Glimpsing Modernity

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Military Medicine in World War I

Edited by

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Cambridge
Scholars
Publishing

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This book first published 2015

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN (10): 1-4438-7714-X
ISBN (13): 978-1-4438-7714-5

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INTRODUCTION

STEPHEN C. CRAIG

In the century that has passed since the beginning of the First World War the world has seen another world war, major conflicts in Korea, Vietnam, Iraq, and Afghanistan, and armed conflicts in the Balkans, Latin America, the Middle East, and Africa. These conflicts have left, or are currently leaving, their own individual physical and psychological imprint on the military participants, the populations affected, and the historians who chronicle them. This collective memory defines the nature of each war, attempts to put the political objectives, the military campaigns, and the suffering and destruction into a broader frame, a more understandable perspective which tempers its impact on future generations. The impression of the First World War remains indelible, largely untempered by time, and compelling to 21st century historians and audiences. The origins of this enduring fascination reside largely in the scientific, technological, and industrial nature of the war and its horrifying, unforeseen outcomes.

In the half century between 1865 and 1914 military and naval science, technology, and industry significantly transformed the weapons, munitions, transportation, and communications capabilities of armies world-wide. Improved casting techniques allowed stronger, larger caliber, and more reliable breech-loading artillery. Rifling and recoil systems improved, more efficiently burning and powerful and in the 1890s smokeless, gunpowder was compounded. The Gatling gun, a machine consisting of 6-10 rifle barrels revolving around a central shaft and cranked by hand, came into use late in the American Civil War and was made obsolete by Hiram Maxim's machine gun (1884) by the turn of the century. These advances increased the accuracy, efficiency, distance and rate of fire, and payload delivered for individual and crew served weapons.

The Union Army in the American Civil War demonstrated the strategic use of railroads. The Prussians, later a unified Germany, and the French continued the development of this technique during the Franco-Prussian War (1870-71). By the turn of the century, the size, capacity, and speed of trains made them indispensable for military supply and troop movement.

The last quarter of the 19th century saw the development of the internal combustion engine and, from the mid-1890s, the diesel engine. Both provided mobility, independent of tracks and time schedule. Automobile chassis were adapted rapidly into military trucks and armored cars. France launched the first diesel-powered ships in 1903 and, a year later, the first diesel-powered submarine.

While France gloried in her modern navy, a bicycle mechanic, Charles E. Taylor, working for Orville and Wilbur Wright in Dayton, Ohio, built the first aluminum water-cooled engine in 6 weeks for the Wright's first flyer. On December 17, 1903, Taylor's engine powered the first heavier-than-air machine, Orville Wright at the controls, 120 feet over the wind swept dunes of Kitty Hawk, North Carolina. Over the next decade, structural integrity, engine and control reliability improved, and a more nuanced understanding of aircraft flight characteristics was obtained. Although largely ignored by American military planners, Europeans grasped aviation's military potential and began its development.

Battlefield communications were also changing. The telegraph demonstrated its worth before the Crimean War. But 1890s brought the advent of wireless telegraphy. The Second Anglo-Boer War its first military use in wartime.

The development and implementation of these technical advances, however, occurred much more rapidly than did the alterations in battlefield tactics required to accommodate them. Napoleonic tactics in an era of more accurate and rapidly firing rifled weaponry had resulted in the slaughter of Pickett's Charge on the third day at Gettysburg in July 1863, frontal assaults on Russian machine gun positions had sent Japanese combat mortality statistics sky high in the Russo-Japanese War (1904-05). In 1914, the German, Russian, French, and British armies would march off to war with 19th century tactical concepts that, unbeknownst to them, had been made obsolete by the very manner in which they could shoot, move, and communicate on the battlefield.

During this same half century, medical and surgical science and technology had also experienced not merely rapid development, but a complete transformation in the approach to, and management of, disease and injury. Ether and chloroform anesthesia had reduced the terror of surgical procedures before the Crimean War, but allowed the surgeon's dirty hands more time in the open wound. The development of bacteriology through the last quarter of the 19th century allowed anti-septic, and, with the invention of the autoclave in the 1880s, aseptic practices to reduce surgical morbidity and mortality. By the late 1890s the

exploratory laparotomy was becoming a relatively safe and common procedure in large urban hospitals.

The new fields of bacteriology established a revolutionary theory for infectious disease causation. Bacteria would hold center stage until the 'filterable agent,' known today as a virus, was recognized in the 1890s. By 1900, vector-borne diseases were identified and the mosquitoes role in transmitting filariasis, yellow fever, and malaria had been established. The body's cellular and humoral defenses against infections had been explored by another new field immunology. Moreover, immunology held out the promise of prevention and cure of infectious diseases in the form of anti-toxins, such as for diphtheria and tetanus (1893) and vaccines, rabies (1885), and typhoid (1896). These advancements gave a scientific foundation to the field of public health. Furthermore, the need to explain the development and transmission of infectious diseases in populations by geography and offer preventive modalities created the field of epidemiology.

Medical diagnostics made significant advancements as well. Improvements in the stethoscope, ophthalmoscope, otoscope, and thermometer made them all more accurate and reliable through the last quarter of the 19th century. The sphygmomanometer, introduced in 1896, would not join them until the 1920s. Bacteriology laboratories were processing throat swabs, urine and fecal specimens, and sputum samples for TB by the late 1890s in large city hospitals. More dramatic was the introduction of the x-ray machine (1895), a medical diagnostic tool whose many applications had to be figured out over time.

These remarkable advancements were accompanied by, indeed some demanded, a growing medical infrastructure. Urban hospitals boasted aseptic surgical suites, laboratories, radiographic and ambulance services; medical research laboratories were established by philanthropists such as Andrew Carnegie and John D. Rockefeller, Sr., medical education became more standardized and academically rigorous; medical practice took its first steps toward specialization; nursing became a properly educated profession; and safe guarding the public's health became recognized as a moral obligation.

