tuttle et al. 1991:143-146).

Airmen housing was improved at Sheppard to help attract and retain personnel, which was necessary when the military switched from a draft to all-volunteer force in the early 1970s. Six 1,000-person air-conditioned dormitories were constructed, and a new Consolidated Base Personnel Office was completed in 1974. The $3 million building was a three-story, masonry structure with no windows. In the early 1980s, the need for a new training facility was identified at Sheppard. The USAF requested $30 million for a new medical training facility and for a two-phase renovation of Building 1900. After budget battles with Congress, the new medical training facility was constructed for $9.1 million in 1991 (Tuttle et al. 1991:147–149).

Building 1900

Kearby Hall (Building 1900), the main building in the missile training complex, is a two-story masonry building that cost $2.1 million and was completed in 1958. The building was later rehabilitated in the 1960s for use as a medical training facility. The development of intercontinental ballistic missile (ICBMs) and intermediate-range ballistic missile (IRBMs) as a delivery system for nuclear weapons was a very important part of the development of American nuclear strategy in the late 1950s. The USAF's reliance on heavy bombers to deliver nuclear weapons was quickly supplemented by the missiles. Because of the state-of-the-art nature of the technology used in ICBMs and IRBMs, the missiles required almost constant maintenance to keep them in operational condition. The training of the maintenance crews was essential to successfully fielding the missiles as a viable deterrent and keeping the systems operational. Therefore, the training conducted in Building 1900, and in other buildings in the missile training complex at Sheppard AFB, was very important to the deployment of nuclear missiles.

Building 1900 was the centerpiece of a large training complex that originally contained various classroom buildings and mock-ups of missile silos. The two-story masonry building contained 190 classrooms, and the modified hangar was used as a training bay. Most of the classroom instruction occurred in this building.

Building 1900 played an important role in training USAF personnel who were needed for the deployment of the missile force in the 1950s and 1960s. The building, however, has undergone many alterations to both the interior and exterior of the building. A review of the drawings in the 82 Civil Engineering Squadron (CES) office indicate extensive alterations. The changes in the building include the addition of a new metal

roof, windows, and doorways; and the welding shut of the metal doors on the large open bay. In addition to the exterior changes, the interior of the building had been remodeled for medical training. Because of these architectural changes to the interior and exterior of the building and because the machinery and training devices used for ICBM and IRBM training are no longer present, Building 1900 no longer conveys the feel of a missile training complex and is therefore recommended not eligible for listing in the NRHP.

Buildings 1918 and 1924

Buildings 1918 and 1924 (Figure F-1) are similarly constructed one-story, rectangular, metal buildings built in 1962 and 1960, respectively. Building 1918 was a missile maintenance area and Building 1924 contained a master control room for training in launch procedures. Both buildings are associated with missile training, which is a Cold War mission. Because of alterations to the buildings during their conversion to medical training facilities, the buildings lack the necessary architectural integrity for listing in the NRHP. Because of these architectural changes, Buildings 1918 and 1924 are recommended as not eligible for listing in the NRHP.

Source: Sale, et. al, 2002

FIGURE F-1. BUILDING 1924 (PHOTOGRAPH BY EDWARD SALO).

Current information from the Base Historian (2019)

Medical training for the USAF was also conducted on this base during the Vietnam War. All of that medical training for the military services were consolidated at Fort Sam Houston, Texas in 2011. Building 1900 currently houses the Noncommissioned Officer Academy (classrooms/associated training), building 1918 was demolished, and building 1924 now consists of administrative offices. A new medical treatment facility is being built and will be completed in 2020. Once it is completed, the base hospital building will be torn down.

Evaluating These Buildings Under This Subcontext

Note: The following is to illustrate how this context may be applied to research facilities. Additional research on specific studies conducted at the facility and whether research was conducted as a result of the Vietnam War would be necessary to make a conclusive determination of significance under this context. Information would also be needed to determine if the facility retains integrity for the period of 1962 to 1975.

This medical school at Sheppard AFB would likely be evaluated as a historic district (see section 4.6.1). The former missile training complex was used for the medical school with each structure providing a different component of the campus. The overall importance of a particular building or laboratory would depend on the mission of the school.

A medical school associated with the training of medical personnel for duty in Vietnam, especially if specialized training were necessary for treatment of specific conditions or wounds, could have significance under Criterion A. Buildings and classrooms provided locations for hands-on training and included laboratories, operating rooms, and examination rooms. Academic buildings, classrooms, and auditoriums provided venues for various medical procedures, techniques, applications, and demonstrations of these skills. Specialized equipment would have been required to demonstrate and practice skills. The MSS could be eligible under Criterion A, Associated with Events. In order to be eligible under Criterion A, the property must have an important and specific association with medical training for the Vietnam War and it would need to be determined if training was unique or specialized for duty.

This complex could be eligible under Criterion B, Associated with Significant People, if it is associated with an individual who made an important contribution to medical training for the Vietnam War. The complex would likely not be eligible under Criterion C, Design or Construction, because it was originally built for a different purpose and would not embody distinctive characteristics of a type, period, or method of construction that would have been required for the specific training associated with the Vietnam War.

If the complex is significant under one of the criteria, it must also be determined if it retains its ability to convey its significance through retention of the property's essential physical characteristics from its period of significance. The seven aspects of integrity are as the following:

1. Location: the place where the cultural resource was constructed or the place where the historic event occurred.
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6. Feeling: a property's expression of the aesthetic or historic sense of a particular period of time.
7. Association: the direct link between an important historic event or person and a cultural resource.

For properties significant for their association with medical training during the Vietnam War on U.S. military installations, they must retain the key physical features associated with these themes. Properties significant for their design and construction must retain the physical features that are the essential elements of the aspects of the building type construction that the property represents.

Due to the demolition of some buildings and reuse of others, it is not likely that this complex retains integrity under this Vietnam War sub context.

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