Adapting these civilian practice changes to the military field environment proved to be as challenging as the integration of new weaponry and tactics. Organizational and logistical concerns were major hurdles to the integration and provision of state-of-the-art care on, and evacuation from, the battlefield. Moreover, convincing skeptical military commanders and some of the more senior medical officers to accept the intrusion of modern medicine and surgery into mobilization activities and wartime operations only compounded these problems.

The Prussians had learned a hard lesson concerning the organization and implementation of medical services during the Austro-Prussian War (1866). When they invaded France in 1870, initiating the Franco-Prussian War (1870-71), the Prussian's had a more organized and dependable medical service with railroad evacuation of sick and wounded, and all her soldiers had been vaccinated against smallpox. During this same war, the French decided against smallpox vaccination and suffered a devastating epidemic in her army.

During the Russo-Turkish War (1877-78), Dr. Karl von Reyer, a German surgeon in the Russian service, conducted a series of surgical protocols using Lister's antiseptic surgical procedures in combination with judicious debridement and épluchage on wounded patients in his hospital. Reyer demonstrated clinically and statistically that the combination worked better than either technique alone. Regrettably, the German surgical community, enthralled with Lister's method, focused on anti-sepsis while ignoring the importance of debridement and épluchage.

However, by September 1893, US Army Surgeon General George M. Sternberg commented at the Pan-American Medical Congress held in Washington, D. C. that field antiseptic procedures combined with the etiological knowledge of hospital gangrene, erysipelas, and tetanus would reduce battlefield mortality. Sternberg and other like minds also saw the advent of high-velocity rifled bullets as reducing the killed to wounded ratio. If true, this circumstance would not only increase the surgeon's workload and demand close attention to state-of-the-art combat surgical techniques, but also require a robust casualty evacuation system if mortality rates were not to climb.

This prediction was validated during the Spanish-American (1898), Philippine-American, (1899-1902), and Second Boer Wars (1899-1902). But the difficulty of obtaining clean water, the dirt and flies, all challenged the surgeon's ability to achieve anti-sepsis. Evacuation from point of injury to surgeon not only remained bound to the horse-drawn ambulance, but also remained low on a commander's list of priorities. Hence, treatment was often delayed for hours. Complicating this picture was the fact that a high velocity bullet could pass through the chest or abdomen without causing damage that required surgery, but there was no way to tell. During the Spanish-American War all four abdominal cases treated surgically died, while 37% of those treated medically survived. British surgeon G. H. Makins, consulting surgeon to the South African field force, noted that spontaneous recoveries of abdominal wounds did occur and concluded that intestinal wounds should be watched not explored in the field. These results were verified by Russian surgeons during the Russo-

Japanese War (1904-05). This conservative trend, as erroneous as it was, would accompany western military surgery into the First World War.

The four wars just mentioned saw the advent of spacious, steel-hulled hospital ships where electric lights, aseptic surgical techniques, laboratories, and x-ray machines now defined state-of-the-art strategic evacuation. British forces deployed a small portable radiographic machine to South Africa in 1898 and the first typhoid vaccine.

Typhoid fever (Enteric fever) was still endemic in many countries around the world, including the U. S. and U. K., making it a perennial threat to military campaigns. The U. S. Army Medical Department had been embarrassed, and the nation shocked, by a large typhoid outbreak in its mobilization camps in the summer of 1898. By the time British forces sailed for South Africa the following year, Royal Army Medical Corps Director-General James Jameson was actively implementing anti-typhoid measures that included a new typhoid vaccine created by Almroth Wright. Wright was confident his typhoid vaccine was sufficiently safe and efficient to preclude a British repetition of the American experience. Regrettably, his efforts received little support from military commanders. Soldiers were offered the vaccine on a voluntary basis as they sailed for South Africa, but only 5 percent consented; orders to use of only filtered or boiled water were either not given or not enforced by commanders. In late winter and early spring 1900, the British army in South Africa was devastated by typhoid fever.

A conjunction of cooperating militarily astute medical officers and medically educated line officers was, and still is, required for field sanitation and hygiene methods to be efficient and effective. Such a conjunction may have occurred in both the Russian and Japanese armies in their 1904-05 conflict. The implementation of modern field preventive medicine practices appears to have resulted in remarkably low battle to disease mortality ratios, 2.6 for Russia and 2.2 for Japan. [Duncan, *Comparative Mortality of Disease and Battle Casualties in Historic Wars*] This outcome was not lost on western military medical observers. Over the next decade, how to achieve that military-medical cooperation, as well as the adaptation and integration, became more complex as developments in medical science and technology burgeoned.

By June 1914 in the fields of bacteriology and immunology, the role of the mosquito in transmitting malaria and yellow fever, personal protection and environmental mosquito control had been established. Chemical purification (hypochlorite) of water in the field and a more effective typhoid vaccine had been developed. Diagnostic tests, such as the blood smear (malaria), Widal (typhoid) and Wasserman (syphilis) tests were

standard procedures. The disease-carrier state had been established for typhoid, cholera, diphtheria, and bacterial meningitis providing a broader role for the epidemiologist, laboratory technician, and public health officer in controlling infectious diseases.

In surgery, the role of the vasomotor system, blood pressure, blood, and fluid resuscitation in traumatic shock were being investigated. In hematology, blood typing and simple cross-matching procedures described, and methods of blood preservation were being studied and tested. In physiology, research into bodily responses to the effects of hypo and hyperbaric extremes achieved new status as it became militarily relevant.

Wartime requirements and the industrial base that supported them had a catalytic effect on the continuing development of the military and medical technology described above. Heavier artillery with a larger payload; aircraft that could fly at velocities and altitudes beyond human tolerance, aerial bombing; submarines that could dive deeper and stay down longer; chlorine gas and nerve agents; armored and armed rolling pillboxes dubbed 'tanks' impervious to small arms fire; larger troop formations for attack, more accurate and efficient mortars and machine guns to greet them. These generated battlefield experiences and a scope and magnitude of casualties that could never have been imagined, or planned for in 1913. To cope with the large numbers and varieties of casualties during the war, military medicine and its establishment expanded tremendously in size, became reorganized administratively, recognized the need for larger numbers of trained, efficient ancillary personnel, and embraced the requirement for specialized services from maxilla-facial and orthopaedic surgery, psychiatry, and aviation medicine to patient regulating, evacuation, and logistics. In essence, military medicine shed the last vestiges of the 19th century and took on the mantle of a 20th century medical profession.

Glimpsing Modernity is a collection of papers from the U. S. Army Medical Museum sponsored conference on medical aspects of the First World War held in San Antonio, Texas in February 2012. It captures the metamorphosis of military medicine during the war in a series of inter-related vignettes. Some of these stories provide new and insightful interpretations of known military medical themes while others depart from these to examine less well-known, but truly important medical topics.

In the first section, Military Medical Planning & Operations, Steve Oreck reviews the military and medical failures of the amphibious assault at Gallipoli. Operational doctrine for this type of assault had not been developed by 1915. Without that close joint military and naval planning and coordination as a foundation, military and naval medical support

operations - treatment, evacuation, and re-supply – were preordained to fall far short of expectations. The article not only describes the complexities of providing medical support to amphibious operations, but also demonstrates that early medical support planning and integration and follow on execution are imperative to the success of any military operation. William Hanigan continues this theme in another medically challenging venue in his article on military operations in German East Africa and highlights difficulties in executing medical plans during mobile operations. Disease threats in the African theater of operations and preventive modalities were known and prepared for by the more medically progressive German and British MO's. But the concepts of water and vector-borne disease had not been embraced by all physicians nor had the responsibilities for disease prevention and soldier health registered with all line officers. As the disease burden grew during the campaign so too did inadequacies in medical personnel, medical resupply, and evacuation. In "Dr. Jekyl and Mr. Hyde", Tim Cook observes a conundrum familiar to regimental and battalion MO's in any army: the integration of duties and responsibilities of a military officer with those of a physician. This conundrum is a difficult one for career-oriented medical officers in peacetime to contend with, for regimental MO's pulled from civilian practice, given a modicum of military/military medical training, and sent to the Western Front it was undoubtedly a loathsome daily burden for many. "Dr. Jekyl and Mr. Hyde" describes life in the trenches for Canadian MO's and how they dealt with this conundrum, but it reflects the lives of all regimental MO's on both sides of the front.

In the second section, Hospitals, the conceptual development of continuity of medical treatment from point of injury to definitive care facility can be observed through a hospital chain striving to adapt medical science and technology to the battlefield. Jennifer Nieves and Diane O'Malia describe the advent and deployment of American Base Hospitals through the activities of Base Hospital #4. Of the fifty Base Hospitals deployed during the war, Base Hospitals #4 (Lakeside Hospital, Cleveland, Ohio) and #5 (Harvard University) are probably the most famous because of the clinician/researchers – George Crile, Harvey Cushing, Walter Cannon – who worked there and for their research contributions that directly impacted medical and surgical treatment of combat wounded. These tertiary care facilities demonstrated that state-of-the-art, university-centered medical and surgical care could be translated effectively and efficiently to the battlefield environment. In "Mobile Hospital #1"William Montgomery explores the daily activities and associated risks of one of the first motorized hospitals in combat.

Although the concept of a hospital keeping up with the movements of a military campaign was not new in 1914, the combustion engine changed the speed with which it could do so, reduced evacuation time to base hospitals, and could transport modern medical equipment and laboratory facilities to the field with relative ease. It also created new internal logistical and administrative problems, such as the need for more medically owned vehicles, maintenance personnel, and a significant gasoline ration. The gasoline-powered mobile hospital brought medical care more closely into harm's way and a new hope for combat wounded.

Injury and Disease comprise the third section. The industrial, technological, and generalized nature of the war created new injuries, such as those produced by chemical weapons and the traumatic psychosis induced by a variety of wartime experiences, and allowed certain diseases, such as epidemic louse-borne typhus and, in 1918, influenza, to run rampant. As well-known and documented as these have been, the war created other unique medical conundrums. In the "Shadow Land", Emily Mayhew describes the experiences of those nearly 68,000 'slightly injured' (petit blesse) soldiers interned in Switzerland during the war. The medical trials and tribulations suffered by these men concerned not only Lieutenant Colonel Henry Picot, the British officer in charge of the interned, but the Royal Army Medical Corps and the Swiss government. L. G. Walker, Jr. redirects focus to the deadly unity of injury and disease in front line hospitals in "Alexis Carrel's Contribution to the Care of the Wounded". Carrel's passion and determination to discover a viable anti-septic treatment for traumatic infections, his interaction with others in trauma research such as Sir Watson Cheyne, Almroth Wright, George Crile, Walter Cannon, and support given by organizations like the Rockefeller Institute make a dramatic and gratifying story. Moreover, it provides a conjunction between combat, and the wounded it generates, and medical care from field hospital to research laboratory. Pete Starling provides in "White Smoke Rising" an account of the introduction of the chemical weapon on the battlefields of the Western Front and the Royal Army Medical Corps response to the new threat. In particular, Captain Starling focuses on the interplay between the front line efforts at prevention and treatment and the rear area research and development efforts involving career officers and civilian scientists, such as Professor Ernest Starling, mobilized for the war effort. Again, modernity is captured in the use of modern medical science to combat operational problems in real time.

In the last section, Civilians at War, the multi-faceted effects of war on the general population and the efforts of those outside of the military to

ameliorate suffering wherever they found it is reviewed. In doing so, the difficulty of bringing modern technology and medical science to bear in the civilian community enveloped by conflict is reviewed. More importantly, the dilemma often posed by politics and ethnic loyalties on neutrality and humanitarian relief is examined. Bradford Waters, in "Americans Under Fire on the Eastern Front", presents the work of the American Red Cross (ARC) in Serbia, Russia, and Romania largely in the years before the US entered the war. In Serbia and Romania, ARC physicians, surgeons, nurses, and support staff were confronted with many of the same medical, surgical, logistical, and evacuation problems experienced by front line military medical personnel. They also provided food, immunizations, dealt with non-urgent medical care, contended with malaria, and fought a large outbreak of epidemic louse-borne typhus, the bane of the trenches, which claimed a number of ARC physicians and nurses. In Russia, the ARC faced these same issues, a shortage of medical facilities, and how to provide medical and humanitarian care in prisoner-of-war camps as the Russian Revolution burst over the country. Medical care on the Eastern Front is also the locale of Leo van Bergen's article "We only drive off to help the wounded", based on the experiences and records of Dutch ambulances on that front. Van Bergen postulates that the destination and delivery of medical services and humanitarian relief was influenced by political and ethnic considerations. Moreover, these considerations became so powerful in one ambulance that neutrality, the ethical currency that ensures freedom of movement and safety for ambulance personnel, was violated for military gain. Natalia Starostina returns to the Western Front to describe the difficulties encountered in French rail evacuation. Originally designed and configured by the army to accommodate far fewer wounded than generated in the war, the rail evacuation system and its operating regulations were made obsolete as the war began. The tremendous numbers of sick and severely wounded nearly brought rail transportation to a halt. A successful solution to this dilemma was a cooperative effort between civilian railway and military authorities in which original thought and creative innovation established an efficient and effective evacuation system.

Together these glimpses of modernity describe how the first industrial war shaped the development of the academic discipline called military medicine.

SECTION I.

MILITARY MEDICAL PLANNING AND OPERATIONS

CHAPTER ONE

MEDICAL PLANNING AT GALLIPOLI

STEVEN L. ORECK

The assault at Gallipoli in 1915 by British, Imperial, and French forces in an attempt to open the Straits, force the Ottoman Empire out of the war, and provide a more direct route for aid to Tsarist Russia has long been held out as one of the most tragic, and costly, military failures in modern history. Gallipoli very nearly permanently ended the political career of Winston Churchill, and the efforts and sacrifices of troops from Australia and New Zealand, as well as the not unrealistic feeling that these troops were ill-served by the overall British military command, have become a part of ANZAC identity. There are partisans on both sides of the strategic divide, that is whether or not a successful campaign could have achieved the goals set out by the Entente, and part of that debate includes whether or not such a plan was at all practicable. There is general agreement, however, that the overall plan for this campaign was deeply flawed from the beginning, and that throughout the campaign there were a series of conceptual, tactical, and operational errors that doomed the campaign not only to failure, but to disaster.

The errors at Gallipoli included errors in medical planning, which sadly increased the human suffering that attended these assaults. I hope to identify where errors or omissions in medical planning occurred, and their consequence, and to examine how medical planners in the interwar period utilized these "lessons learned" in developing doctrine for future amphibious warfare. In defense of the planners, Gallipoli was really the first large scale amphibious assault in modern times. The American landings in Cuba and Puerto Rico in 1898 had been unopposed, and while some of the Union attacks of the American Civil War (such as Fort Fisher) were opposed, the differences in weapons and technology between the 1860s and 1915 was significant.

The lesson learned from the Gallipoli campaign, at least by the United States Army and the British military, was that amphibious assaults were to

be avoided.[1] Raids with limited objectives, preferably performed at night, might be acceptable but full-scale assaults were to be avoided.(Because the United States Marine Corps had, beginning as early as 1919, seen its future raison d'être as seizing advanced bases in the Pacific in support of U.S. fleet operations as envisioned in War Plan Orange, they had to have an attitude that amphibious assault could be made to work, if only the correct doctrine, and materiel, could be developed (Smith 1992, 23).Necessity having become the mother of invention, it devolved upon the naval physicians assigned to service with the Marine Corps during the interwar period to develop the medical doctrine to support such assaults, and, as the evidence will show, they used Gallipoli (as did their line counterparts) as the bad example to avoid.

In order to understand the problems of medical support for amphibious assault, it is necessary to understand some of the key differences between amphibious assault and a similarly sized assault in a traditional land campaign. One important difference is that an amphibious assault is, by its very nature, a joint endeavor. The naval and military components have different tasks, and coordination and unity of command and planning is absolutely necessary to avoid difficulties. Until the assault force has moved well inshore, there is no rear area for combat service support elements such as medical units, and until there is adequate depth to allow for medical units to be set up onshore, transportation of the wounded for medical treatment involves shore to ship movement with its' attendant complications. Amphibious assaults, as opposed to unopposed or lightly opposed landings are frontal assaults, and as such generate a very large number of casualties in a relatively short period of time. These were some of the issues that medical planners had to deal with in preparing for the Gallipoli assault and, unfortunately for them and their troops, with little if any guidance from the British Combined Operations Manual of 1911.

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[1] The literature on the development of amphibious warfare in the interwar period is replete with examples of how the US Army, the British Army, the Royal Navy and Royal Marines all rejected major amphibious assault. For examples see books by Arch Whitehouse Amphibious Operations, Ian Speller & Christopher Tuck Strategy and Tactics: Amphibious Warfare, Jeter Isely & Phillip Crowl. The U.S. Marines and Amphibious War, Kenneth Clifford Amphibious Warfare Development in Britain and America From 1920-1940. Other analyses include Donald Bittner "Britannia's Sheathed Sword: The Royal Marines and Amphibious Warfare in the Interwar Years- A Passive Response" (The Journal of Military History, 1991) and David MacGregor "The Use, Misuse, and Non-Use of History: The Royal Navy and the Operational Lessons of the First World War" (The Journal of Military History 1992).

In addition to the special requirements of an amphibious assault, the medical planning attendant on any assault or invasions still had to be dealt with. Issues of water supply, sanitation, and the climatological and geographic constraints of the assault/invasion area have to be dealt with. At a minimum, input from the medical staff is required. Sadly, even these "normal" medical planning inputs were not sought, or if offered not acted upon.

From the beginning, an amphibious assault at the Dardanelles was a backup plan, to be utilized only in the event of the failure of a purely naval assault to force open the straits. The commander of the military component of the assault, General Sir Ian Hamilton, was informed by Lord Kitchener of his appointment to command this effort March 12, 1915 while in London-and the timeline for an assault (if necessary) was to be late April. In his diary, Hamilton noted he sent staff to the intelligence section to see what information was there and nothing was found except standard texts (Hamilton 1920, 1, 14). Hamilton did not even know who his Director of Medical Services (DMS) would be on March 17, when he was enroute to Egypt (Hamilton 1920, 19). In fact his DMS was to be Surgeon-General Sir W. G. Birrell (RAMC), who had been brought out of retirement. Surgeon-General Birrell would not even arrive in Egypt until April 11, 1915, by which time Hamilton and the General Staff, though not the Administrative Staff, had moved forward to Mudros on the Greek island of Lemnos (James 1965, 87). The bulk of medical planning prior to mid-April, such as it was, had been done by members of the General Staff, not the Administrative Staff which included the DMS and his (limited) staff as well as the Adjutant-General.

A further complication in planning was the division of responsibilities between various components. The primary destination for seriously wounded was to be Egypt, with Malta being a secondary receiving area. The senior medical officer in Egypt, Surgeon-General Ford (RAMC), was not involved in the planning and furthermore the bulk of his assets came from medical units of the Australian Imperial Force (AIF). These AIF medical units were to become responsible for a much larger number of wounded (ANZAC and other) than they were designed to handle, and relations between Ford and the medical staff of the AIF were distant and strained at best (Butler 1938, 82; Tyquin 1993, 23). Egypt was to have been an intermediate stop for the AIF, which had been raised in Australia for service in France.

The division of responsibility between the Navy and Army was arcane. While the Navy was responsible for the material condition of hospital ships, the fitting out of these ships as hospital ships (equipping and

staffing them) was an Army responsibility with exception of those ships that were actually part of the Royal Navy. Once wounded had been delivered to the beach, it was the responsibility of the Royal Navy to get them from the beach to a receiving ship (of some sort) at which point their immediate responsibility ceased. Overall control of shipping to and from the invasion area was under Royal Navy control. While hospital ships were pained in accordance with Geneva regulations, and as such were exempt from enemy attack, most wounded were to moved on transports (black ships) which were used for mixed purposes and therefore not protected by Geneva rules.

As noted, during the assault casualty handing/evacuation was the responsibility of the Royal Navy between the high water mark and the deck of the receiving ship, the rest was up to the Army. It is not clear when joint, that is Army-Navy, medical planning began, however the first joint staff meeting of any kind between the Army and the Royal Navy took place on April 10, 1915 in Egypt, less than two weeks before the planned assault date (de Roebeck, BNA, ADM 137/400). As icing on the cake, during the assault, the Administrative Staff including the DMS would be on one ship (and this not even at Gallipoli but at Mudros on the day of the assault), the General Staff on another ship, and the naval medical staff on yet a third ship with limited communication between them (Butler 1938, 125; Tyquin, 1993, 20-21).

As if the obstacles in the way of proper medical planning were not already bad enough, there seemed to be an attitude among the officers of the General Staff that the medical staff was either superfluous or irrelevant. T. H. E. Travers opined that the short shrift given medical planning was typical of Victorian/Edwardian British army thinking that saw casualties fatalistically and was ambivalent about the importance of medical matters (Travers 1994, 412-13). General Hamilton had been the Chief of Staff for Lord Kitchener during the Boer War, and it is entirely possible he retained the disdain for medical arrangements that had been a hallmark of that campaign, where Kitchener had over-ruled many of the requests of the medical staff (Harrison 2010, 171). In any case, until Surgeon-General Birrell arrived at Mudros about a week before the planned assault, the only medical officer on the scene interacting with the General Staff was Surgeon Lieutenant-Colonel A.E.C. Keble (RAMC), a relatively small (although prescient as we shall see) fish among the whales of the staff.

The initial estimate, by the General Staff, for casualties for the Gallipoli assault was only 3,000. The RAMC training manual (1911) suggested that for a force of the proposed size casualties would be 9,000

(Butler 1938, 137). Lieutenant-Colonel Keble, prior to the arrival of Surgeon-General Birrell at Mudros, had proposed an estimate of at least 10,000 and from Alexandria Surgeon-General Birrell had requested increases in both hospital ships and facilities to be established on Mudros with those requests being reduced by the War Office (Tyquin 2003, 137; Harrison 2010, 174-75). Given that the medical staff was only becoming involved with planning for the assault three to four weeks before the projected landing, even had the General Staff and the War Office agreed with Birrell and Keble, it would have been impossible to have more medical units or hospital ships available in the region in time for the assault. In the case of hospital ships this would have taken six to eight weeks for a ship to be fitted out/converted, and then additional time to sail to the Eastern Mediterranean.

The medical support for the British and Imperial units consisted of the organic medical staff for the units, as well as some attached casualty clearing stations, but the more robust support was primarily from the AIF in the form of stationary hospitals, the first of which arrived on Lemnos transferred from Egypt on March 15 (Tyquin 2003, 132).It needs to be noted that preliminary surveys of the proposed staging facility on Lemnos highlighted the inadequacies of the harbor facilities at Mudros, the very poor road system on the island, and the verylimited supply of fresh water on Lemnos. While Lemons' location was excellent, these factors called in to doubt its ability to serve as a support base and to support larger medical units caring for wounded. The situation on Lemnos would never be remedied, and as late as August of 1915 the 52nd (Lowland) Casualty Clearing Station, assigned Lemnos for convalescent care, would have extreme difficulties obtaining an adequate water supply (War Diary 52nd CCS, BNA WO95/4356).

Unfortunately because of the expectations of the Australians that the AIF was headed for service in France, and not a more independent role, as well as the expectation that British medical services would be providing the line of communication (LOC) level care meant that the medical staffing of the AIF was well under what was required (Butler 1938, 88).Similarly the equipment and stores, both medical and Red Cross/comfort that the AIF possessed were less than would be required in its new role. The Australian Army Medical Corps (AAMC) was advised in September, 1914 to create one Casualty Clearing Station (CCS), two Stationary Hospitals (200 beds), and two base hospitals (520 beds). The AAMC contingent began arriving in Egypt in January, 1915 at which point they were off loaded and diverted from their planned destination on the Western Front. The CCS subsequently went to the Dardanelles and the

two stationary hospitals to Mudros, leaving the two base hospitals as the major medical units supporting the assault in Egypt (Barrett, 1918, 8, 19-21). From this small start, the AAMC had, by June, 1915, expanded in to responsibility for 10,600 hospital beds and numerous separate locations including a separate unit for venereal disease cases (Barrett, 1918, 41).

The Royal Navy managed medical support for the Royal Naval Division, the Royal Marines, and for naval personnel in general. This included separate hospital ships belonging to the Royal Navy. Medical care for the French units was also separately managed, with their own senior medical staff for planning and their own evacuation chain. While it is probable that there was some ad hoc mutual support during the campaign, there were no formal plans for such support.

Surgeon-General Birrell's order for arrangements of medical care was promulgated April 24, 1915. It can be seen that the number of hospital ship beds were grossly inadequate, even for the expected number of casualties, and the shore to ship medical evacuation is really not defined properly. Most importantly there is no mechanism for control of the flow of wounded. The overall plan for the evacuation flow from ANZAC is shown in figure (1). This is adapted from the scheme the BEF used in Western Europe, however the key differences are the distances involved and the necessity for seaborne transport for much of the evacuation. Figure (3) illustrates the "local" distances from the beach areas to the island bases supporting the assault.

It appears that the medical units detailed to support the assault, both the various medical ships (hospital ships and transports), and the land based units, were never filled in on the overall medical plan, to the extent that such a plan existed. Personal accounts and war diaries indicate that units were given perhaps seven to ten days notice, and only the most sketchy details of any "system". To add to the difficulties, there were deficiencies in equipment and personnel for many of the units, which was compounded by a good deal of shuffling of personnel to try and plug gaps and equipment getting lost or misplaced in a ship different than that which transported the medical personnel.

The assault was delayed for 24-48 hours due to bad weather, but on April 25, the initial landings took place on several beaches on the peninsula, separated by rugged terrain, as well as a diversionary French landing on the Anatolian mainland. The landing sites are seen in figure (3), however this map does not show how rugged the terrain was both in the immediate areas of the landings, and in the intervening terrain. Because of the previous attempts to force the straits, and the geography of the peninsula, neither the landings nor their location was a surprise to the

Ottomans and their German advisors who had had about six weeks for final preparations, having been alerted by previous naval assaults and a brief landing. The results of the assault are well documented, casualties were heavy and the advances limited. In fact, for some of the landing areas the beaches would never be free from artillery fire for the entire campaign. Because the beaches were constantly under artillery fire, it was not possible to provide the planned level of care on the beaches, putting additional strain on the medical evacuation plan.

A.G. Butler's *Official History of the Australian Army Medical Services 1914-18* and Michael Tyquin's *Gallipoli: The Medical War-The Australian Army Medical Services in the Dardanelles Campaign of 1915*, as well as the war diaries of various casualty clearing stations, among many others sources, paint a vivid picture of the chaos that was the medical support during the initial landings. Medical staff, themselves under fire, were overwhelmed with numbers of wounded well beyond what they could handle even under ideal conditions. The medical posts at ANZAC immediately following the landings are shown in figure (4) – it is clear no medical station was in a safe area. Clearing the wounded off the beaches was a significant problem. Even before one allowed for difficulties due to the fact that the landing areas were swept by rifle, machine gun, and artillery fire, launches and tows for evacuating the wounded were not scheduled to be detailed until later in the afternoon, or when their initial duties of landing troops had been accomplished – no boats were detailed for medical evacuation from the initial stage of the landing. During the initial landings there were no organized Royal Navy shore parties, and Vice Admiral de Roebeck in his 1 July, 1915 report summarized this problem thusly:

> The difficulties of disembarkation were accentuated by the necessity of evacuating the wounded, who were very numerous; both operations proceeded simultaneously (deRoebeck, ADM 137/40).

Absent proper medical regulating, wounded were evacuated haphazardly and the hospital ships (one for each major assault area) were soon filled to capacity, and mostly with wounded who should have been triaged to a less capable ship. Wounded on boats or on barges were brought from ship to ship trying to find succor. Lt-Col V. E. Hugo, senior medical officer on the HMHS Gascon noted in his diary that his ship had to turn away one lighter load and five boat loads of wounded because there was no room to take them on board (Hugo, RCS MSO 057/1). Reports of wounded brought aboard ships previously used for animal transport and not cleaned, equipped, or staffed to handle serious cases, while denied by Surgeon-

General Birrel and others later on, are well documented. This included wounded brought aboard ships that had been used as animal transports, with sanitary conditions that could only have been described as totally unsatisfactory, and in some instances with no medical officer aboard.

There was no relief in the days following the landings. The Commanding Officer of the 11th Casualty Clearing Station noted on May 6, 1915, that there had been a breakdown of evacuation arrangements and that the boats and barges detailed for this purpose had been taken for other uses. He communicated with "Naval seniors" but was told that there would be no improvement in the situation for at least 48 hours. On May 9 he was told to hold all wounded as the ships were full, and through the end of the month there were several instances of either no hospital ship (for serious cases) being available, no sweeper available for the lighter cases, or in fact no ship available at all. Throughout the latter part of May transfers of 100-300 wounded per day are considered routine (War Diary 11th Casualty Clearing Station, BNA WO95/4356). The complaints and difficulties of the 11th CCS were typical of all units involved in the evacuation chain.

In the first 10 days after the landing approximately 16,000 casualties were brought to Egypt alone (Harrison 2010, 182). Writing home in May 1915, a member of the staff of the Second Australian Stationary Hospital on Lemnos expressed the anger and frustration felt by the medical personnel taking care of this flood of sick and wounded:

> All of this was somebody's fault, but God knows it was not ours, who already had a superhuman task before us. Someday, perhaps, it may be fixed to somebody holding a much higher position than any of ours. Surely a want of preparation and foresight on somebody's part (Tyquin 1993, 19)?

Recalling that the number of expected wounded for the entire campaign was 9,000-10,000, 16,000 wounded arriving in Egypt in 10 days clearly represented an influx that could only be dealt with by superhuman efforts on the part of the medical personnel.

Frustration with lack of adequate planning was not limited to medical officers. Nursing sisters had to deal with the consequences of inadequate planning with resultant lack of supplies, as this vignette from an Australian nurse aboard a hospital ship illustrates:

> On the return journey to Gaba Tepe, we work hard getting our wards ready, can't get clean pyjama suits; pick out the cleanest, & about 40 pairs of blood stained ones, with the orderlies assistance, we do our best to wash in salt water, & then dry on the deck. Every spare minute is spent in

> making up dressings, & padding splints which the ship's carpenter is making for us (Harris 2008, 29).

This lack of adequate hospital clothing for the wounded, and the necessity for the ships' carpenter to fabricate splints for fractures clearing indicate a lack of planning, specifically for the logistic portion of medical support. It cannot be stressed too strongly that the presence of adequate numbers of trained medical personnel is not enough by itself to provide medical care. Medical personnel must have adequate equipment and consumable supplies, and adequate resupply of expended consumables, in order to carry out their tasks.

Through the latter part of May and then June and July a stalemate was reached, with the action on the peninsula resembling the static warfare of the Western Front. While medical services improved, the lack of proper sanitary preparations, with no sanitary officer having been appointed to the staff at the beginning of the campaign, became a major problem (James 1962, 222;Tyquin 2003, 134). Disease rates were very high, with various intestinal diseases becoming rampant as the weather became warmer during the late spring and summer. Due to the lack of a sanitary officer on the initial planning staff, and for some time after the initial landings, the medical department had to continually attempt to catch up with disease rates that were very high –with up to 20% of the Australian force (for example) presenting to sick call on a daily basis (ButleR 1938, 228-253). This high level of disease placed a continuing strain on the medical evacuation system and hospitals along the LOC.

As a measure to improve medical services the RAMC had appointed Surgeon-General Babtie as "Principal Director of Medical Services" in June to coordinate medical care, and the Royal Navy had appointed Surgeon Vice-Admiral Sir James Porter as "Principal Hospital Transport Officer" shortly thereafter (Tyquin 1993, 34). In fact, this did not improve anything but rather created even more confusion in the chain of command and more opportunities for inter-personal and inter-service squabbling. Medical units on the Gallipoli Peninsula continued to complain about inadequate transport to clear wounded off the beaches and out of field medical units. Bed capacity on Lemnos was expanded, however the infrastrucure to support these units was simply not there – port capacity, roads, and water supply were stretched thinner and thinner. Although bed capacity in Egypt had been significantly expanded by June, clearing of convalescents to the UK or Australia/New Zealand as appropriate, continued to be a bottleneck.

In an attempt to break the stalemate a second landing was made at Suvla Bay in early August. While there were improvements in the

planning for the August landings at Suvla Bay, the number of hospital ships and medical transports having been increased, most of the issues that had plagued the initial landings went unresolved. While the decision to make the Suvla landings was made on July 13, the British and Australian medical staffs were not informed about the details until the day before the landings, effectively cutting them out of the planning process (Tyquin 1993, 37; Tyquin 2003, 150). No effective system of medical regulating was established. Predictably, medical care during the assault and thereafter was less than could have been expected. The scene at Suvla Bay on August 10, a few days after the landing, was described thusly by a British staff officer:

> Meanwhile the condition of the wounded is indescribable. They lie in the sand in rows upon rows, their faces caked with sand and blood; one murmur for water; no shelter from the sun; many of them in saps, with men passing all the time scattering more dust on them. There is hardly any possibility of transporting them (an MP 1919, 159).

Almost all of the medical planning mistakes of the initial landing were repeated during the Suvla Bay landings. There was no system of medical regulation, no clear unity of command between the army and navy with appropriate clear division of responsibility and authority, the medical staffs were out of the planning loop until the last moment, and the difficulties with proper marrying of units with their medical stores during and immediately following the landing continued.

The frustrations of the medical personnel with the continuing unresolved issues were apparent. The experiences of the 14th Casualty Clearing Station at Suvla Bay are typical, and cover the whole range of continuing errors. Upon landing they find that some of their equipment is missing, they have to scrounge tents for themselves, and share out medical equipment and stores with field ambulances and dressing stations closer to the front who are also short of necessary equipment and stores. Two weeks after the landing there are significant difficulties in getting wounded evacuated appropriately. The end of month summary for August notes that the unit in three weeks has cleared approximately 3,000 casualties and that a CCS staffed for 200 patients has been grossly overworked, and has had to perform surgeries well above what was planned (these units were supposed to do little if any surgery, only the most urgent cases). Medical supply remained an issue, with stretchers, blankets, hospital clothing and so forth going with patients to ships, but no returns or resupply forthcoming in a timely manner (War Diary 14th Casualty Clearing Station, BNA WO95/4356).

In the last stages of the campaign, the later fall and early winter of 1915, the basic issues had still not been solved. For example blankets were a shortage item, and were critical as the weather on the peninsula became colder. The Commanding Officer of the 16th Casualty Clearing Station complained to higher authorities that his unit was handling double the number of patients that they were staffed to deal with. From August through November of 1915 this CCS admitted 15,794 patients (War Diary 16th Casualty Clearing Station, BNA WO95/4356). This complaint was typical for all units at Gallipoli, and for units in supporting locations such as Lemnos and Egypt, and while the overloading of medical units had tended to improve during the campaign it was never truly adequately addressed.

When the withdrawal from Gallipoli occurred in December 1915 and January 1916 there were no medical difficulties, in large measure because the evacuations were carried out without any significant Ottoman opposition. The entire campaign had cost approximately 250,000 casualties on land, about 25 times the original staff estimates. The only saving grace was that both sides made a sincere effort to respect the Geneva rules. While medical units on the beaches were frequently exposed to enemy fire, and were often in close proximity to legitimate military targets, multiple diaries and records indicate that medical units never felt they were specific targets, and truces to clear dead and wounded were not unusual. Similarly hospital ships (those marked per the Geneva rules) never felt they were targeted, although the crowded conditions of the anchorages off the Dardanelles meant that stray shells might come close.

As noted earlier, the lesson learned from Gallipoli by the British and the U.S. Army was, in short, do not do amphibious assaults. Analyses made during the war and immediately afterwards, as well as the final report of the Dardanelles Commission, were in my view and the view of others, a whitewash of the situation (*Final Report of the Dardanelles Commission* 1919). In those inquiries, as well as in works published by participants after the war, facts were either distorted or omitted and diaries at least partly rewritten. Not surprisingly, senior officers were anxious to avoid taking blame for the disaster, and the general trend was to blame most of the problems on the inevitable unknowns and bad outcomes that would accompany even the best plans in war. Although generally seen as somewhat biased as well, it was not until A.G. Butler published the *Official History of the Australian Army Medical Services 1914-18* in the 1930s that there was a more open disclosure of many of the medical failings of the Gallipoli campaign.

A brief mention should be made of the German use of "lessons learned" from Gallipoli. Prior to "Operation Albion", the assault on three Baltic islands in 1918, the German staff had looked at Gallipoli and attempted to avoid some of the errors they could see from their observations of the assault. Michael Barrett's *Operation Albion* relates the German preparations in detail, and compared with the British/Imperial planning those preparations were meticulous indeed. Having said that, the landing of adequate medical forces and equipment was later in the schedule (about 48 hours) than it should have been (Green 1936, 429). However, as the assault was not expected or properly resisted, and the defenders collapsed rapidly, the delay in landing medical forces did not result in any significant problems. Following World War I amphibious warfare was not a subject studied in any depth by the German military, and such planning or analysis of amphibious assaults tended to be on the lines of "it's just a big river crossing."

Since War Plan Orange and the prescient analysis by "Pete" Ellis in 1921 made it clear that the Marine Corps would have to assault Japanese held islands in the Pacific, another answer rather than "it can't be done" needed to be found by the Marine Corps ("Advanced Base Operations in Micronesia", 1921). Analysis of Gallipoli by the U.S. Navy and Marine Corps began almost immediately after the war. In 1921 an article in the *Marine Corps Gazette* by Brigadier General Robert H. Dunlap urged the study of British failures at Gallipoli, and one of five prominent areas of failure he noted was "evacuation of the wounded, requiring close cooperation between the Army and Navy" (Daugherty 2009, 204, 206). Captain W.S. Pye, USN, summarized the harsh, although not inaccurate, conclusions about the Gallipoli Campaign from the viewpoint of the American sea services in his two-part article in *Naval Institute Proceedings* in 1924 where he said:

> The British Army and Navy have been conducting joint operations for centuries yet the history of the Dardanelles Campaign, their latest large joint operation, indicates that almost every known error was committed at some time during the campaign (Pye, 1924, 1964).

Although the 1920s were a period of retrenchment for the American military, consideration of future needs and doctrine was not totally ignored. In conjunction with War Plan Orange navy medical personnel had begun to analyze projected needs in support of this plan, estimating hospital beds required and recognizing that hospitalization of forward units would be on hospital ships (Carpenter, 1924). In 1927 Commander W.L. Mann, MC, USN, published his monograph *Medical Tactics in*

Naval Warfare, compiling and expanding on his articles the previous year in the *United States Naval Medical Bulletin*. Errors in British medical planning at Gallipoli were specifically noted as mistakes to avoid. The need for proper medical regulating, close involvement of the medical staff with line staff planners, and proper combat loading (putting medical supplies on the same ship that carries the medical unit they are for) were all stressed as both important and as areas where the Gallipoli landings and campaign had failed (Mann 1927, III(a) 102, III(b) 2, 14).

Beginning in the early 1930s the Marine Corps began detailed development of doctrine for amphibious warfare, with the creation of the Fleet Marine Force 1933 and the development of the *Tentative Manual for Landing Operations*, distributed in 1935. This tentative manual was later adopted in the late 1930s as FTP-167 and further adopted by the army with some modifications as its basic doctrinal publication for amphibious landings. In order to test and refine doctrine and equipment a series of Fleet Exercises (FLEX) were carried out in the 1930s, which from early on involved medical exercises and planning.

As with Commander Mann in the 1920s, the "bad example" of Gallipoli was closely studied as a road map of errors to avoid. The medical section of the 1935 edition of the *Tentative Manual for Landing Operations* specifically addressed issues of medical command structure, medical planning (including medical requirements to the rear of the assault area), triage, medical regulation, and casualty estimates for amphibious assault (*Tentative Manual for Landing Operations*, 295-299).[2] Commander (later Vice-Admiral) Joel Boone, MC, USN recommended A.G. Butler's *Official History of the Australian Army Medical Services 1914-18* for close scrutiny, and offered to loan his copy to other interested physicians for study (Boone n.d.). Medical aspects of the various FLEXs were analyzed in after action reports, and recommendations for improvements forwarded, and particular attention was paid to the areas where there had been conspicuous failures at Gallipoli. Naval medical officers attached to the Marine Corps formed a close-knit circle of physicians working to develop doctrine and procedures to support amphibious assault.

I do not intend to imply that this process of learning from the bad example of medical planning at Gallipoli was by any means smooth. There are numerous examples in the correspondence and papers of medical officers working on this issue of their concerns being ignored or

[2] Preliminary casualty estimates were based on Gallipoli, and the starting point for estimation was 15% of the assault force on day one, and a further 10% over the first three days. Of every five casualties there was one KIA and four WIA, with 30% of the WIA considered permanent losses.